**STUDIES IN ANCIENT ART AND CIVILIZATION**

**19**

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*Jarosław Bodzek*

Krakow 2015

ON THE COVER
*Acorn-shaped counterweight from the agora in Paphos, Cyprus.*
*Photo by Robert Słaboński*



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# Contents

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Krakow

# BEER JARS FROM TELL EL-MURRA GRAVES. SEASONS 2011–2015

**Abstract:** *Over the five excavation seasons conducted between 2011 and 2015 at the Early Dynastic Tell el-Murra cemetery, 17 graves were discovered along with their pottery assemblages. Nine of them contained vessels which are generally considered to be beer jars. Amongst the 18 examples of this kind of jar, a few types can be distinguished that show an affinity to similar vessels from the other Early Dynastic sites of Tell el-Farkha, Minshat Abu Omar, Buto, Helwan, Abydos, and Kafr Hassan Dawood. These analogies indicate that the Tell el-Murra graves should be dated to the Naqada IIIC2/D period and in some cases an even more precise date can be obtained. In addition, the presence of beer jars within the pottery assemblages of the graves also provides us with information concerning the funerary customs of the inhabitants of the Tell el-Murra site.*

**Keywords:** *Beer jars; graves; cemetery; Tell el-Murra; Early Dynastic*

Old Kingdom tombs are replete with scenes depicting the brewing of beer using slender vessels (Faltings 1991, 104). Due to their frequent appearance in this kind of depiction, as well as the accompanying inscriptions, archaeologists have named them ‘beer jars’. At the beginning of the 20th century, researchers tried to match the ‘beer jars’ from the depictions with real pottery vessels discovered at Old Kingdom sites (Reisner 1931, 212; Balcz 1934, 4). According to D. Faltings (1998, 209), classical beer jars from this period have a rounded base and a short, vaguely distinct neck. Their surface is rough and irregular, they possess horizontal lines on their rim and they are made of clay with a large amount of temper. Although

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the origin of the term 'beer jar' was initially linked to Old Kingdom imagery and vessels, scholars later began to use the term with regards to Early Dynastic (1st and 2nd Dynasties) vessels with similar features in terms of morphology, manufacture, shape and surface finish (e.g. Raue 1999; Kroeper and Wildung 2000; Köhler and Smythe 2004). Old Kingdom beer jars evolved from Early Dynastic vessels, which had broad shoulders, a short but distinct neck, a simple or thickened rim and an oval or conical shape. They also usually had scratch marks on the lower part of the body and sometimes possessed an uneven surface, especially on their shoulders. In German, a beer jar is known as a *Biertopf*, *Bierflasche* or *Biergefäß* (Kroeper and Wildung 2000, 19–21, 51–52; Hartmann 2007, 82–97) but in English (especially in older publications) it is termed an 'offerings jar' (Petrie 1903, 39; Reisner 1931, 212; Reisner 1932; Reisner 1955; Simpson 1961; Eggebrecht 1974). Indeed, Old Kingdom scenes do seem to suggest that these vessels were not solely beer containers (el-Senussi 2013), but multifunctional (Bourriau 1981, 17; Arnold 1993, 16; Wodzińska 2007, 297; Hawass and el-Senussi 2008, 196).

At Tell el-Murra (Jucha 2009a; Jucha 2010), Early Dynastic beer jars have only thus far been found in a cemetery, located in the southeastern part of the tell (trench S3), which has been explored since 2010.[1] In another area (trench T5), situated in the northeastern part of the tell, settlement remains have been discovered. The pottery material collected so far from these structures includes Old Kingdom vessels (Kazimierczak 2015). During the past five excavation seasons at the Tell el-Murra cemetery (2011–2015), 30 graves have been examined, 17 of which contained pottery vessels (Kazimierczak 2014; Kazimierczak forthcoming). Amongst these, eight contained beer jars. These were graves 2, 7, 12, 18, 19, 23, 27, and 31.

The Early Dynastic beer jars from the Tell el-Murra graves are made of medium quality Nile clay fabric tempered with fine to medium large straw particles and fine to medium quantity sand, as well as rounded quartz. The surfaces are usually red, brown or reddish-brown, but their colour is never homogenous. Most of the beer jars, especially on their outer surface, have yellowy-greyish-black stains and discolorations, which is probably the result of a postdeposition and/or a burning/firing process. In some cases, the remains of a yellowish-white covering are visible on the outer surface. It could perhaps be a kind of self-slip/wash, but mineralogical analysis must

[1] The project was financed by funds from the National Science Centre allocated on the basis of decision number DEC-2013/09/B/HS3/03588.

be conducted in order to confirm this.[2] All of the beer jars from the Tell el-Murra cemetery were mostly hand-made (especially their base and lower parts) and their upper sections (rims, necks) were probably finished on a slowly turning device.

When considering the beer jars discovered so far at the Tell el-Murra cemetery as a whole, a few groups and types can be distinguished.

Group 1

This first group includes broad-shouldered, conical jars of various height with an angular transition between the neck and shoulder and a flat base. The rims, necks and sometimes the shoulders of these jars are only roughly smoothed. Turning marks are also visible, whilst the surface below the maximum diameter of the vessels has been roughly scraped with vertical or diagonal strokes.

Amongst the beer jars of this group, two types can be distinguished:

Type 1: slender forms with a narrow lower part of the body (grave nos. 2, 12, 18),

Type 2: less slender forms with wide shoulders (grave nos. 7, 18, 19, 23, 31).

This division was made according to S. Hendrickx's (1994, 40) classification of the measurement of vessels. Beer jars with a d/h index (maximum diameter to height)[3] lower than 60 were considered to be slender.

The first type contains forms with a simple (direct) or slightly thickened lip-rim, a slightly concave neck and an angular transition between the neck and shoulder. The lower section of the body also narrows towards the flat base and they are slender, with a d/h index lower than 60 (Fig. 1). One small beer jar with the features described above and a simple rim was found in grave no. 2, which was explored in 2011 (Pls. 1: 1, 4: 1). Four other examples of this type, but with a slightly thickened lip-rim, were discovered in grave no. 12 (Pls. 1: 2–5, 4: 2) and two more in grave no. 18 (Pl. 1: 7, 8). These graves were examined in 2013 and 2015 respectively.

The second type is that of a broad-shouldered jar with a slightly thickened lip-rim, a short, slightly concave neck, an angular transition between the neck and shoulder and a flattened base. Beer jars belonging to this type are much wider than the jars mentioned above, with a d/h index higher than 60 (Fig. 1). They also usually have a slightly wider lower section of the body above the base. Two beer jars of this type were found in grave no. 7

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[2] A few beer jar samples have been sent for analysis to IFAO this year.

[3] Vessel index d/h=Md: Hx100 (Hendrickx 1994, 40).

| Vessel | Measurements (cm) | | | | | |
|---|---|---|---|---|---|---|
| | Maximum diameter | Height | Vessel index d/h | Rim diameter | Base diameter | Height of maximum diameter |
| G2-VC-10 | 14 | 24 | 58.3 | 8.5 | 4 | 18 |
| G7-VC-1 | 22 | 34 | 64.7 | 9.5 | 5 | 23.5 |
| G7-VC-4 | 23 | - | - | 10 | - | - |
| G12-VC-1 | 21 | 40 | 52.5 | 10.2 | 6.5 | 30 |
| G12-VC-2 | 22 | 40 | 55 | 9.7 | 6.5 | 30 |
| G12-VC-3 | 22 | 38 | 57.9 | 9.5 | 6.5 | 28.5 |
| G12-VC-4 | 22 | 38 | 57.9 | 10.5 | 6.5 | 30 |
| G18-VC-1 | 23 | 35 | 65.7 | 11 | 6 | 25.5 |
| G18-VC-2 | 21 | 35.5 | 59.1 | 10 | 6 | 26 |
| G18-VC-3 | 21 | 35.5 | 59.1 | 10.5 | 5 | 26 |
| G19-VC-2 | 25 | 36.5 | 68.5 | 9.9 | 5.3 | 24.4 |
| G23-VC-3 | 22 | 32.5 | 67.7 | 8.9-10.1 | 5 | 22 |
| G23-VC-4 | 22.5 | 32.5 | 69.2 | 9.5 | 6.5 | 24 |
| G27-VC-2 | 21.5 | 37 | 58.1 | 10 | rounded | 26 |
| G27-VC-3 | 21.5 | 36.5 | 58.9 | 9 | rounded | 26 |
| G27-VC-4 | - | - | - | - | rounded | - |
| G31-VC-1 | 23 | - | - | - | - | - |
| G31-VC-2 | 22 | 33.5 | 65.7 | 9-12 | 6 | 22.5 |

Fig. 1. Tables with measurements of the beer jars

(Pl. 2: 1), explored in the 2012 season, one in grave no. 19 (Pls. 2: 2, 4: 3), examined in 2014, and one more in grave 18 (Pls. 1: 6, 4: 4). In addition, two pottery vessels found in grave no. 23 (Pl. 2: 3, 4) during the 2015 season can also be termed beer jars and are probably of the type described above with the lip-rim. Both of these jars' preservation was 'complete', but they were crushed, meaning that their measurements had changed. One of the beer jars from grave no. 23 had a hole in its flat bottom. Other probable examples of the same type were discovered in grave no. 31 (Pls. 2: 5, 4: 5), but they had also been crushed, meaning that their original shape and measurements could not be precisely measured.

Beer jars from Tell el-Murra graves 2, 7, 12, 18, 19, 23, and 31 seem to represent earlier types of this kind of vessel, which were typical of the 1st Dynasty (type 59h, Petrie 1953, pl. XIII). They may be compared to pottery from the group of graves in Tell el-Farkha dated to Naqada IIIC2/IIID (Jucha 2012, 84), according to Hendrickx chronology (1996, 62, tab. 7). They show a particular affinity to the group of beer jars with a scraped surface dating to Naqada IIIB–C2/D (Jucha 2008, 134; Jucha 2009b, 52–54). Similarities can also be seen in the beer jars found in group IV of Minshat Abu Omar graves (Kroeper 1986/1987, 77, 91, fig. 77; Kroeper 1988, figs. 161–164; Kroeper and Wildung 2000, 111–113, cat. nos. 404/11–15). Beer jars with short but distinct necks, slightly thickened lip-rims, flat bases and scratch marks visible on the surface have also been recorded at the cemetery of Kafr Hassan Dawood (Hassan *et al*. 2008, 47, fig. 4b) and the cemetery from Abydos contains similar objects. Furthermore, at the Umm el-Qaab necropolis, jars with the aforementioned features have been found in the tombs of Den (Petrie 1902, pl. VII/23; Petrie 1953, pl. XIII/59H2), Qa'a (Engel 1993, 25; Engel 1996, 67, Abb. A–C) and probably in the tomb of Semerkhet (Petrie 1900, pl. XLI/20; Petrie 1953, pl. XVI/66M, T).

In Area B at Tell Ibrahim Awad, graves dating to the 1st Dynasty have been discovered. Among the assemblages were 32 beer jars, some of them of the type with broad shoulders, a lip-rim, a narrower lower section near a flat base and scraped surfaces (van Haarlem 1993, pls. 3, 4a, 8a–11; van den Brink 1988, 78–79, 94, fig. 16). The beer jar forms occurring in Tell el-Murra grave nos. 2, 7, 12, 18, 19, 23, 31 may also be compared to the first recorded specimens in the typological sequence of beer jars presented by Ch. Köhler and Jane C. Smythe (2004, 133–134, fig. 2: 1), which date from Naqada IIIA/B. However, this form continued to be produced over a longer period and may have been made at the same time as other types of beer jars (Jucha 2009b, 50–54). In addition, similar jars have also been found in settlement contexts dating to Naqada IIIC and IIID in places such as Buto, where jars with a scraped surface were attested in Layers IV to VIa. Forms with flat bases appear from the end of Layer III (the end of the Protodynastic period to the beginning of the 1st Dynasty) and become more common in Layer IV (the early 1st Dynasty) (Köhler 1998, 16–17, 52–58, Taf. 5: 1, 7: 4, 7: 7–9). At the Tell el-Farkha settlement, the first examples of this kind of jar were found in the upper strata of Phase 5, but they occurred mostly in Phases 6 and 7, dating to the Early Dynastic and Old Kingdom periods (Jucha 2005, 42–43, pl. 26, fig. 14).

All of these analogies allow us to date the graves from Tell el-Murra containing the types of beer jar presented above. The beer jars and plates from the assemblages of grave nos. 2 and 19 show an affinity to pottery from graves at Tell el-Farkha dating to Naqada IIIC2/IIID (Jucha 2012, 84–86), but the occurrence of other pottery vessels, including wine jars with a rope band and small jars with broad shoulders, could imply that their chronology should be connected with the 1st Dynasty. This permits us to assume that grave nos. 2 and 19 date to slightly earlier than grave nos. 7, 12, 18, 23, 31 in the Naqada IIIC2 period.

The beer jars, red-coated bowls and plates from graves 7, 12, 18, 23, 31 show a particularly close affinity to the assemblages of graves from Tell el-Farkha dating to Naqada IIIC2/IIID, which suggests that these graves should probably be dated to the same period, i.e. Naqada IIIC2/D.

Group 2

The second group of beer jars from Tell el-Murra consists of broad-shouldered jars with a thickened external rim, a slightly concave short neck, a smooth transition from the neck to the shoulder and an almost rounded or slightly flattened base. The outside surface of these jars has been roughly smoothed and scratch marks are visible below the maximum diameter of the vessels. Most of the pottery vessels found in grave no. 27 (Pls. 3: 1, 2, and 4: 6) were beer jars. Amongst them were two complete examples,one of which was of the type described above. The other was only partially preserved from its shoulders to its base without a neck or rim. The d/h index of these jars is lower than 60 (Fig. 1). Similar forms of vessel are also known from Tell el-Farkha's cemetery (Jucha 2009b, 51, 57, fig. 1: 4). They occur in graves alongside other types of beer jars dating to the 1st Dynasty. Analogical material has also been discovered at Buto in the settlement's Layers IV–V (from the middle to the end of the 1st Dynasty) (Köhler 1998, 16–17, 52–58, Taf. 6: 4). This suggests that grave 27, which has a similar assemblage to those of the group of graves from Tell el-Farkha dating to Naqada IIIC2/D, should be dated to the same period in the second part of the 1st Dynasty.

## Summary

All of the beer jars unearthed so far at the Tell el-Murra cemetery do not greatly differ from each other. However, a few types may be distinguished. Their affinity to similar examples from other sites (where they were found with other types of vessels) allows us to date the beer jar graves to the Naqada IIIC2/D period and to position them on the chronological map of the cemetery in relation to other graves.

Beer jars found in the graves at Tell el-Murra are also an indication of the funerary practices that took place and can thus provide some insight into their beliefs in the afterworld. The vessels were usually located in the graves, outside the coffin, behind the feet of the deceased or in an additional chamber located to the south of the main chamber. There were only three cases (grave nos. 2, 19 and one beer jar from grave 27) in which beer jars were discovered in the northern part of the chamber or behind the head or coffin. This positioning suggests that the vessels had a relatively low intrinsic value and that their contents were far more important. According to Egyptian beliefs, it was necessary to provide a dead person with the same goods that he required in daily life in the afterlife. One of these was beer, a staple in ancient Egypt. This is confirmed by offering texts from Old Kingdom tombs and other objects connected with the funerary cult (Leprohon 2001, 570). Beer jars were placed in the graves as a symbol of beer or of other goods, but they probably would not have not contained the liquid. However, it is hard to state this for sure, since the original contents of the vessels have not been preserved. The beer jars discovered in the graves at Tell el-Murra were filled with loose soil and in some cases the vessels, especially in their lower section, contained darker soil resembling mud. This usually covered the inner walls and the inner surfaces near the bases.[4]

[4] Paleobotanical research of the contents of the beer jars is in progress.

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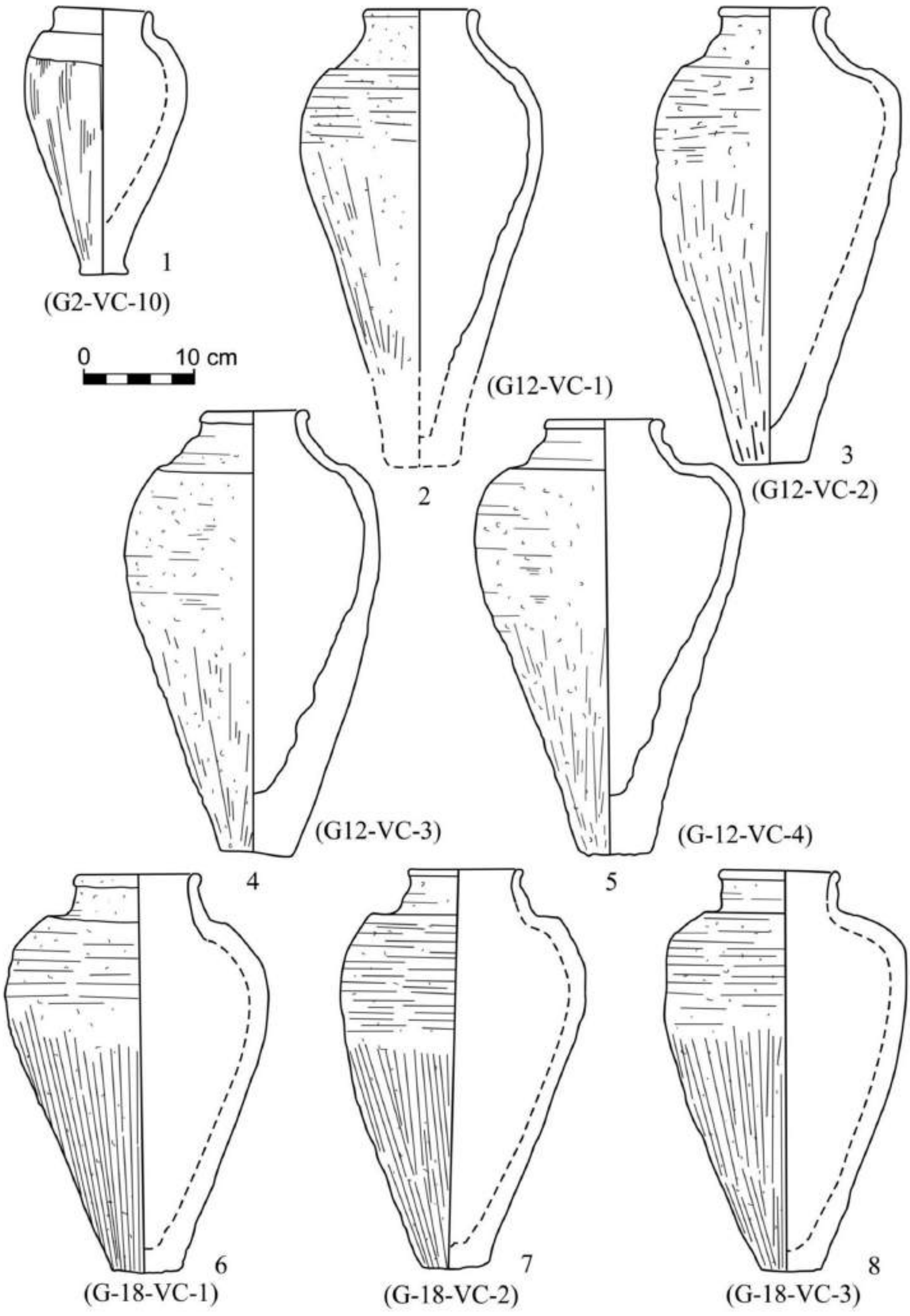
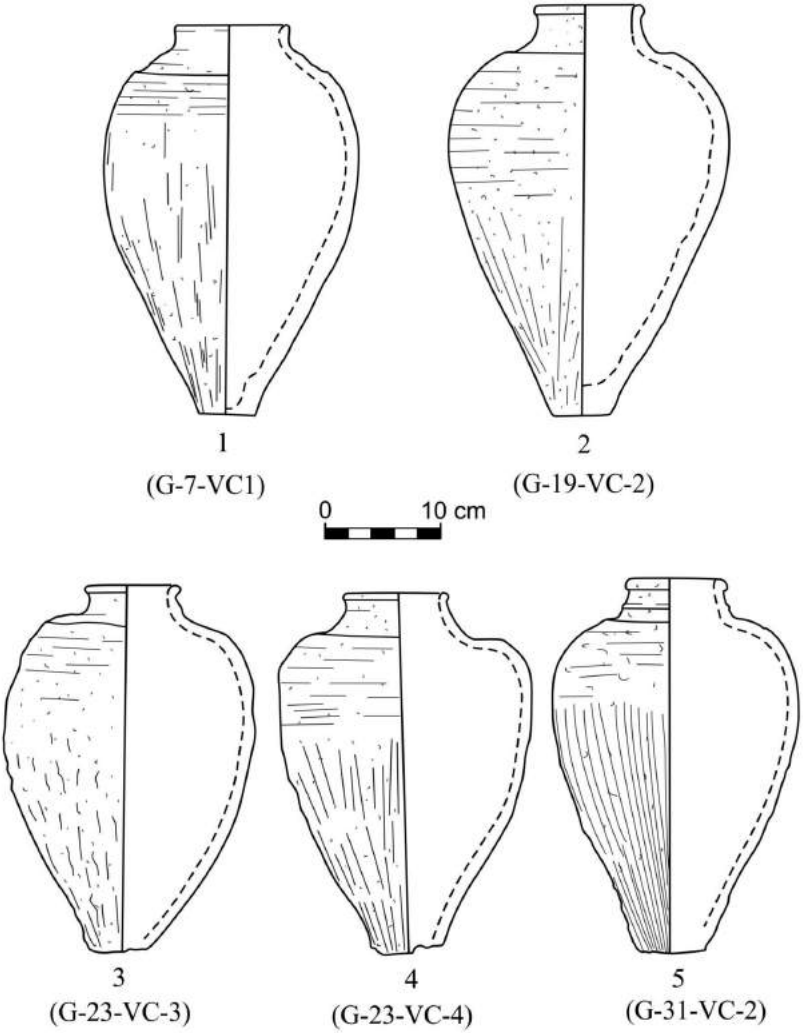
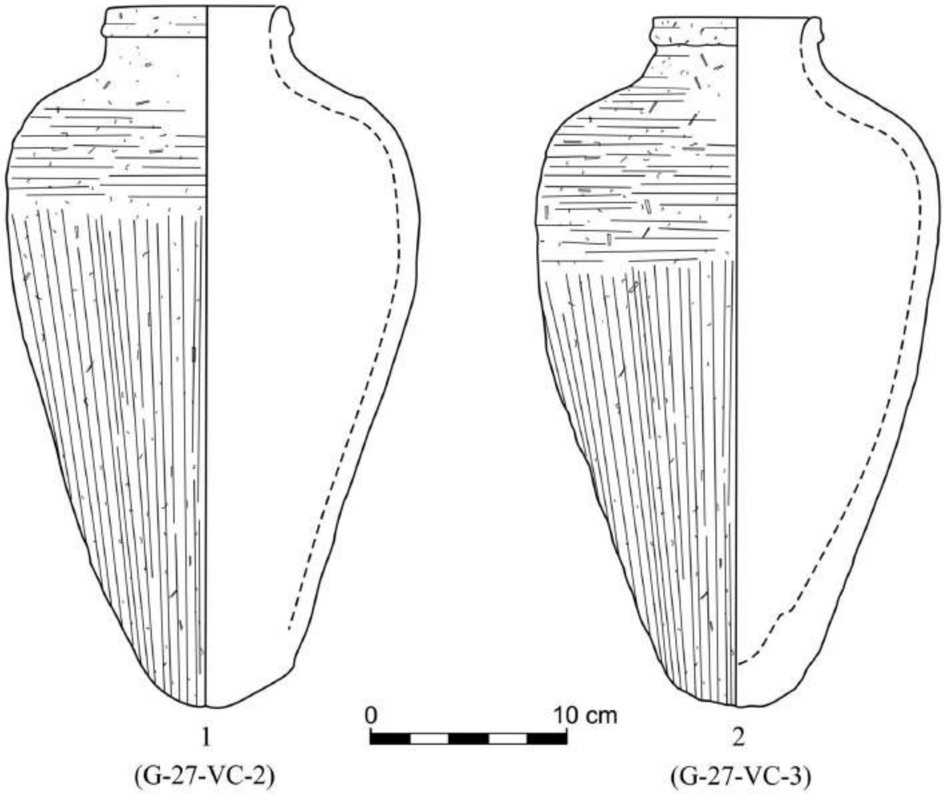



Pl. 1. Beer jars from the Tell el-Murra graves. Archives of the expedition.
Digitising U. Bąk




Pl. 2. Beer jars from the Tell el-Murra graves. Archives of the expedition.
Digitising U. Bąk




Pl. 3. Beer jars from the Tell el-Murra graves. Archives of the expedition.
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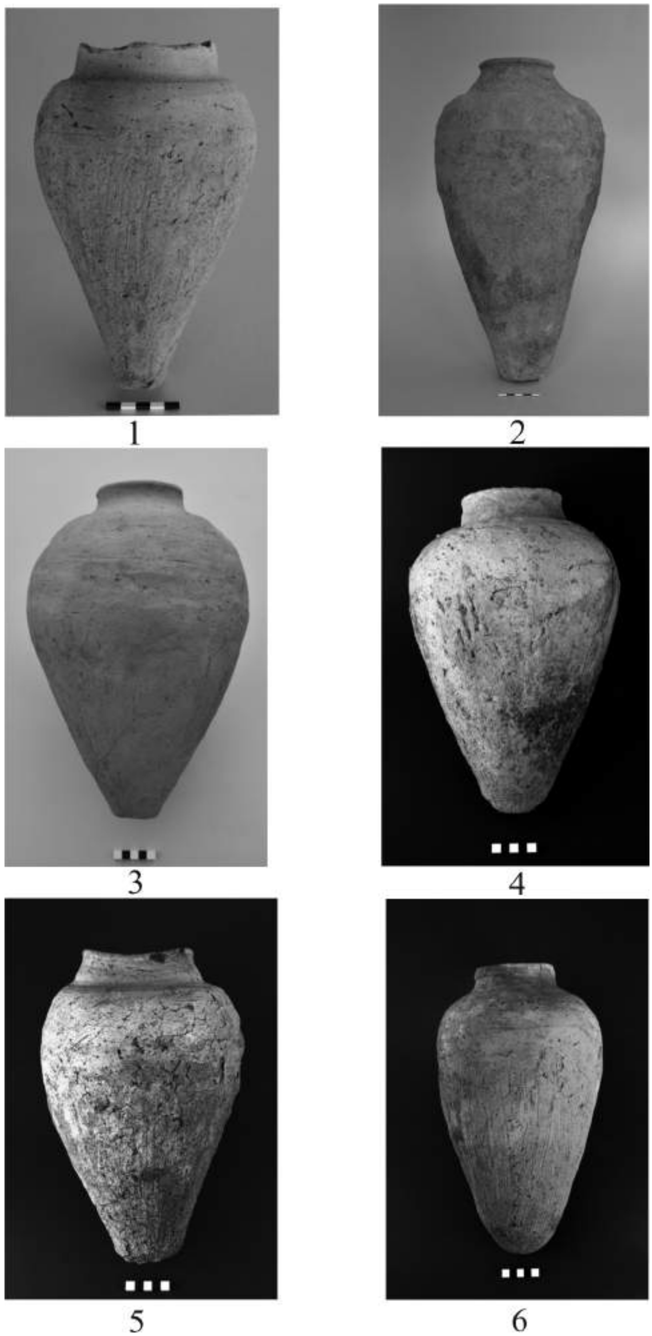


Pl. 4. Beer jars from Tell el-Murra graves. Archives of the expedition. Digitizing U. Bąk
1 – Beer jar from grave no. 2; 2 – Beer jar from grave no. 12; 3 – Beer jar from grave no. 19;
4 – Beer jar from grave no. 18; 5 – Beer jar from grave no. 31; 6 – Beer jar from grave no. 27

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# A CLASSIFICATION SYSTEM FOR POTTERY SHAPE AT PREHISTORIC SITES IN LOWER EGYPT

**Abstract:** *Pottery data from prehistoric sites in Lower Egypt has been reported using different classification systems dependent on the site where it was discovered. This makes comparative analysis of pottery from different locations highly problematic. The significant majority of pottery excavated at these sites is either incomplete or consists of pot sherds that cannot be reconstructed. This paper will consider the problems that exist in publishing data concerning pottery shape and examine the classification systems adopted in earlier reports. Bearing these earlier systems in mind, the report will consider what the most feasible general classification system would be for the recording and classifying of pot sherd shape data from all Lower Egyptian sites, which would also be able to integrate together even with pottery shape data in the earlier reports as accurately as possible. There might be the feasible system or a prototype of it amongst the systems already in use.*

**Keywords:** *Pot sherds; pottery shape; morphological classification system; structure; integrating*

## Introduction

Pottery data from prehistoric sites in Lower Egypt has been reported using different classification systems dependent on the site where it was discovered. This makes comparative analysis of pottery from different locations highly problematic. It is therefore difficult to both clearly distinguish an overall picture of pottery from the sites and to establish their social context.

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This paper will consider the problems that exist in already published pottery shape data and analyse the classification systems that were used in earlier reports. Taking these into account, the report will consider what the most feasible general classification system would be for the recording and classifying of pot sherd shape data from all Lower Egyptian sites, which would also be able to integrate together even with pottery shape data in the earlier reports as accurately as possible.

## Background

The major problems in integrating pottery shape data from prehistoric sites in Lower Egypt may be taken up as follows:

*Differing publication styles in earlier reports*

There are several problems in the earlier published reports to integrate the pottery shape data as accurately as possible:

Classification

Pottery data from prehistoric sites in Lower Egypt has been published using various classification systems developed at each individual site by different researchers. That means that every site has adopted a different manner in which to present pottery data (for example on form, ware and decoration) in their publications.[1] In some cases, multiple classification systems have been adopted to describe pottery data at the same site, because the excavations were undertaken by different excavators (or excavation teams) over the years.[2] As a result, there is no universal classification

[1] Although there are a few exceptions, almost the same classification was used in reports from Maadi and Wadi Digla (Rizkana and Seeher 1987; Rizkana and Seeher 1990).

[2] In the case of ware classification at Sais, pottery ware excavated in Excavation 3 is classified into five groups (Wilson 2007, 97–98) and the percentage of each ware as part of the whole is shown in detail by a table. However, pottery ware excavated in Excavation 8 is classified into a different set of five groups (Wilson *et al*. 2014, 92–96), although the percentage of each ware is still shown by a table. It should be noted that even though Excavation 3 is regarded as 'preparatory work for Excavation 8' (Wilson *et al*. 2014, 2), the team studied and excavated the same prehistoric layers at the same sites in both Excavation 3 and Excavation 8 (Wilson *et al*. 2014, 153). Another example of this can be found at Buto, where Faltings *et al*. (2000, 131–179) published a report based on the excavations she conducted there from 1995 to 1996 following a series of excavations by von der Way. In Falting's report, she explains and describes the pots and pot sherds from layers I and II, but she seldom uses terms from the classification system developed by von der Way (1997); she does not use the terms 'ware 1a' or 'ware 1b' at all, and only once refers to forms G1b

for published reports on prehistoric Lower Egyptian sites. Data on form from pots and pot sherds has not been distinguished between and they have both been published in the same way as other pottery data.

Selected data

Detailed data is only shown in reports for a limited number of selected pots and pot sherds. In general, information on the fabric used, surface treatment and shape can all be considered to be important pottery data that should be included in a report. It is therefore to be expected that this detailed information should be recorded for every single pot and pot sherd that is excavated and published. However, this data is only published for a selection of them. As a result, limited 'general data' on site pottery as a whole or on each classification group is all that is sometimes provided.

Drawings represent the most reliable and clear data concerning shape in a report. If a pot or pot sherd is drawn, relatively detailed data generally seems to accompany it. On the other hand, if drawings do not appear, specific individual data is not normally given. It is most common for only drawings of a limited number of pots to be recorded and published. Only well-conserved pots and pot sherds[3] that are close to their original shape are illustrated, alongside pot sherds that have key diagnostic characteristics in terms of shape or decoration. However, there is no objective standard by which pots and pot sherds are selected to become plate drawings in publications. It may even sometimes be the case that only the ones that best suit a researcher's own classification are chosen. This means that the drawings of some complete pots may even have been omitted.

'General data/information'

As has already been mentioned, detailed individual data on pots is not available in reports. Although 'general data/information' is given on the pottery of a site to present its 'general' characteristics (or that of particular layers), it is unclear whether the unselected pots and pot sherds are properly reflected by the 'general' data provided.

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and O3a. In other reports on pottery from layers I and II at Buto, Faltings (1998a; 1998b) does not make any use of von der Way's classification system. In these pieces, Faltings discusses the pots and pot sherds from Buto layers I and II in terms of their connection with Palestine, but the lack of any reference to Way's system is nevertheless worthy of note.

[3] In this paper, 'selected pots' and 'selected pot sherds' refers to pots and pot sherds of which the drawings and detailed data have been presented in a report.

'General data.' Numbers

When the number of pots belonging to a certain group is stated in a report, the figure should be treated with caution. If a damaged pot sherd is considered to have been preserved in a condition that permits it to enter a classification group, it is classified and counted in the same group as the complete ones.

Obviously, all complete pots are included in the total number of pots belonging to each shape group in the classifications. However, the criteria for judging which damaged sherds should be counted and which ruled out are not explained clearly.

In the Maadi report, the following cautionary lines appear: 'there was no possibility of recording and storing every sherd and flake, so a representative collection had to be chosen. This consisted of complete vessels and of interesting fragments, such as decorated sherds, handles, etc. At the same time, it was not possible to mend and preserve the broken vessels,' 'the collection preserved from the old excavations is a biased sample, as it consists almost solely of complete vessels,' and 'like fig. 5, fig. 6 is also the tabulation of a biased sample, as the sherd material of the excavation is not taken into account. It is therefore no precise statistical record, but is only intended to give a general idea about the quantitative distribution of types' (Rizkana and Seeher 1987, 19, 23, 34 respectively).

'General data.' Shapes

Although damaged pot sherds are classified and their number is included in the count of a certain classification group, their drawings are most often not shown in reports. In addition, the criteria are not clear in terms of which sherds should be included and which ruled out.

As a result, it is sometimes the case that the only way to discover the shape of a damaged but counted pot sherd is to either refer to the general data/information for the shape group into which the pot sherd has been classified or to look at drawings of pots belonging to the same shape group. However, both of these methods do not really guarantee the exact shape of the pot sherds. Moreover, it is not possible to determine the condition of the pot sherd, for example which part of the pot has been conserved.

In the Buto report (von der Way 1997, 93–94), O5 (open form 5) is described as a form group that can be divided into two sub-groups, O5a and O5b, with 21 and eight sherds (for a total of 29 sherds) coming from each respectively. The number of sherds identified as 'open form 5' is also shown in a table in the report (see Fig. 1), which presents how many sherds have been excava-

| G (closed forms) | | 1a | 1b | 2a | 2b | 3a | 3b | 3c | 3d | 3e | 4 | 5 | 6a | 6b |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ware | 1a | 26 | 15 | 48 | 18 | 3 | | 2 | 1 | 6 | 1 | | | 11 |
| | 1b | 11 | 5 | 11 | 15 | 13 | 2 | 2 | 5 | 1 | 6 | 2 | | 1 |
| | 1c | 15 | 9 | 17 | 37 | 65 | | 7 | 11 | 5 | 2 | 1 | 1 | 11 |
| | 1d | | | | | | | | | | | | | 2 |
| | 1f-g | | | 1 | | | | | | | | | | 2 |
| | 2 | | | | | | | | | | | | | 18 |
| | 3 | | | | | | | | | | | | 3 | |

| O (open forms) | | 1a | 1b | 2 | 3a | 3b1 | 3b2 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|
| Ware | 1a | 55 | 8 | 21 | 40 | 19 | 29 | 8 | 18 |
| | 1b | 38 | | 2 | 7 | 5 | | | 1 |
| | 1c | 39 | | 1 | 10 | 2 | 1 | 1 | 8 |
| | 1d | | | 1 | | | | | 2 |
| | 1f-g | | 30 | 10 | 1 | | | | |
| | 2 | 1 | | | | | | | |
| | 3 | | | | | | | | |

Fig. 1. Correlation between type and ware.
Reproduced from von der Way 1997, 93, table 5

ted from the site categorised by form and fabric (ware). However, only eight of the 29 sherds are drawn and explained in the catalogue. The actual shape of the remaining 21 sherds is thus impossible to ascertain. The same registration method was also used with other form groups. As a result, although a total of 770 examples were discovered at the site, it is impossible to reclassify them, as the precise shape of each individual sherd was not recorded.

The problems with earlier reports cause difficulties in further study

The methods used in earlier reports cause major difficulties for current researchers, who are unable to ascertain the exact shape of the vast majority of pots and pot sherds that were not selected for individual registration. It also prevents them from checking if the classification developed and employed in reports was authoritative and objective, from confirming whether the generalisations made were reasonable and from reclassifying or modifying pottery data.

Therefore, researchers who wish to conduct comparative studies with other sites are forced to use data which is biased to a certain extent, which in turn makes their study a little misleading and not entirely objective.

*Uneven treatment of pot sherds as primary and secondary source data*

To integrate pottery shape data from already published reports as accurately as possible, some issues also arise in the treatment and preservation of data.

Badly preserved pot sherds have often been discarded,[4] even though they account for the vast majority of the ceramics excavated and even when pots and pot sherds have been kept, they have often been poorly or inadequately recorded. As a result, it is often difficult to confirm if a site's classification system and general pottery data is objective, since many of the primary sources (i.e. pots or pot sherds) and some of the secondary sources (i.e. records of pots and pot sherds) are not accessible for the purposes of reanalysis.

In the case of Heliopolis, Debono (Debono and Mortensen 1988, 7) declares 'I participated in many other projects and it was not until now, 35 years later, that I was offered by the German Archaeological Institute in Cairo with the assistance of Bodil Mortensen to write the final report. In order to prepare this publication it was necessary to re-study the objects… Not only the finds but also the documentation had suffered from the passing years. The paper had turned yellow and become brittle, the writing had faded so that it was difficult to read, but with the help of a photocopier the writing became legible again. The photos and negatives had also faded.'

In the case of Maadi, only complete vessels were kept, as pot sherds were not considered to provide data worthy of publication. Moreover, the pots excavated here were stored separately and some published in the report (Rizkana and Seeher 1987) have since fallen victim to theft and illegal trafficking (e.g. Brodie 2005; *ICE* 2008).

## Examinations

In this section, we will consider what kind of classification system would be the most appropriate for the recording, classifying and integrating

[4] From my experience at a few prehistoric sites in Lower Egypt, every pot sherd discovered is first quickly checked. If the body sherds have neither decoration nor a distinctive feature, they are discarded after being added to the appropriate layer (location where the sherd was found) and ware (fabric) counts. Sometimes they are discarded very soon after the initial check.

of pot sherd shape data from all Lower Egyptian sites. We will also examine if a classification system already in existence may be suited to this challenge.

*What kind of classification system would be the most feasible for pottery from prehistoric sites in Lower Egypt?*

Firstly, I would like to clarify the current state of pottery excavated from prehistoric sites in Lower Egypt, as this is necessary to determine which classification would be the most suited not only to record and classify pot sherd shape data, but also to integrate this information with shape data from earlier reports as accurately as possible.

The great majority of pottery is excavated as fragments and complete vessels (including pot sherds that may be reconstructed) are limited in number. It is also highly possible that the contents of assemblages of well-preserved vessels are slightly biased, since particular forms tend to often be present, such as miniature vessels.

This situation exists at every prehistoric site in Lower Egypt and must therefore be taken into consideration when discussing typology. Although the problem has been mentioned in previous studies on Neolithic pottery in surrounding regions as a major issue (Mesolithic and Neolithic pottery at Khartoum, e.g. Arkell 1949, 81, Neolithic pottery in the Nabta-Kiseiba area, e.g. Nelson 2002, 9 and late Chalcolithic pottery in Upper Egypt, e.g. Hoffman and Berger 1982; Friedman 1994, 217), it seems that studies of prehistoric pottery in Lower Egypt have dismissed or underestimated its serious nature. No pottery shape classification system had confronted the situation head-on until very recently. We will now examine the kind of data that has been used for developing the pottery shape classification systems for each late Chalcolithic site[5] in Lower Egypt.

At Maadi (Rizkana and Seeher 1987), Wadi Digla (Rizkana and Seeher 1990) and Heliopolis (Debono and Mortensen 1988), the pottery shape classification systems were developed based on data from complete and reconstructed vessels (Fig. 2). At Minshat Abu Omar (Groups I and II), no pottery shape classification system for pottery shape has been created. However, a drawing of each pottery vessel is given and brief explanations are provided for each pit (Kroeper and Wildung 1994; Kroeper and Wildung 2000). Since very few pot sherds are drawn and described, it can be assumed that some were included in the data and diagrams of restored or complete

[5] Here, classification systems dealing with pottery data from layers which were formed before Naqada IId2 at prehistoric sites in Lower Egypt are specifically referred to.

| Sites | Reference | Kind of data used for developing the classification system |
|---|---|---|
| Maadi | Rizkana and Seeher 1987 | Complete vessels |
| WadiDigla | Rizkana and Seeher 1990 | Complete vessels |
| Heliopolis | Debono and Mortensen 1988 | Complete vessels |
| Buto (Layer I and II) | von der Way 1997, 88–96 | Pot sherds (mainly rim sherds) |
| Minshat Abu Omar (MAO I and II) | Kroeper and Wildung 1994<br>Kroeper and Wildung 2000 | |
| Tell el-Farkha (Phase 1) | | |
| Tell el-Iswid (Buto II-IIIa/Phase A) | Guyot 2014, 99–117<br>van den Brink 1989 | Pot sherds |
| Sais (Sais III) | Wilson *et al*. 2014, 99–109 | Pot sherds |

Fig. 2. Type of data used for developing the classification system at different sites

vessels without an explanation being provided. At Tell el-Farkha (Phase 1), a pottery shape classification system has not yet been established. At Buto (Layers I and II) (von der Way 1997, 88–96), a classification system was developed based on data from fragmented pot sherds and at Sais (Sais III) (Wilson *et al*. 2014, 99–109) the classification system uses the same basis. At Tell el-Iswid (south) (van den Brink 1989; Guyot 2014, 99–117), van den Brink did not devise a classification system, but one has been built using new data from recent excavations.

We can therefore see that pot shape classification systems for pot sherds have only been developed at three out of eight sites: Buto (von der Way 1997, 88–96), Tell el-Iswid (Guyot 2014, 99–117) and Sais (Wilson *et al*. 2014, 99–109). If it is possible to find an appropriate system to be used for all prehistoric sites in Lower Egypt amongst those already in use, it must therefore be one of these three. We will now focus on the nature of these systems for classifying pot sherds in more detail.

The Buto classification system

Von der Way (1997, 88) states that 'while the classification systems for pottery shape were created with complete vessel data at some prehistoric sites in Lower Egypt, such as Maadi and Heliopolis, the vast majority of excavated pottery is fragmented at Buto; only 32 of 1348 pieces are complete vessels.'

He also notes that 'the typology designed at Buto is almost exclusively limited to the assessment of pot sherds, in particular the parts of the mouth.' The criteria here therefore seem to put the most emphasis on the rim shape of pot sherds in their classification.

In the Buto classification system (Fig. 3), 'ovoid and globular jars' are divided into seven groups (jar types 2a, 2b, 3a, 3b, 3c, 3d and 3e) purely based on the presence or absence of neck and rim shapes. In the Maadi classification system, however, 'ovoid and globular jars' are classified into six groups (jar types 2, 3a, 3b, 5a, 5b and 5c[6]) with the main emphasis on the bottom's shape, but also taking the rim shape into account. It should be stressed that bottom shape is barely taken into consideration at Buto.

Another notable feature of the Buto classification system is that many groups and sub-groups in the system are created by combining the factor of body contour with the shape of the neck and/or rim. The number of possible body contour and neck and rim pairs is very high, which is why only the combinations that are encountered most frequently are included as groups or sub-groups. As these groups and sub-groups are designed to specifically reflect the characteristics of pot sherds at Buto, they cannot easily be applied to pot sherds from other sites in Lower Egypt. In general, the creation of groups and sub-groups that present a combination of factors in terms of vessel shape is not conducive to the integration of fragmented pot sherd data from a number of sites.

The Tell el-Iswid classification system

The classification system at Tell el-Iswid (Guyot 2014, 99–117) consists of three parts, each of which reflects a contiguous typological feature. The first is a digit (1–4) that indicates the basic contour of the vessel and clarifies whether it is of open or closed form. The second (a–b) denotes whether the vessel has a rim or not. The third is a number that 'refers to the last level of subdivision according to the criteria relating to each group.' This final digit must therefore indicate multiple morphological types of vessel, as can be seen below. Fig. 2 shows the classification system for open forms used at Tell el-Iswid (Guyot 2014). The first and the second characters are clearly objective codes for grouping pot sherds, but the third digit indicates various elements: rim shape, diameter and depth (e.g. 1a2)

[6] The six groups are as follows (Rizkana and Seeher 1987, 34–54): jar type 2a is 'ovoid jars with a pointed base', jar type 3a is 'bottle-like ovoid jars with pointed bases', jar type 3b is 'bottle-like ovoid jars with flat bases', jar type 5a is 'jars with small, flat or flattened bases, and everted rims', jar type 5b is 'jars with small, flat or flattened bases and neck-like restricted openings' and jar type 5c is 'larger jars with v-shaped bottoms'.

| | | | |
|---|---|---|---|
| G (closed forms) | | | |
| | G1 | Oblong to ovoid jars | |
| | | G1a | Jars with narrow necks |
| | | G1b | Jars with wider necks |
| | G2 | Ovoid to globular jars without necks | |
| | | G2a | Jars with rounded rims |
| | | G2b | Jars with straight rims |
| | G3 | Ovoid to globular jars with necks | |
| | | G3a | Jars with vertical necks and edged or overhanging rims |
| | | G3b | Jars with vertical necks and vertical rims |
| | | G3c | Jars with strongly outwardly inclined necks |
| | | G3d | Jars with inwardly inclined necks |
| | | G3e | Large jars with strongly rolled lip |
| | G4 | Large jars with moderately inclined walls inwardly | |
| | G5 | Small jars with moderately inclined walls inwardly | |
| | G6 | Large storage jars or cooking pots | |
| | | G6a | Oblong to spherical jars with outwardly folded and thickened rims |
| | | G6b | Jars with horizontal grooves under the rims |
| O (open forms) | | | |
| | O1 | Bowls with straight or slightly convex walls | |
| | | O1a | Bowls with thick walls |
| | | O1b | Bowls with thin walls |
| | O2 | Bowls with concave walls | |
| | O3 | Bowls with redesigned rims | |
| | | O3a | Bowls with grooves under rims and slightly (partly horizontally) everted rims |
| | | O3b | Bowls with widely everted rims |
| | O4 | Large bowls with thick walls | |
| | | O4a | Bowls with drop shaped thickened rims |
| | | O4b | Bowls with straight rims |
| | O5 | Vats and pans | |
| | | O5a | Vats (open form vessels with thick and medium slope walls and straight rims) |
| | | O5b | Pans (open form vessels with flat bottoms and walls which are between 1,8–4.5cm in thickness and between 1.9 to 6.6cm in height) |
| Miniature vessels | | | |

Fig. 3. The Buto classification system. Reproduced from von der Way 1987, 88–96

and fabric (e.g. 1a3), the last of which is not a morphological element at all. Furthermore, it should be noted that the same code used in the third character does not always indicate the same morphological characteristics. For example, '2' in 1b2 indicates a 'modelled rim', whilst '2' in 1a2 signifies '30–40cm in diameter and shallow'.

If one were to try to apply the Tell el-Iswid classification system to pottery from other prehistoric sites in Lower Egypt, it is clear that this intermingling of multiple morphological features in the third character and the lack of consistency in its meaning would pose a significant problem that would have to be overcome.

Guyot (2014, 117) suggests that 'the first phase (or layer) of occupation at Tell el-Iswid can be dated to the end of the period of Buto II or the beginning of the period of Buto III' in his chronological study. However, we must remember that it is believed[7] that transitional layers (or gaps) were formed in Naqada IId2 (Buto IIIa) at many sites in Lower Egypt and that changes in the composition of ceramic and lithic assemblages and the introduction of mud brick architecture can be observed both before and after their creation. This means that the first phase (layer) at Tell el-Iswid was formed at the same time that transitional layers (or gaps) were being formed at many other sites in Lower Egypt and it is precisely pottery from this layer that was used to create the Tell el-Iswid classification. As a result, any usage of this classification for recording and classifying the shape data of pot sherds from other prehistoric sites in Lower Egypt must be approached with extreme caution.[8]

The Sais classification system

In the Sais classification system, vessels are divided into 21 groups, as can be seen in Fig. 5. At Sais, the number of sherds with decoration and sherds made of imported fabric is limited. Therefore, even though 'decoration' and 'fabric' are not morphological elements, it is understandable that separate groups were created for these features, so as to distinguish them from other sherds. Moreover, seeing that each sherd at Sais is rather small and most bottom sherds do not have body parts, it is perfectly reasonable that a 'base' group was created, purely for base sherds.

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[7] E.g. Köhler 1992; Hendrickx 1999; Mączyńska 2003; Hendrickx 2006.

[8] Special care must be taken when using this system for data from layers that were formed before transitional layers or gaps, because this pottery is thought to be of a Lower Egyptian character. Pottery from the transitional layers or after is thought to have both a Lower Egyptian and Upper Egyptian nature.

| | | | |
|---|---|---|---|
| 1 | Open form with convex wall | | |
| | 1a | Open form with convex wall without rim | |
| | | 1a1 | simple and everted rim inwardly or outwardly, less that 30cm in diameter, 4–8cm in depth |
| | | 1a2 | 30–40cm in diameter and shallow |
| | | 1a3 | thick wall, only inner surface is smoothed and outer surface is coarse |
| | 1b | Open form with convex wall with rim | |
| | | 1b1 | ledge rim, 30–40cm in diameter and shallow |
| | | 1b2 | modelled rim |
| 2 | Open form with straight or concave wall | | |
| | 2a | Open form with straight or concave wall without rim | |
| | | 2a1 | simple and everted rim inwardly or outwardly, less that 30cm in diameter, 4–8cm in depth |
| | | 2a2 | 12–25cm in diameter, this group is called as ‘plates’ in the report and the drawings in the report show shallow in depth |
| | 2b | Open form with straight or concave wall with rim | |
| | | 2b1–a | everted rim, sometimes there is an external groove under the rim |
| | | 2b1-b | everted rim with pointed top |
| | | 2b2 | modelled rim and there is and external groove under the rim, 20–40cm in diameter |
| | | 2b3 | modelled rim, large in diameter and deep in depth, this group is called as ‘basin’ in the report |

Fig. 4. The Tell el-Iswid classification system for open forms.
Reproduced from Guyot 2014, 103–114

Two main dividing criteria are present in this system. The first is based on whether the sherd is of open form or closed form and the second on the rim shape. One of the reasons why the division of closed forms seems to be slightly obscure whilst the division of open forms appears to be objective is the usage of certain expressions, such as ‘small jar’, ‘narrow jar’ and ‘broad jar’, the parameters of which are not clearly defined.

For instance, a group that is labelled ‘small jars’ (group 13) does not have its size defined. Instead, it is explained (Wilson *et al*. 2014, 105) that these jars equate to ‘bag-shaped’ or ‘lemon-shaped’ jars. Even though some of the pots classified as ‘lemon-shaped’ or ‘bag-shaped’ in reports from Tell el-Farkha are slightly larger than 5cm in rim diameter (e.g. Mączyńska 2011, 891, fig. 2; Mączyńska 2012), Mączyńska (personal communication, 13 May 2014) describes them as small. From this information and reference

| Open forms | |
|---|---|
| | 1. Bowls with conical contour and direct rims |
| | 2. Bowls with concave contour |
| | 3. Bowls with carination |
| | 4. Bowls with everted rims |
| | 5. Bowls with everted and thickened rims |
| | 6. Deep bowls with everted rims |
| | 7. Bowls with ledge rims |
| | 8. Vats; wide diameter, deep, thick-walled bowls |
| | 9. Platters; thick-walled, shallow or flat dishes and plates |
| | 10. Pot-stands |
| | 11. Bread moulds |
| Closed forms | |
| | 12. ‘Hole-mouth’ jars and ovoid storage vessels |
| | 13. Small jars and beakers |
| | 14. Cylinder jars |
| | 15. Narrow diameter rims and shouldered jars with various rims |
| | 16. Wide diameter rims and broad shouldered jars with various rims |
| | 17. Jars with thickened rims |
| | 18. Broad jars with thickened rims |
| Others | |
| | 19. Bases |
| | 20. Decorated sherds |
| | 21. Imported sherds |

Fig. 5. The Sais classification system.
Reproduced from Wilson *et al.* 2014, 99–109

to the drawings from the Sais reports (Wilson *et al*. 2014), it can nevertheless be estimated how small the ‘small jars’ of group 13 in the Sais classification system are. The main distinguishing feature between narrow and broad jars (Wilson *et al*. 2014, 106) is the fact that the latter have distinctly wide shoulders and that the angle of the shoulder of the base of the neck to the central axis of the vessel is between 90 and 140.

A lack of terminological clarity is also present in the description of rim shapes. For example, the difference between ‘broad jars with various rims (group 16)’ and ‘broad jars with thickened rims (group 18)’ is not made clear. ‘Broad jars with thickened rims’ (group 18) from the Sais III period, are described (Wilson *et al*. 2014, 107) as pots that sometimes have necks. On consulting the drawings from the report (Wilson *et al*. 2014, pl. 58), however, the presence or absence of a neck actually seems to be one of the key differentiating factors. In addition, if the pots do not have necks, it still seems to be difficult to determine whether they belong to ‘broad jars with various rims’ (group 16) or ‘broad jars with thickened rims’ (group 18). Although it is not explained in the text, the drawings of these two groups (Wilson *et al*. 2014, pl. 58) demonstrate that ‘broad jars with thickened rims’ have thicker walls and rims (*c*. 1.5–2.5cm in the section) than ‘broad jars with various rims’ (*c*. 1–1.5cm in the section). This observation may help to clear up this terminological ambiguity.

It has been reported (Wilson *et al*. 2014, 99) that the variation of forms in prehistoric pottery at Sais is somewhat limited, particularly in the Neolithic period. Therefore, if this system were to be applied to pottery data from other prehistoric sites in Lower Egypt, further sub-groups may need to be added to account for the wider diversity present.

The prehistoric layers at Sais are divided into three categories: Sais I, Sais II and Sais III. Sais I and II are said to come from the Neolithic period, whilst Sais III dates to the Predynastic and Early Dynastic periods (Wilson 2007, 83; Wilson *et al*. 2014, 101). It can therefore be stated that material from Sais III includes pottery from before, during and after the period when transitional layers were formed at sites in Lower Egypt during Naqada IId2.

*Discussion*

We will now examine the structural distinctions between the three classification systems, as well as their advantages and disadvantages.

In all three classification systems, the distinguishing feature is whether the vessel is of open or closed form at first (at the first digit), and this in each case creates the two main groups.

In the Buto and Tell el-Iswid systems, the next division is created by considering the combination of the vessel’s contours with its rim and/or neck shape secondly (at the second digit). And then, as the third step, further details such as rim shape and thickness of walls are considered to organise sub-groups. In the second and third steps of both of these systems, groups and sub-groups are created to reflect the characteristic shapes found at each site, allowing them to be classified and described in detail. In the Sais classification system, however, after the first step to divide open forms and closed forms, other distinguishing features such as the contour of vessels, the existence or absence of rims, the thickness of walls, and the depth of vessels are considered in the second step, and groups are set up for them. Then, the step (the third digit) remains unused. The vessel's contours, the presence or absence of a rim, the thickness of the walls, and depth are all considered in the second step and groups established accordingly.

These differences in the structure of morphological classification systems give us a good indication of what must be considered when creating a classification system to record, classify and integrate the shape data of pot sherds from prehistoric sites across Lower Egypt.

Groups and sub-groups that are created based on multiple factors of vessel shape (such as body contour, shape of neck/rim) allow pottery data from a specific site to be classified and described in greater detail. However, it is not at all suitable for the integration of fragmented pot sherd data from various sites. It would be highly contentious to alter a classification system structure that has been created to describe a specific site's pottery character merely in order for it to also be applied to pot sherds from other sites.

Instead of creating rigid sub-groups that reflect characteristic shapes at a specific site in the second and third steps of classification, it would be better to create pliable groups in the second step that are applicable to data from all sites. This system would allow sub-groups to be created the further sub-groups in the third step later on to describe and classify shapes that are characteristic of other sites or a specific site.

Bearing all these considerations in mind, the Sais classification system is perhaps the most appropriate model for the morphological classification of pottery vessels and sherds from all the prehistoric sites of Lower Egypt, even though some modifications would be necessary.

## Suggestions

A classification system that can reflect data from the vast majority of damaged pot sherds would be the most feasible for recording and classifying shape data of pot sherds from all Lower Egyptian sites. It should also be able to integrate together even with pottery shape data in the earlier reports as accurately as possible. Of the classification systems used at prehistoric sites in Lower Egypt, the one adopted at Sais could serve as a prototype for such a system, although modifications would have to be made.

Another important point that can be gleaned from this study is that the morphological classification system should be elastic structurally and objective terminologically in order to be applicable for various sites. In other words, if the system is impartial and non-partisan, it may be applied to data of pot sherds from various sites occupied by different cultural units (at least similar in terms of social level), although it may be necessary to add further sub-groups to describe and classify characteristic shapes of a specific site. However, it should still be kept in mind that it must remain a morphological classification system which was developed from pot sherd data. This means that the same code letter, code number, group or sub-group will not necessarily imply any similarity in the complete shape of the vessel nor in terms of its use in a morphological classification system developed by data of pot sherds.[9] If this aspect is forgotten, the system cannot be properly applied and used to the data at various sites. Considered in parallel with other factors concerning both elements of pottery vessels (fabric, manufacturing technique, decoration and surface treatment) and other factors which affect those elements (climate, fauna, flora and geological features), a morphological pot sherd classification system may serve as a very useful tool when interpreting the meaning and function of pottery vessels.

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[9] Friedman (1994, 222–223) makes the following statements on the Hierakonpolis system: ‘several different shapes that would be considered separate types in a whole vessel typology are included in one subjective shape class’ and ‘the use of the same code letter does not necessarily imply any similarity in the complete vessel shape.’

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# TEST RESULTS OF FINE SEDIMENT FRACTIONS FROM THE TELL EL-FARKHA ARCHAEOLOGICAL SITE, NILE DELTA, EGYPT

**Abstract:** *The Tell el-Farkha site is located immediately to the north of the modern village of Ghazalah and occupies an area of c. 4.5ha. It is marked by three hills: the Eastern Kom, Central Kom and Western Kom. This research will focus on the profile of the layers of sediment. These studies are important because they are innovative and contain information on the history of the site. Research work was conducted on site and produced graphs showing the composition of individual microartefacts within the sediment. Samples were taken from each profile layer then dissolved and sifted to obtain fine fractions. Laboratory work focused on the calculation of the percentage of different microartefacts in each sifted fine fraction. Photographs of selected microartefacts (bones, ceramics, carbon, quartz, and others) were taken using a binocular magnifier at 20x magnification. The examination of this material has provided both new and valuable information concerning the functioning and development of the archaeological site.*

**Keywords:** *Fine sediment; fractions; Egypt*

## Introduction

The Tell el-Farkha archaeological site is located in the eastern Nile Delta, about 120km northeast of Egypt's capital, Cairo. The study area covers

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about 4.5km$^2$ and is situated on three hills north of the village of Ghazalah. The hills are locally known as 'koms' and have been labelled Kom W (Western Kom), Kom C (Central Kom) and Kom E (Eastern Kom). The layout of the site is presented on the map (Pl. 1: 1).

Archaeological research has been conducted at the site since 1998 by an expedition organised in collaboration with the Institute of Archaeology at the Jagiellonian University of Krakow and the Archaeological Museum of Poznań.

The hills (koms) are made of Pleistocene sands (known as the 'sand of Gezira') surrounded by Nile silt. These deposits cover anthropogenic layers that are up to 6m thick.

The goal of this study was to draw attention to the microartefacts that can be found in the fine fractions that remain after excavated material is sifted, which are not usually examined. This material, if processed statistically, can contribute a great deal of information about the site that may otherwise escape the attention of researchers.

## Methodology

The study of microartefacts is important, not only because it is innovative, but also because it uncovers information on building functions, the delineation of activity areas and the processes involved in a site's formation (Rosen 1991). This kind of research is not commonly used, however, because of the time required to recover, sort, and identify microartefacts (Sherwood and Ousley 1995). In 2012, a soil profile of the layers of sediment was created at the site that included graphs showing the composition of individual elements in the sediment.

The profile was performed on Kom E in the northernmost wall of the archaeological excavation. Pl. 6: 1 shows the profiled wall.

Macroscopic observations revealed that all the test layers were similar to each other and that it was sometimes not easy to distinguish one profile from another. The most useful profiles to observe were not those that had been cleaned, but those that had been subjected to the natural erosion of the wind for some time. Wind is able to transport the slightest material and this revealed the nature of the deposits that were used as the basis for sampling and subsequent analysis.

The first sample was collected approximately 20cm below the ground, as modern sediments mixed with modern waste lay above it. The first sampling layer is clear sand, with any loamy sediments destroyed by local birds. The second layer of the profile is heavily eroded and the presence of doped brown coal dust creates its darker shade. The third layer contains lighter sediments due to its higher quartz content in both the fine and coarse fractions. The fourth layer is loamy-sandy and grey. The fifth layer is loamy-sandy and doped with coal dust from destroyed bonfires. Layer six also has a pronounced anthropogenic character, which is the cause of the light colour of the layer, which contains loamy minerals next to quartz. Distinct macroscopic pieces of chaff are also present, which makes this layer's colour stand out from the ones above. It is also very light due to the large admixture of sand, in which it is possible to distinguish broken fragments of ceramic vessels without the use of a microscope. The seventh layer is made up of sediment with light, dusty deposits with an admixture of quartz sand. The eighth layer is slightly darker than the previous. This layer ends in a sequence of regular, uncut, horizontal layers consisting of weakly concise powder. This results from the presence of a mixture of anthropogenic and mineral components. The ninth layer is the thickest layer in the profile. It contains evidence of increased human activity at the site during its formation. Within it, a difficult to identify fragment in the shape of an inverted trapezoid was discovered, as well as a damaged part of wall. Layer 10 consists of a brick wall built of dried bricks made from local Nile silt. The 11th layer, like the ninth, contains a trapezoidal construction and the wall. It has an anthropogenic character, as it contains fragments of burnt daub and pottery. It is thinner due to its admixture of dust from wood coals. The 12th layer is composed of darker loamy-sandy sediment with an admixture of anthropogenic material. It has a silt structure and is crossed by two walls built of dried bricks. The 13th layer contains a further part of the brick wall that also appears in layers 12 and 14. The 14th layer is of average thickness and fragments of wall appear in three places. The brown sediment is fine, dusty and lumpy in places. The 15th layer of sediment is the refill of a small recess in the shape of a lens. The material in the recess is anthropogenic. The 16th layer is made up of sandy-dusty sediment and contains the same lens from 15. It has similar, but more loamy and lumpy sediment. The 17th layer is composed of almost horizontal sediment. In the eastern part of the profile, the sediment rises to the top, leaning on the wall fragment that cuts into the 14th layer. This suggests that the genesis of this layer is related to the destruction and backfilling of this brick wall. Layer 18 has origins similar to the layer 17. It is of a dusty-sandy nature and contains a large admixture of what is probably Aeolian quartz sand. The 19th layer is located in the eastern part of the geological profile and is the same as the previous layer, except for the fact that the sandy deposits contain many fragments of burnt daub. A further fragment of wall can also be discerned in this sediment. Layer 20 is the lowest layer in the sequence of hover sediments on the eastern side of the profile. It contains a large amount of daub and many burnt fragments of pottery. Some of the daub fragments most probably come from a brewery. The 21 layer is the oldest anthropogenic layer in this part of the site. It is of a sandy nature and contains a small admixture of loamy minerals. Fragments of burnt daub (a cylindrical brick from a brewery?) are also present. The sediments occur within natural sand under a ceiling of Gezira sand. Some deposits are of Aeolian origin.

During the profiling stage, sediment samples were taken for laboratory tests. A sample was taken from each profile layer (21 layers altogether). The weight of the samples was about 2–3kg, depending on the compactness of the deposits. The samples were then dissolved and sifted to obtain fine fractions of daub, carbon, ceramics, flint, bone, quartz, rock fragments and fish remains. The diverse composition of the sediments meant that some of the samples were easily soluble and offered more in terms of fine elements, whilst other samples were more difficult to dissolve due to high clay content. The sediments provided isolated fragments of bone, quartz, and ceramics and the material obtained was dried, examined, and analysed under a binocular magnifier.

## Test results

During research, a soil profile was drawn to show the layers of sediment at the northern wall of Kom E. This drawing is shown on the Pl. 1: 2 with each sample layer marked.

All the material obtained was levigated and wet-sifted through a one-millimetre mesh and then was washed and dried several times. The first stage of laboratory examination focused on the calculation of the percentage of each microartefact in each fine sift fraction. About 500 grains were counted out in each sample and the results were converted to percentages, which are presented in Fig. 1.

Based on the data presented in Fig. 1, diagrams were created (Pls. 2–4), showing the percentage of each element in both the samples and the whole profile.

Photographs of selected microartefacts (bones, ceramics, carbon, quartz and others) were taken using a binocular magnifier at 20x magnification

| Sample number | daub [%] | ceramics [%] | carbon [%] | bone [%] | flint [%] | rock fragments [%] | quartz [%] | fish remains [%] | aggregates [%] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 88.0 | 2.1 | 0.0 | 1.0 | 0.0 | 0.0 | 2.0 | 0.0 | 6.9 |
| 2 | 87.9 | 2.4 | 1.1 | 0.0 | 4.3 | 5.2 | 1.1 | 0.0 | 0.0 |
| 3 | 83.9 | 7.7 | 7.5 | 0.0 | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 |
| 4 | 72.0 | 2.9 | 3.1 | 0.0 | 0.9 | 3.0 | 10.0 | 8.1 | 0.0 |
| 5 | 75.4 | 1.6 | 0.8 | 10.4 | 2.4 | 0.7 | 1.5 | 7.2 | 0.0 |
| 6 | 66.6 | 12.2 | 0.9 | 1.8 | 2.7 | 0.0 | 14.1 | 1.7 | 0.0 |
| 7 | 80.4 | 5.6 | 2.8 | 0.0 | 0.0 | 0.0 | 11.2 | 0.0 | 0.0 |
| 8 | 93.9 | 0.0 | 1.0 | 0.0 | 0.0 | 1.1 | 4.0 | 0.0 | 0.0 |
| 9 | 71.4 | 13.8 | 0.8 | 0.0 | 0.9 | 0.0 | 12.1 | 0.0 | 1.0 |
| 10 | 89.3 | 1.1 | 4.3 | 0.9 | 0.0 | 0.0 | 4.4 | 0.0 | 0.0 |
| 11 | 52.7 | 16.3 | 12.2 | 11.3 | 0.0 | 5.6 | 1.9 | 0.0 | 0.0 |
| 12 | 32.8 | 9.1 | 21.8 | 9.1 | 1.1 | 3.2 | 2.2 | 20.7 | 0.0 |
| 13 | 67.0 | 0.8 | 16.9 | 7.1 | 0.9 | 1.8 | 2.7 | 2.8 | 0.0 |
| 14 | 76.2 | 3.9 | 7.8 | 2.9 | 0.0 | 0.7 | 2.7 | 5.8 | 0.0 |
| 15 | 69.4 | 6.9 | 7.7 | 3.0 | 1.5 | 0.7 | 4.6 | 6.2 | 0.0 |
| 16 | 72.5 | 3.3 | 8.4 | 4.2 | 1.6 | 2.5 | 7.5 | 0.0 | 0.0 |
| 17 | 54.0 | 6.7 | 1.6 | 3.2 | 2.5 | 5.0 | 9.3 | 17.7 | 0.0 |
| 18 | 3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 65.7 | 27.5 | 0.0 | 0.0 |
| 19 | 81.4 | 0.9 | 0.0 | 0.0 | 0.0 | 3.6 | 14.1 | 0.0 | 0.0 |
| 20 | 82.2 | 10.2 | 2.6 | 1.3 | 0.0 | 2.5 | 1.2 | 0.0 | 0.0 |
| 21 | 66.3 | 4.2 | 1.4 | 0.0 | 2.8 | 0.0 | 25.3 | 0.0 | 10.9 |

Fig. 1. Composition of fine fractions in consecutive layers of the soil profile

(Pls. 6: 2, 3, and 7). Analysis of linear diagrams (Pl. 5) on the variation of particular microartefacts within the profile shows that the lower layers appear to have a larger quantity of fish bones, pieces of natural rock, flint and grains of quartz. In the middle part of the profile, larger quantities of fish bones, coal dust and bones can be observed. Finally, in the upper part of the profile, stones, fish bones, bones and pebbles of quartz are all visible.

This variability in the occurrence of microartefacts within the profile could provide evidence of how the function of this site changed across different periods.

## Summary and conclusions

Varying quantities of ceramic fragments appear at random in the profile analysis. This is probably the result of the occasional destruction of clay pottery.

The fluctuating quantity of charcoal micro-fragments in the profile is probably connected to changes in the functioning of the site. The coal is usually dispersed, but there is definite evidence of a campfire in the vicinity of sample 12 at some point in time (Pl. 1: 2).

An increased quantity of bone micro-fragments appears in samples 5 and 11. Unfortunately, it has not been possible to determine to what species they belong. This could have allowed the anomaly to be interpreted in a meaningful way.

The negligible and fairly constant level of micro-fragments of flint suggests that flint tools were probably not made in the excavated area. The micro-fragments present are more likely to be the result of flint tool usage. Some of the fragments are burnt out, which may imply that activities occurred around a fire here. The mineralogical and petrographic nature of the flint fragments suggests that they are either genetically related to limestone from the Nile valley or that they come from other gravel sites genetically related to this limestone.

Fine fragments of rock are concentrated in the lower parts of the profile (sample 18; Pl. 1: 2). Sharp-edged fragments of quartzite and limestone are present here, suggesting that these rocks were processed in the area. Mineralogical studies of stone monuments found at the site suggest that the fragments of quartzite could be associated with the production or use of grain grinders. The pieces of limestone (from the Nile valley) may have come from the production of small pots used for different purposes that were discovered in the graves located in Kom E.

The quartz grain composition in the profile varies, as does the proportion of burnt and natural grains. Although the origin is hard to categorically determine, it can be assumed that they are genetically related to the sands of Gezira, which could have been used for a variety of purposes.

Larger bits of fish bones and bone fragments (discs) were found in samples 4, 5, 12 and 17. Their presence in samples 4, 5 and 12 correlates with a slightly larger quantity of charcoal pieces, which may suggest fish were baked over campfires during the examined time in this area.

Burnt daub fragments are the main component of almost all the tested samples, with only one exception. Their percentage in the samples varies between 32.8% and 93.9%. Only sample 18 has a different main component, which is that of rock fragment (65.7%). Here, daub occupies just 3.6% of the total volume.

The quantity of daub is largest in the lower sections of the profile and decreases in its higher parts. Its concentration in samples 11 and 17 may suggest a specific function related to it in the area at those particular times. Mineralogical studies of the daub fragments show that they consist of Nile silt mixed with straw chaff. The composition of the daub and the presence of straw chaff, as well as the directionality of the straw, suggests that the daub was used in the construction of small buildings. The absence of wood or stick imprints suggests that the silt-and-straw mixture was used directly in the construction of buildings (huts? farm buildings?). The fact that the daub is burnt (which is why it only remains in fine bits) shows that the buildings must have been burnt (and burnt-out). The presence of so many of these microartefacts shows that fires were a frequent occurrence at the site. However, nothing can yet be said about the specific causes of such fires. They may have been caused by hostile invasions, but more mundane causes are also possible, such as accidental fires.

In conclusion, the examination of microartefacts provides much new and valuable information concerning the functioning and development of an archaeological site. The failure to conduct such research may lead to an irretrievable loss of valuable data that could be useful both in the reconstruction of human activity in the region where the site is located and to assess the variability of certain environmental and climatic indicators.

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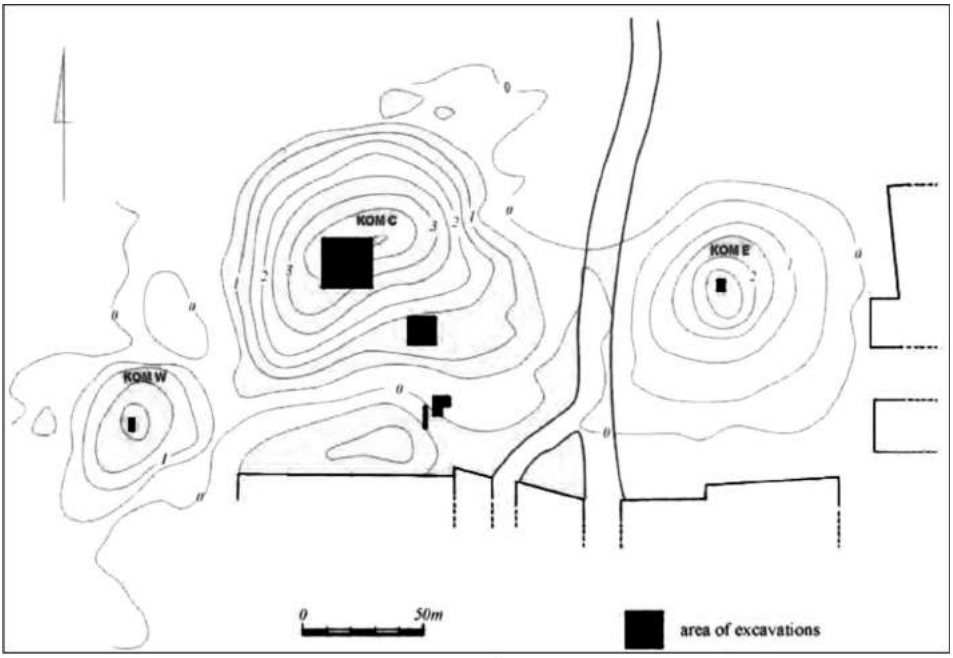


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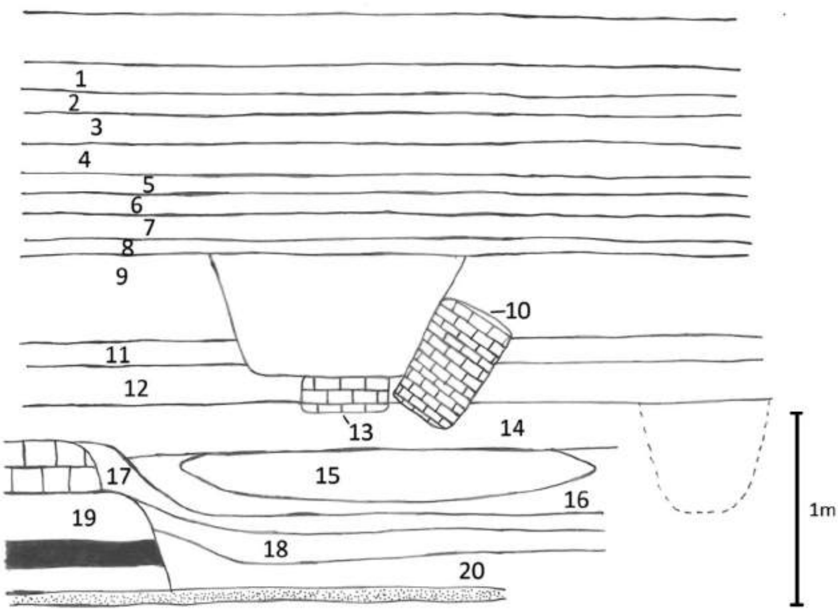
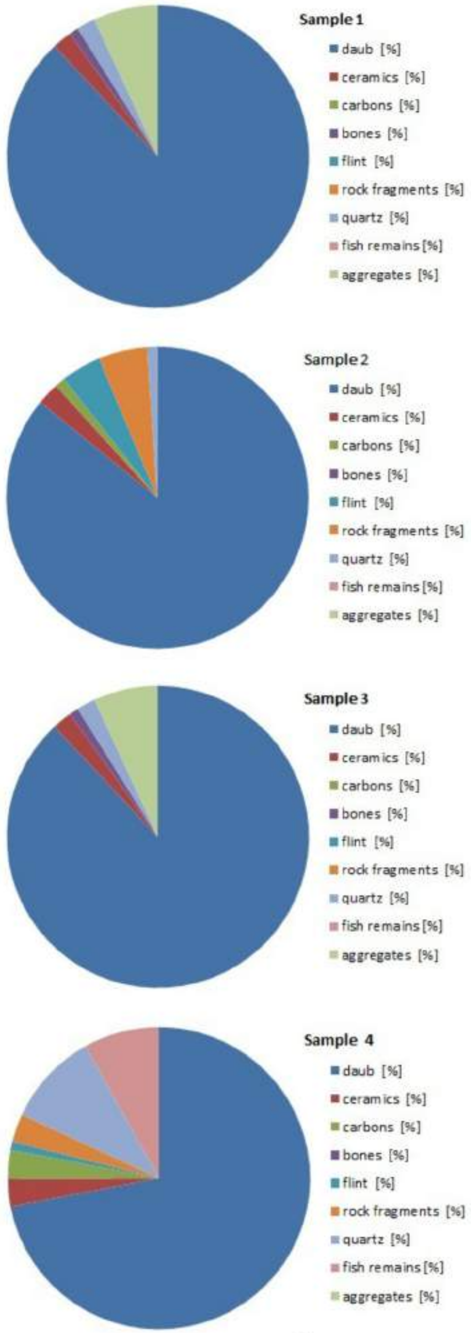



2

Pl. 1. 1 – Map of the Tell el-Farkha site. Reproduced from Chłodnicki 2012, 11; 2 – Soil profile drawing made at Kom E in the northern part of the archaeological excavation (profile N). Drawing by E. Słowioczek

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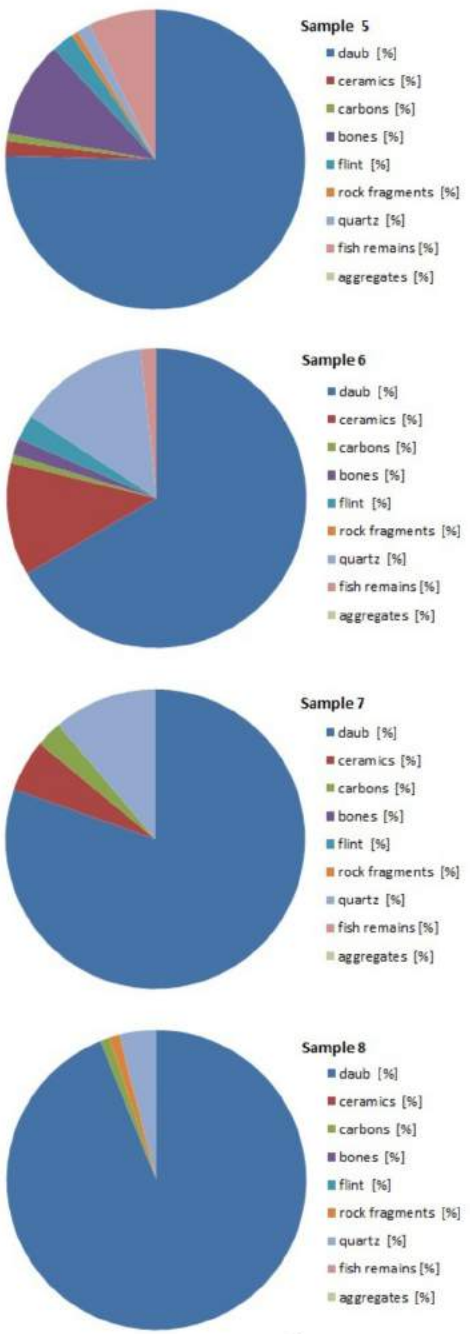


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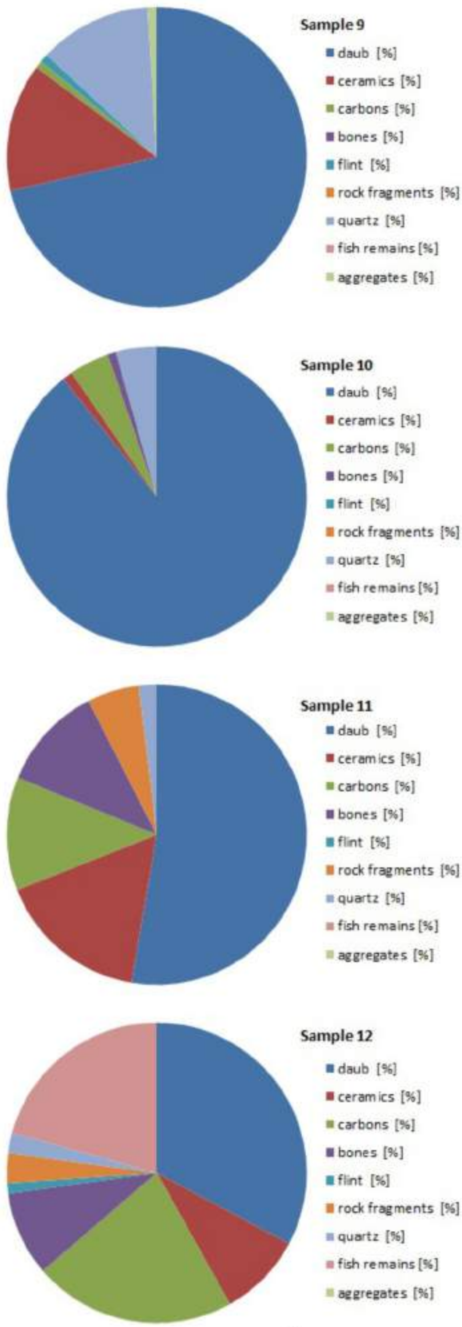
Pl. 2. 1 – Pie charts showing the composition percentages of samples 1–4;
2 – Pie charts showing the composition percentages of samples 5–8

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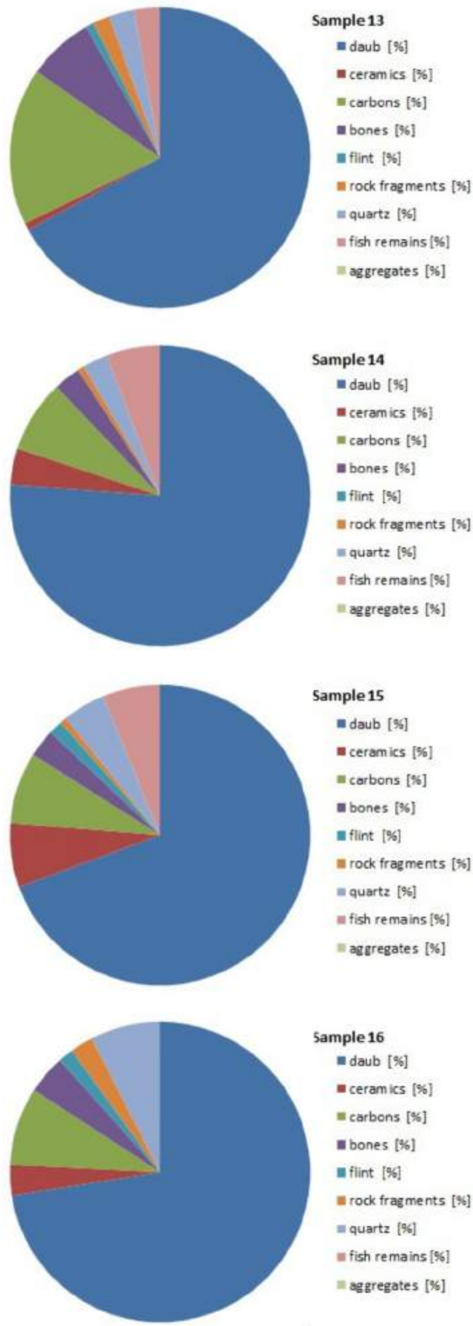
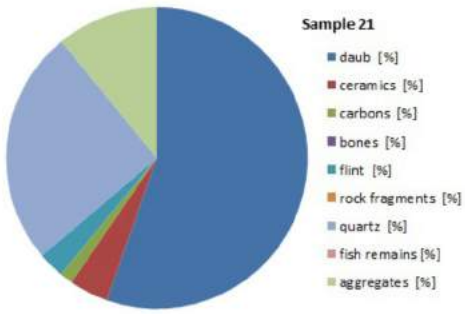



2

Pl. 3. 1 – Pie charts showing the composition percentages of samples 9–12;
2 – Pie charts showing the composition percentages of samples 13–16

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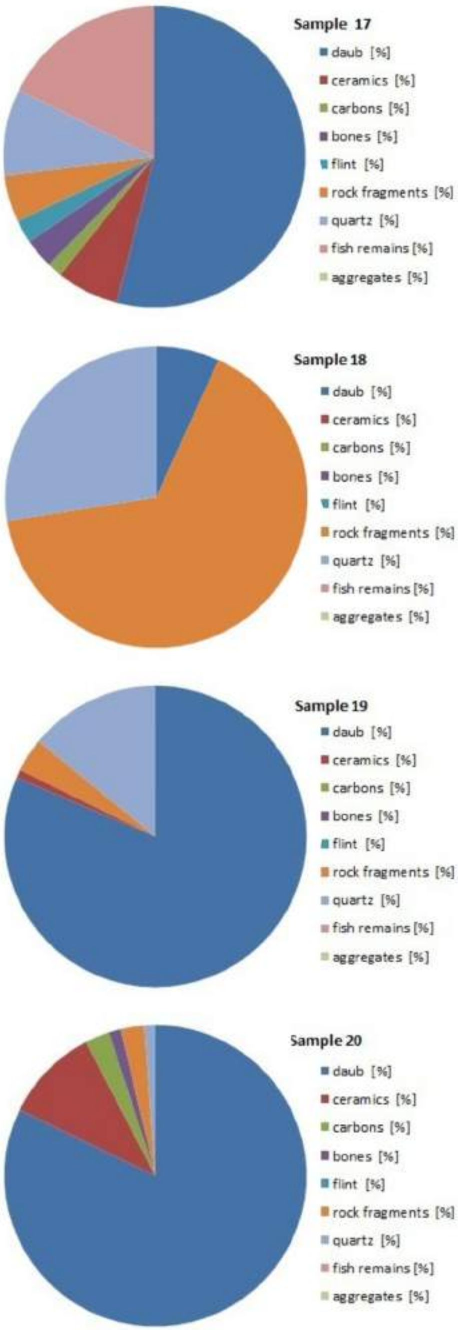
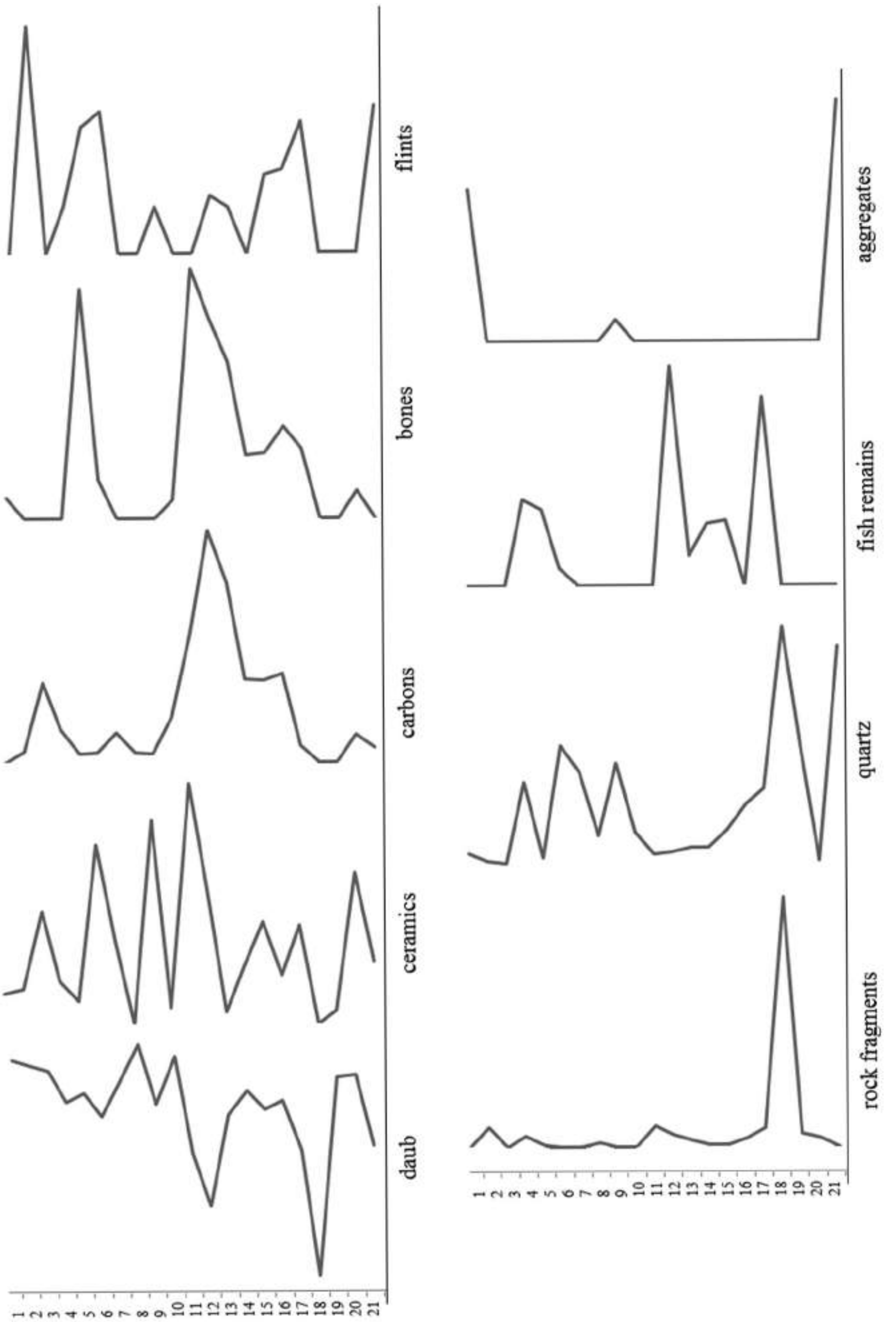
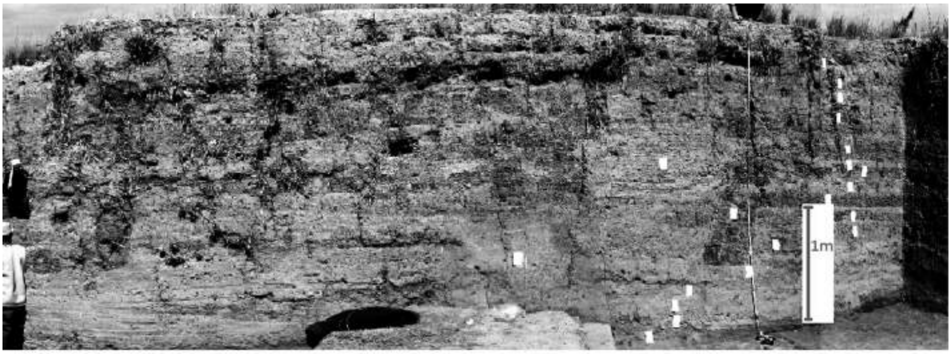



1

Pl. 4. 1 – Pie charts showing the composition percentages of samples 17–20;
2 – Pie chart showing the composition percentages of sample 21




Pl. 5. Linear diagrams showing the varying distribution of fine fractions in subsequent layers of sediment. Drawing by E. Słowioczek




1

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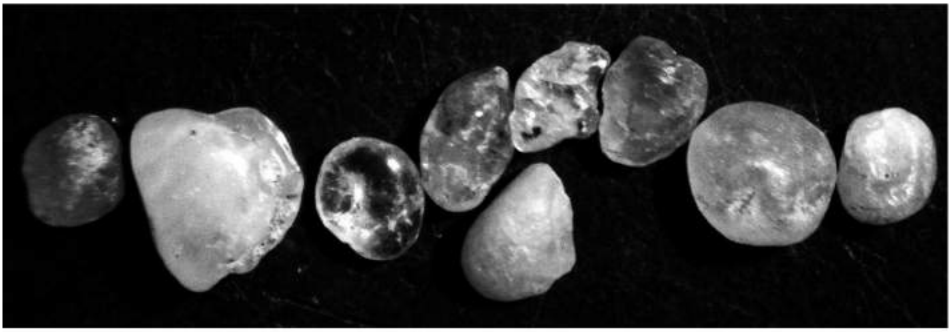
Pl. 6. 1 – The kom wall used to create the soil profile of the layers of sediment. Photo by M. Pawlikowski; 2 – Fragments of fish bones. Binocular magnifier, 20x magnification. Photo by M. Pawlikowski; 3 – Bone fragments. Binocular magnifier, 20x magnification. Photo by M. Pawlikowski



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Pl. 7. 1 – Several small grains of natural and burnt quartz. Binocular magnifier, 20x magnification. Photo by M. Pawlikowski; 2 – Daub crumbs with imprints of straw fragments. Crumbs went red when burnt in the presence of oxygen, but grey when oxygen was absent. Binocular magnifier, 20x magnification. Photo by M. Pawlikowski; 3 – Fragment of a ceramic vessel. Binocular magnifier, 20x magnification. Photo by M. Pawlikowski

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# EARLY GREEK FORTIFICATIONS IN THE TERRITORY OF THE LATER BOSPORAN CITIES

**Abstract:** *Scholars have long debated the question how a small state like the Bosporus managed to remain independent for almost a millennium by the side of two nomadic giants, the Scythians and the Sarmathians. One of the reasons of their success were the fortifications that they had started building around their cities in the early stages of the colonization effort. Summing up the current knowledge of early Greek fortifications in the territory of the future Bosporan state, one cannot but note the weakness of the evidence. Changes of ground topography, natural and anthropic, have destroyed most of the earliest occupation sites. Practically none of the early Greek cities that should have had fortifications judging by their later histories are known.*
**Keywords:** *Early Greek fortifications*; *Bosporus*

Scholars have long debated the question how a small state like the Bosporus (Pl. 1: 1, 2) managed to remain independent for almost a millennium by the side of two nomadic giants, the Scythians and the Sarmathians. It competed effectively with the great superpowers of the ancient world: Persia, Egypt, Macedonia and Rome and one of the reasons of their success were the fortifications that they had started building around their cities in the early stages of the colonization effort. The answer is not straightforward. Cities like Gorgippia (Alekseeva 2003) were fortified most probably in the first settlement phase (the end of 6th century BC), possibly because they bordered on territories occupied by the warlike Caucasian highlanders, a situation that made defenses a necessity. The small Bosporan

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cities of Akra (Kulikov 2003), Porthmion (Vahtina 2009a), Torikos (Onajko 1980) and the later Tanais (Arsenyeva 2007) had fortifications that were erected most probably simultaneously with the houses of the first colonists (in the 6th century BC) because their role was either to protect access to the densely populated lands first colonized in the Cimmerian Bosporus (Akra, Porthmion) or to protect the residents and merchants from the mountain tribes (Torikos), or because they had to fend for themselves owing to the sizable distance from other Bosporan towns (Tanais).

The Greeks arrived in the northern Black Sea littoral at the beginning of the Nymphaion transgression (in the second half of the 7th century BC), when the sea level was lower than today, determined at between 5m and 12m depending on the researcher (Golenko 2007, 189, with the newest references). Over time the water level rose, gradually flooding the lower-lying ground. In some places the material evidence for the presence of the first colonists is difficult to trace because the settlements were situated often by the seaside. A few important cities, especially on the Taman peninsula, have never been found and it is perhaps for this reason that nothing is known of the Greek presence on the northern coast of the Azov Sea. The higher-lying settlements continue to be destroyed by abrasion, e.g. the progressing destruction of Kytaion (Molev 2010) as well as Nymphaion (Sokolova 2007) and its *chora* (Scholl and Zin'ko 1999). Seismic activity was strong in the region between the 4th century BC and the 3rd century AD. Written sources recorded some of the catastrophes, like the one of 63 BC (Dio. Cass. 37.11). Landslides have also made research on early settlement difficult; this is illustrated particularly well by the slopes of Opuk hill where Kimmerikon once stood (Golenko 2007). Regular quarrying of stone building material from the ruins, by local inhabitants as well as by the civil and military authorities in particular, should also be mentioned. Wars, starting from the Crimean War through the Civil War to World War II, caused substantial damage to the archaeological sites and finds, as well as scientific documentation. Irreparable losses were done in the early 1990s by illicit diggers working with very modern equipment on an unprecedented scale. Earlier plundering concerned mostly the cemeteries.

Archival, mainly 19th century, materials are the source of further problems. Some of the documentation has been lost and other records have survived solely as descriptions, without any plans or finds. On most maps, plans and drawings, the urban layouts reflect the last stages of their existence, that is, a situation from the first centuries AD. The plans show the cities before they became quarries for salvaged stone building material, but it is still difficult on these grounds to reconstruct the earlier periods in the existence of these. Hence the limited use of these sources recently made available in a book by I. Tunkina (2002).

Thus, the beginnings of Greek settlement in the Bosporus are lost in the darkness with insufficient written sources and very modest archaeological sources. It is not clear when the first settlers came to these territories. It may have taken place in the first three decades of the 6th century (Zin'ko 2014, 292–293), and it is possible that Greeks were present in the area as traders. It is to be kept in mind that in antiquity the border between Europe and Asia (Pl. 1: 2) passed through the current Kerch Strait (ancient Kimmerian Bosporus), the Azov Sea (ancient Maiotis) and the river Don (ancient Tanais). The shores of the Kimmerian Bosporus was where the first Greek settlers made a home for themselves. Another spot was the mouth of the Tanais where it flowed into the Maiotis, that is, the city of Kremnoi, of which little is known (Kopylov 2002).

The first settlers were challenged more by the forces of nature than by the local tribes. The sources intimate nothing about military action on the part of the tribes against the settlers. The first evidence of burning in Myrmekion dates from the mid-6th century BC, but is not accompanied by any evidence of raiding (Vinogradov 1999, 290). Fires were fairly common in ancient settlements, due to either living conditions or natural forces. Ravages caused by military action are known from the cities from layers of the end of the 6th and early 5th centuries BC. An exception in this respect are the earlier damages to the Archaic fortifications of Torikos.

The location, whether on one or the other side of the Kimmerian Bosporus, determined the kind of building material that prevailed: stone on the European side, mud brick on the Asian side. The Kerch peninsula and the vicinity of Tanais were rich in beds of limestone, while building stone was largely missing from the Taman area, Gorgippia being an exception as it was built on a limestone hill that served as a quarry. The debate on whether the upper parts of walls were of stone or mud brick is theoretical; it is reasonable to suppose that wherever stone was more easily available locally (outcrops of limestone and sandstone can be seen in places), it would have been used more often than mud brick.

The author has recently discussed urban fortifications built before the middle of the 1st century BC (Scholl 2014), while the embankments were described by him in an article published in 1981 (Scholl 1981). Since then a substantial amount of fieldwork has been carried out to verify ideas related to the existence and form of these defenses (Maslennikov 1998; Maslennikov 2003; Gavrilov 2004; Ermolin 2010).

The embankments, both existing and hypothetical ones, were referred to traditionally by different names; hence a numbering system has been proposed in order to avoid any misunderstanding in the scholarly debate. The first embankment was near Pantikapaion, embankment II ran from Lake Uzunlar to the Azov Sea, embankment III encircled Nymphaion, embankment IV was near Kytaion, V near Theodosia, VI cut across Perekop cape, VII protected cape Fontan from the east (Scholl 1981, 344–345). Not all of these defenses need to have been contemporaneous. For example, embankment VI seems to be a later addition, namely, it appears to have been constructed when the island that existed here during the times of the original Greek colonization was joined to the mainland. A Russian-German expedition (Schlotzhauer and Zhuravlev 2014, 213) working currently on the site has undertaken geoarchaeological investigations to resolve the issue. Embankment II also seems to be later than the period in question, being connected with the Archeanaktid dynasty at the earliest or the first Spartokids. The same may be true of embankment V, as the need to fortify the western flank of the Bosporan state coincided with the incorporation of Theodosia into the Spartokid domain; for many centuries this border remained unchanged.

Thus it may be assumed that only the European part was defended by a system of earth embankments preceded by a system of ditches on the western side. Considering Herodotus' (4.12) information about the Kimmerians retreating from the Scythians behind successive embankments, it would mean that they first made embankment II, followed by I, III and IV; it may be assumed then that in extending their territories the Greeks first renovated embankments I, III and IV, and then embankment II (Scholl 1981, 348). There is no certain archaeological evidence, however, for the use of embankments as fortifications in the early phase of Greek colonization in the region.

Additional elements, like towers and garrisons, presumably did not appear on the embankments before the high period in Bosporus development, that is, in the second half of the 4th century BC. The early Greek settlers chose naturally defensive locations on the sea with fertile lands extending around them. These original places became acropoleis over time (Myrmekion, Pantikapaion). Pantikapaion developed into the biggest city on the Bosporus and the state capital (Pl. 2: 1).

The defensive system of Pantikapaion, its acropolis in particular, was reconstructed tentatively by Tolstikov (1984, 28ff.; 2010b). Defense wall 115, fragmentarily exposed in 1949 in the *Esplanadnyj* trench (Blavatskij 1957, 7), must have belonged to an early period, possibly even the 6th century BC. The foundation, now surviving to a maximum height of 1.21m and width of 2.34m, was composed of huge dressed stones. It may be part of a fortification predating the arrival of the Greeks, possibly a Cimmerian fortified shelter, according to Blavatskij. The wall was dismantled almost entirely not later than the first half of the 5th century BC (Blavatskij 1957, 25) or even its beginning (Blavatskij 1964, 14). It may have also been the fortified settlement of the first colonists when they first arrived. Tolstikov (2001a, 48), however, does not believe in its defensive function.

Tolstikov and others (Tolstikov *et al*. 2003, 319ff.) were of the opinion that earlier fortifications existed on the acropolis before the construction of the palace of the Spartokids. The acropolis, which was the best fortified part of the Greek city, was built in the second phase of building period II, at the end of the 6th century BC. The earliest known fortifications, defending the entire region of the First Throne, date to this period.

Tracing the boundaries of the acropolis, which centered on the peak of the First Throne, was a major research task that Tolstikov (2000, 303ff.) took upon himself. The ground topography on the east and south formed the natural boundaries, according to the scholar. A rock ledge to the west of the First Throne is the highest peak at 92m a.s.l. and the central point of the acropolis; its cut-back cliff descends onto the fairly flat and even western plateau of the Hill of Mithridates. Natural steep slopes form the eastern and southern edges of this plateau. Rock outcrops can be seen with evidence of rock-cutting under the fortifications.

Building appears to have been hurried in the early phases, taking advantage of the topography and using stone from earlier ruined structures. Layers of destruction of this earlier architecture have yielded, among others, numerous Scythian arrowheads from the second half of the 6th and early 5th century BC.

The town of Myrmekion may have also acted as a central distribution center for the colonists in the early stages of the colonization (Pl. 2: 2). The first defenses were constructed in the middle (Vinogradov 1999, 290) or the third quarter of the 6th century BC (Butâgin 2006, 19). A wall was built on a rock ledge in the southwestern part of the town, cutting off access to the highest part of the hill. The stone socle of this wall, which was presumably of mud brick, has survived in place. This base (walls 37 and 58) was approximately a meter wide and followed the ground relief, incorporating natural rock outcrops (Pl. 3). Wall 37 adjoined steep rock cliffs at both ends, on the east and west, protecting the ascent to the acropolis from the side of the gentle slope. It stands on pits dating from the second quarter of the 6th century BC. Wall 58, standing on a rock (with a smaller tower-like projection next to it), consisted of two separate walls, one earlier and the other later, fortifying the original complex. The reinforcement may have been added in the end of the 6th or the early years of the 5th century BC. The cultural layer underlying the wall foundation yielded Chian amphorae sherds typical of the second half of the 6th century BC, as well as a fragment of an Attic kylix and the neck of an Ionian jug from the same period. The wall turned at right angle a number of times, forming two tower-like projections, one 4m long and the other just 1.2m long. The stones of the wall foundation were large and undressed, laid straight on the rock ground in places, the gaps between them filled with smaller stones bonded in clay. The building technique resembles closely the early fortifications of Porthmion; thus, they are one of the earliest examples of fortifications in the northern Black Sea littoral. The original fortified acropolis was no bigger than 150–200m$^2$, although Vinogradov (1995, 35) estimated the area to be closer to 320m$^2$. The acropolis may have lost its military function within its old borders possibly already in the beginning of the 5th century BC (Butâgin 2006, 20).

Porthmion was a highly peculiar city in that it was surrounded by masonry walls on all sides from the start. Vestiges of the earliest fortifications were uncovered in 1986 in the eastern and southeastern parts of the city (Pl. 4). The eastern wall, traced on a length of 12.8m, ran parallel to the natural plateau edge. It was heavily reinforced in view of the easy approach to the site afforded by the gentle slope here. The stone foundation rested on huge blocks of limestone reaching 1.2m in length and 0.6m in width (Vahtina 1995). The stone blocks higher up in the wall were of smaller size and the interstices between them were filled with stone debris and earth. The wall was roughly 1–1.1m wide and survives to a height of 1.2m. The upper section may have been made of mud brick in all probability.

The southern part of the Archaic defenses was based on a natural rock outcrop, running in a broken line and forming a natural kind of a tower. Parts of it have been preserved over a distance of 20m. The rock cliff was undercut in places to accommodate the fortification, while gaps in it were filled with stones, rubble and earth. Like the east section, the southern one ran along the edge of the plateau, over a very steep gully slope. There may have been a tower in its southwestern part (Vahtina 2008, 53).

A section of the early defenses was observed also in the southwestern part of the city, while excavating some later residential architecture. It formed the side wall of one of the houses. The rest appears to have been dismantled when the new building project was executed.

A rainfall disposal channel had been constructed against the inside face of the east wall. A section 10m long was reserved. It was 0.4m deep and 0.35–0.4m wide (Vahtina 2009b, 69). At the southern end it opened outside the defenses. In the next building phase, the channel was built up and huge blocks of limestone sealed its mouth.

The walls were erected in the second half of the 6th century BC and are considered the oldest Greek fortifications in the northern Black Sea littoral. The dating is based on the oldest pottery material from the lowest layers next to the wall foundations, compared with the pottery assemblage from the water channel. This included primarily sherds of amphorae from Miletus and Klazomenai, as well as table ware. The only defenses that were contemporary with the early wall of Porthmion are the defenses on the Myrmekion acropolis (Vahtina 2009a, 94). They suffered from a severe conflagration in the end of the 6th century, but were rapidly rebuilt and existed in unaltered form and course throughout the Classical period.

Tyritake played an extremely important role, blocking a potential attack on Pantikapaion and Myrmekion from the south. In the end of the 6th and the beginning of the 5th century BC nomads threatened to raid the Bosporus. Defenses started to be built, some better, some worse. Nothing is known of the Tyritake fortifications from before this time, although earth embankments cannot be excluded and those would be difficult to trace. In the early 5th century BC (first half of the age, Gajdukevič 1971, 57), Tyritake was defended by a stone wall which incorporated also the outer walls of earlier structures. On the one hand, it attests to a hurried construction, but it may also indicate a downplaying of the threat by the Greeks. Money was also an issue. Some of the buildings were destroyed during the construction or their walls served as substructures for the fortifications. The walls presumably surrounded all 5ha of the town (Zin'ko 2014, 306–308). A section of double-faced wall, 1.7–1.8m wide, was uncovered in trench I (Marti 1941, 14). It was built of large well-dressed limestone slabs lining a core of smaller stones and pebbles bonded in clay. Pottery of the 6th century BC was found in culturally sterile layers at the base of the foundations. Two other sections of these fortifications, approximately 2m wide, were found on the western side, in trenches V–VI. This wall (no. 106) was erected of large undressed limestone chunks which were not bonded (Knipovič and Slavin 1941, 42). Found in the lowest course of this wall were two anthropomorphic stelae from the 3rd millennium BC (Zinko 2003, 829).

The defense wall in trench XIV (curtain walls 2 and 2a) joined two buildings from the mid 6th century BC (Pl. 5), that is, the outer walls 18 and 72 of these buildings (Gajdukevič 1952, 87). The damage to these walls is substantial, but their course and manner of construction are still evident. Walls 2a and 71 are interbonded in the lower part, 2a starting to overlap 71 from the fifth course up. At this point the width of the wall was 1.71m. Further north, inside an Archaic structure, one can see some stones, which could be part of the defense wall running across the structure. The building was probably already out of use when the defense wall was built. Inside the building, a paved surface (no. 80), 0.68m wide, appeared alongside curtain 2a. This particular wall, of which some 13m were cleared, was built of broken stone bonded in clay, the stones in the facing being larger and roughly squared. Its northeastern end was joined to wall 75, a small fragment of which was cleared inside the trench. It may have been part of a tower, but the ancient remains in this part of the town were annihilated during World War II (Gajdukevič 1952, 87).

The uncovered section of wall 2 stretched 15.25m in a southeastern direction from wall 23, which was part of the oldest Archaic building. The southern termination of wall 2 had been dismantled completely, whereas the northern end joined the building. At this point, the wall was up to 2m wide, tapering to 1.7m at the other end. The inner face of wall 2 at the joining with wall 23 was reinforced by adding an additional face of large limestone slabs. These slabs overlap wall 23, hence wall 2 should be considered later in date, especially as it is founded on a slightly higher level than wall 23.

It seems obvious that walls 2 and 2a were constructed at the same time and in response to a situation of external danger. Numerous finds of bronze arrowheads outside of wall 2a can be considered as proof. The steepness of the slopes, on which the defenses were constructed should also be emphasized.

Phanagoria was the biggest city and later capital of the Asiatic part of the Bosporus state. During the Archaic age it may have given way in precedence to Kepoi and Hermonassa. Heavily damaged sections of the lower parts of a fortification (wall 72) were discovered in the southeastern part of the city (Kobylina 1969, 98–99). Huge flattish chunks of sandstone interspersed with debris and single stones formed the lowest course of this wall, which was erected on a substructure of sand up to 0.7m deep in places and leveling the ground surface under fortifications 4m thick. The upper courses of this wall would have been built of mud brick. After Zavojkin (2004, 51–52) this wall was built in the second part of 5th century BC.

The most important town of southern Bosporus was Gorgippia, but there is very little information about its Archaic-period fortifications. Sections are invisible under modern building, while other parts were used to construct new lines of defenses. The earliest recorded remains, found in the 'Okean' trench (Pl. 6: 1), comprised a presumed ditch about 2m deep, 2.2m wide at the bottom and spreading to 4.5m at ground level (Alekseeva 1997, 14). A 60m long section (Pl. 6: 2) of this ditch was investigated, which appeared to encircle the area from the west. The inside slope of the ditch may have been topped by wattle-and-daub defenses. The fortifications protected semi-sunken huts, possibly also more solid, public structures but the patchy character of the excavations carried out in this area do not permit any more definite conclusions. The ditch appears to have been filled in already in the second building stage, when a house (no. 1) with walls one meter thick was constructed on the spot. The fill of the ditch yielded amphora sherds, including Chian vessels with bulging necks, proto-Thasian amphoras and containers from Clazomenai, the latter decorated with broad red lines. The material is dated from the end of the 6th to the early 5th century BC (Alekseeva 2003, 19). House 1 could have easily been a defensible building itself.

Another city playing a significant role in the colonization process was Patrasis (Pl. 7). The upper town was fortified from the second half of the 6th century BC (Abramov and Zavoykin 2003, 1124). One of the defensive features was a ditch, 4m wide and at least 1.56m deep, separating the upper town from the eastern and western economic zones (Abramov 2010a, 11), at the same time the ditch cut the peninsula off from the steppe (Abramov 2005, 34). Stratigraphic exploration of the fill confirmed its natural origins (Abramov 2000, 7).

Torikos was the most important center of Greek settlement in the foothills of the Caucasus (Onajko 1980). The fortifications used local marl stone, taking advantage of ground relief, especially the rock outcrops as a base for the defense walls (Pl. 8). Larger stones, mainly slabs, were laid in the foundations and were also occasionally used in the upper wall courses. Larger stones were also used in the wall faces, while the core consisted of smaller rocks, all bonded in a loose clay mortar. Only one entrance to the fort has been recorded; it was situated near the western corner, on the southwestern side. Wall 1, which measured 0.8m in width, protected the fort from the east; it was constructed of large, long, neatly laid blocks forming two faces for a core of smaller stones bonded in clay. The lower courses were more likely to be formed of large blocks. Level with unit W, the walls were given an additional facing about 0.4m wide, forming a kind of a tower, which measured 1.2m wide, extending for 4m. The wall and the additional facing were contemporaneous. The full length of the wall running north to unit B is not known, the wall having been damaged by a modern pit beyond which there is the cliff. Transverse inner walls joined wall 1.

Unit I, which covers more than 24m$^2$, projected 4.5m from the southern curtain, just 30 m east of the gate entrance. It must have been the room inside a tower guarding the gate. The tower has three outer walls: the southern one (no. 17), the eastern one (no. 1) and the western one (no. 16). Wall 29 is shared with unit E. Wall 1 is interbonded with wall 17, which is 0.8m wide and is built of large stones, especially in the lower part. Wall 17, the known length of which is 7m, was built of stones that were smaller than those in wall 1, although it also has large stones in the lower courses. Interbonded with wall 17 was wall 16, which was 6.3m long and 0.7–0.75m wide. Remains of a floor pavement inside the tower room (no. 27) survived chiefly in the northeastern part and in the entrance to unit E; it comprised flat stones of irregular shape bedded in natural clay and bonded with a clay mortar. Two stone supports were found standing in unit I, both rectangular, one (no. 25) built of stones in a clay mortar, 0.55m high and attached to wall 1, the other (no. 28), measuring 1.65m by 1m, attached to wall 17. The excavator believes these supports to be platforms either for stone steps (Onajko 1980, 23) or wooden ladders operating inside the tower.

The defense wall (no. 5) on the south was 30m long and 0.5–0.7m wide; it was not as well preserved as wall 1, being dismantled almost completely in places, but even so, the bondwork seems to have been more regular than in wall 1. Transverse inner walls were interbonded with wall 5. On the other side of the gateway, wall 5 was continued by wall 62, only fragmentarily preserved (3.6m surviving length, 0.8m wide); the faces of this wall, especially on the outside, were constructed of large and well fitted stone slabs.

Unit T, which was a passage leading from the main gateway inside the complex, can be found between units S and U. It was 8m long and 2.2m wide. That was the width of the entrance at the southern end, fitted with a threshold (no. 63) made up of five large slabs, the largest one being 0.75m by 0.6m and 0.08m thick. The west wall (no. 68) featured large blocks of stone in the lower courses on the passage side. A paved area at the northern end (no. 106) suggests that the entire unit was paved. The west wall (no. 61), which was 9m long and is missing the middle part, removed down to the foundation, also ended at the southern end of this paved area. At the southern end this wall was up to 0.7m wide, narrowing to 0.5m at the northern end, away from the entrance. It was built entirely of middle-sized stones.

As for the western defense circuit, all that has remained is the rubble (no. 104) and a fragment of a wall (no. 105) closing unit H. This wall, 0.6m wide, was built of large slabs up to 1m long and 0.2m thick; the slabs were the largest especially in the outer face of the wall.

After the first destruction, in which the western fortifications of Torikos suffered the most, a reinforced wall 68 took over as the town defenses along with the newly built wall 90, which linked the new unit SZ with unit H. The old entrance was blocked using, just like for the new walls, stone salvaged from the destroyed part of the town. Wall 90 was 0.8m wide and had an outer facing of well fitted regular slabs, the largest of which were used for the lowest course. Later a parallel wall (no. 59), which was 0.5m wide, was added on to it on the inside. At the northwestern corner of unit SZ, wall 90 turned to the southeastern corner of unit H, running for 5m; in the next building phase, it was reinforced on the outside with wall 91 that reached one meter in width.

Unit F was added on the southern side of units R and S; it was rectangular, the inside measurements being 10.5m by 1.4–2m. It served most probably as a tower or rampart. Wall 5 was dismantled completely along the width of both units. It is impossible to tell whether this happened during renovation work in antiquity (and unit F would simply constitute the remains of units R and S) or whether the stone was salvaged in modern times and an entirely new room was built in this spot in antiquity. Perhaps the entrance to the town had led through this new unit F once unit U and the entrance had been destroyed. Undoubtedly, the fact that this room projected from the southern face of the defenses gave it a defensive function as well. Walls 60 and 70 constituted the outside perimeter of this unit from the south, wall 79 from the east and there is no west wall as the new gateway to the town may well have been situated here (Onajko 1980, 48). Wall 58 was founded on a sand bedding that was at least 0.3m deep. It was 1m wide with an inner facing of large, well fitted stones, including a 1.8m long slab. Wall 70 was up to 0.7m wide and was interbonded with the east wall (no. 79), which was also 0.7m thick and running for 3m. All the walls of unit F were constructed of well fitted stones, especially the outer faces in which large slabs were used particularly in the lower courses.

A different and more likely theory contrary to Onajko's positioning of the new entrance holds that the passage led through unit O, thus giving reason for the reinforcing of wall 5 on the inside and outside (east and west sides respectively). Two towers would have additionally protected an entrance in this place from the east and west. However, a modern robber's pit in this spot makes it impossible to verify this idea with any certainty.

The outer lines of defenses were reinforced primarily in the third building phase. Additional internal walls appeared in units I and SZ, and parallel walls were added to existing ones in other places: wall 5 (in units L, N, O and P), wall 59 (in units S and SZ), wall 93 in unit H. Unit F also received a new set of walls: nos. 75, 80 and 81. The building material in these new walls often included sea pebbles and local boulders, bonded in a clay mortar. The workmanship is generally poorer than in the case of the older walls.

Unit I was also rebuilt on the inside with wall 13 being added to wall 29, making it 1.3m thick overall (twice the original width). The added wall stood on an occupational layer up to 0.8m thick. Wall 16 was given added height and perhaps also width, becoming interbonded with wall 13 in the upper parts. The doorway was also blocked at this time. A wall (no. 15) was built inside the room, projecting west from wall 1. Destruction in this part of the unit leaves unanswered the question of whether the wall reached wall 16 or whether there was an intentional narrow passage left in it by wall 16. In any case, two separate units were formed in this fashion, the northern one Ż and the southern one Z. Wall 15, 0.8m wide and surviving for a length of 4.45m, stood on a gravelly layer up to 0.45m deep plus up to 0.6m loess, thus placing its footing more than a meter above the foundation level for the older structures.

Wall 5 was reinforced with additional walls. Wall 38 was constructed inside units L, N and O; it was 0.6–0.8m wide. On the outside of unit P, wall 54 was hastily put together. This made the wall twice as thick as before, the width being now 1.3m, while reducing the size of the rooms at the same time. The additional walls were founded on a level 0.7m higher on the average than the original wall 5.

Room F was given an additional wall (no. 75), reinforcing the old walls 70 and 79. It ran in a slightly arching line. A poorly preserved wall (no. 81) was constructed perpendicular to its orientation. The bedding layer for all the new walls contained few artifacts next to a large amount of charcoal from burned structures. Wall 81 presumably divided unit F into two. Only a small fragment of wall 64 was preserved, it being a defensive wall and a continuation of wall 60. These two walls fortified the southwestern corner of the fort, thus making unit F another tower, similar to unit I. The main gate could have been located in this period between walls 60 and 70.

The west walls of units S and SZ were reinforced with an additional wall (no. 59), built on an occupational layer up to 0.6m thick, thickly mixed with charcoal. In its western part this wall was 0.35m thick, in its northern part 0.5m thick, thus extending the overall width of the defenses in this place to 1m.

Wall 91 was added on the outside to wall 90, which joined units SZ and H. The overall length of wall 91 was 6.4m, its thickness 0.65m, raising the overall thickness of the defenses here to 1.6m. It was constructed of large and middle-sized slabs, standing on an occupational 0.4m thick layer.

Wall 93 was also added in unit H, forming together with the older wall 92 a single line 1.6m thick. It, too, stood on an occupational layer up to 0.45m thick. The west wall (no. 105) was reinforced on the inside with wall 102, the joined walls giving the same thickness as recorded in the case of the south wall (nos. 92 and 93).

Summing up the current knowledge of early Greek fortifications in the territory of the future Bosporan state, one cannot but note the weakness of the evidence. Changes of ground topography, natural and anthropic, have destroyed most of the earliest occupation sites. Practically none of the early Greek cities that should have had fortifications judging by their later histories, is known. On the European side there is Akra (a defensive ditch and embankment may have been used in the earliest occupational phase), Kimmerikon (possibly the first settlers occupied the upper plateau with very steep cliffs rising 40m high) and Theodosia. Nothing is known about the early fortifications of the Asiatic cities of Hermonassa, Kepoi, Labrys.

The Greeks settling the European side of the Bosporus probably met with no resistance from the local tribes. The Kerch peninsula in this period was probably poorly populated in this period giving the Greeks time to prepare for contacts with the Scythians. The situation in Taman peninsula is not clear. The region should have been settled by Meotians, especially Scythians, who were quite advanced in terms of civilizational development. Hence presumably the active participation of these tribes in trade on one hand and on the other, their organized resistance to the Greeks as attested by the war led by Queen Tirgatao (Polyaenus 8.55). The Greeks not only had to defend their cities, but they were also forced to protect their agricultural hinterland. Stone fortifications could be built around the cities, but fields could be protected solely by defensive ditches and embankments. Such a system, comprising a ditch and embankment, was widely used by the first Greek settlers (Gorgippia), as well as by the local tribes, the Meotians and Scythians. The early settlements presumably had to satisfy certain conditions: seaside location, best on a peninsula, convenient harbor, cultivable land nearby. A cape extending into the sea had to have a river or other source of potable water near it. The cities were fortified first and only after that were efforts made to protect the agricultural land, which is connected in turn with new permanent settlements in the *chora*. Neither should one exclude fear of annexation by neighbors as a reason for fortifying settlements near other Greek settlement centers.

The different situation of towns on the Asiatic side of the Bosporus, compared to those on the European side, in terms of external threat in the early stages of the colonization, is well illustrated by the fortifications of Torikos, a city of Greek settlers lying in a hostile environment and far from other settlements of their compatriots. The sound and repeatedly reinforced defenses were aimed at defending the population. The layout suggest a refugial function. The large inner courtyard presumably surrounded by walls (three sides have been preserved) and clusters of rooms inside these fortifications provided enough space to shelter not only the ship crews with their goods, but also the farmers from around the town with their livestock.

Thus, we know that the first Greek settlers fortified their cities and that the strength of these fortifications depended on the threat: defenses were much stronger on the Asiatic side of the Kimmerian Bosporus. However, there seem to have been other factors than just external threat as well. The acropolis of Myrmekion was fortified already in the second half of the 6th century BC, and Porthmion was given fortifications as well. While the residents of Myrmekion could have easily dealt with the fortifications around the small acropolis of their town, it is not clear who constructed the strong forts of Porthmion, as well as Torikos. The inhabitants of these two towns had neither the manpower nor the resources to complete building projects on such a grand scale. Thus, it seems evident that at least some of the Greek cities took advantage of aid from outside, possibly from their mother cities.

Independently of the quality of the defensive architecture and funding sources, Greek settlement in the territory of the future Bosporan state succumbed to a common catastrophe that came from outside. Evidence of destruction is evident in Kepoi in the third quarter of the 6th century BC layers. Phanagoria was destroyed in the end of the 6th century BC, at the same time that Porthmion, too, was razed. The destruction in Torikos and Nymphaion is dated to the same period. These events presumably prompted a political consolidation of the settlers. In the opinion of V. Tolstikov (2001b, 47), around 480 BC, the Greeks on both sides of the straits came together under the leadership of Pantikapaion and the dynasty of the Archeanaktids. But that is an entirely new phase of the history of the Bosporus.

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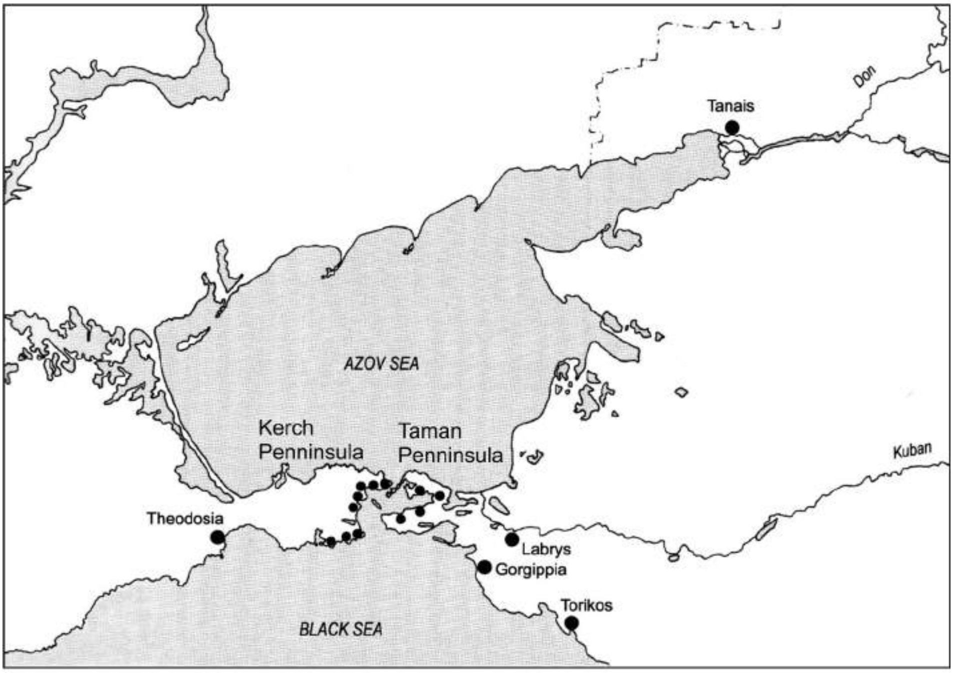


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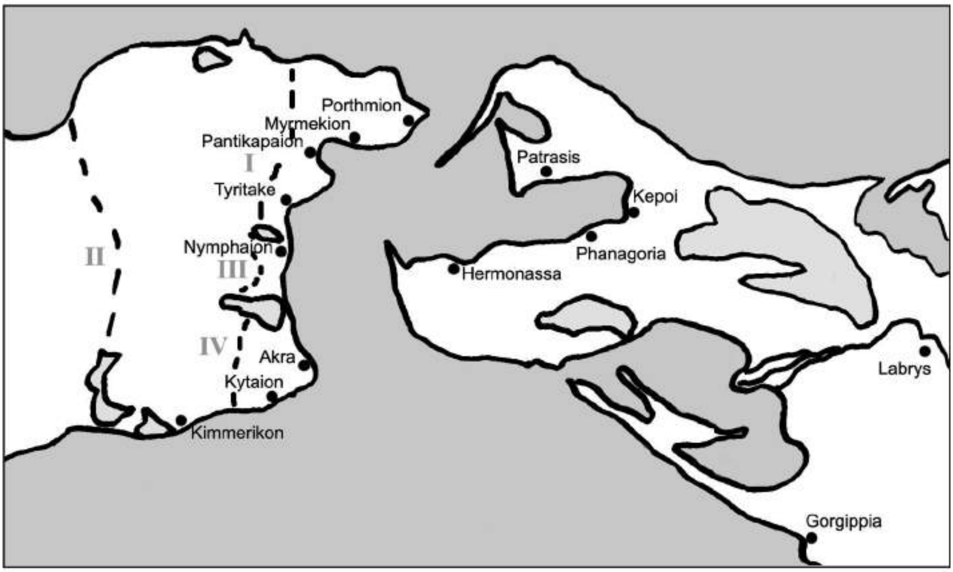


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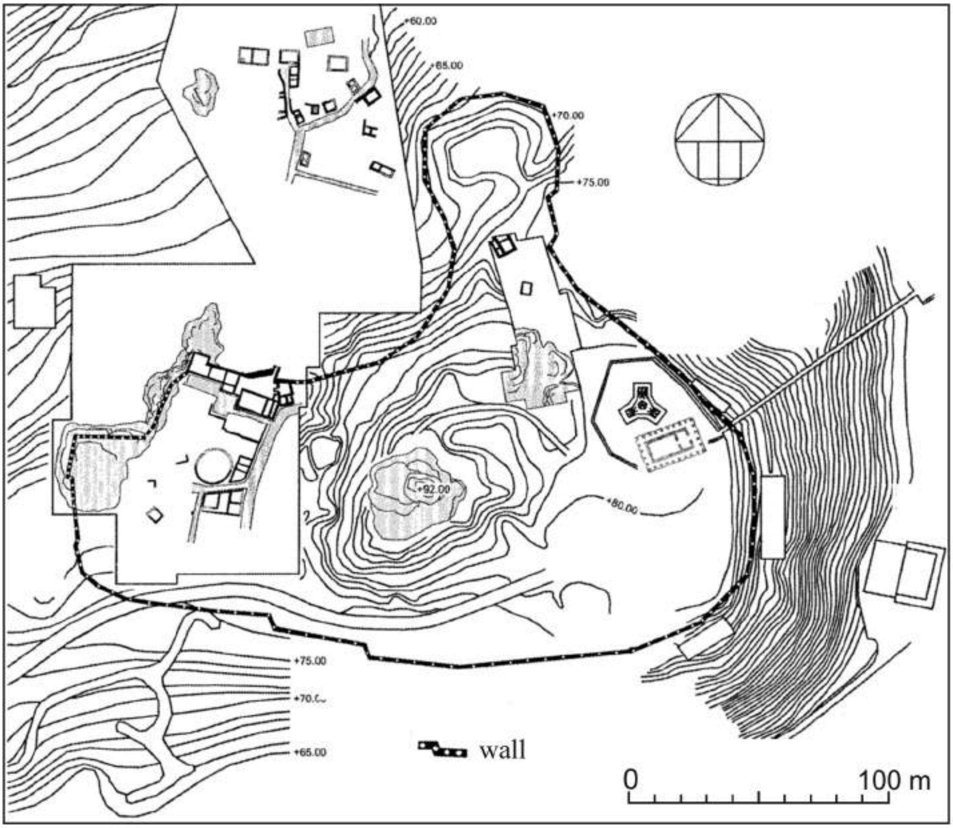
Pl. 1. 1 – Kerch Strait with ancient cities. Drawing by J. Scholl;
2 – Ancient cities of Greek period of Bosporan Kingdom. Drawing by J. Scholl

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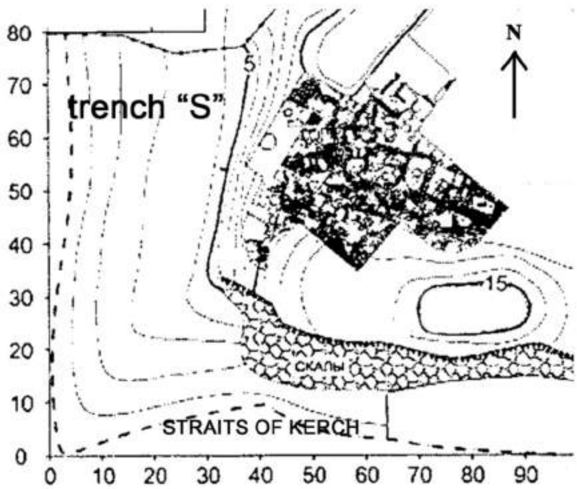


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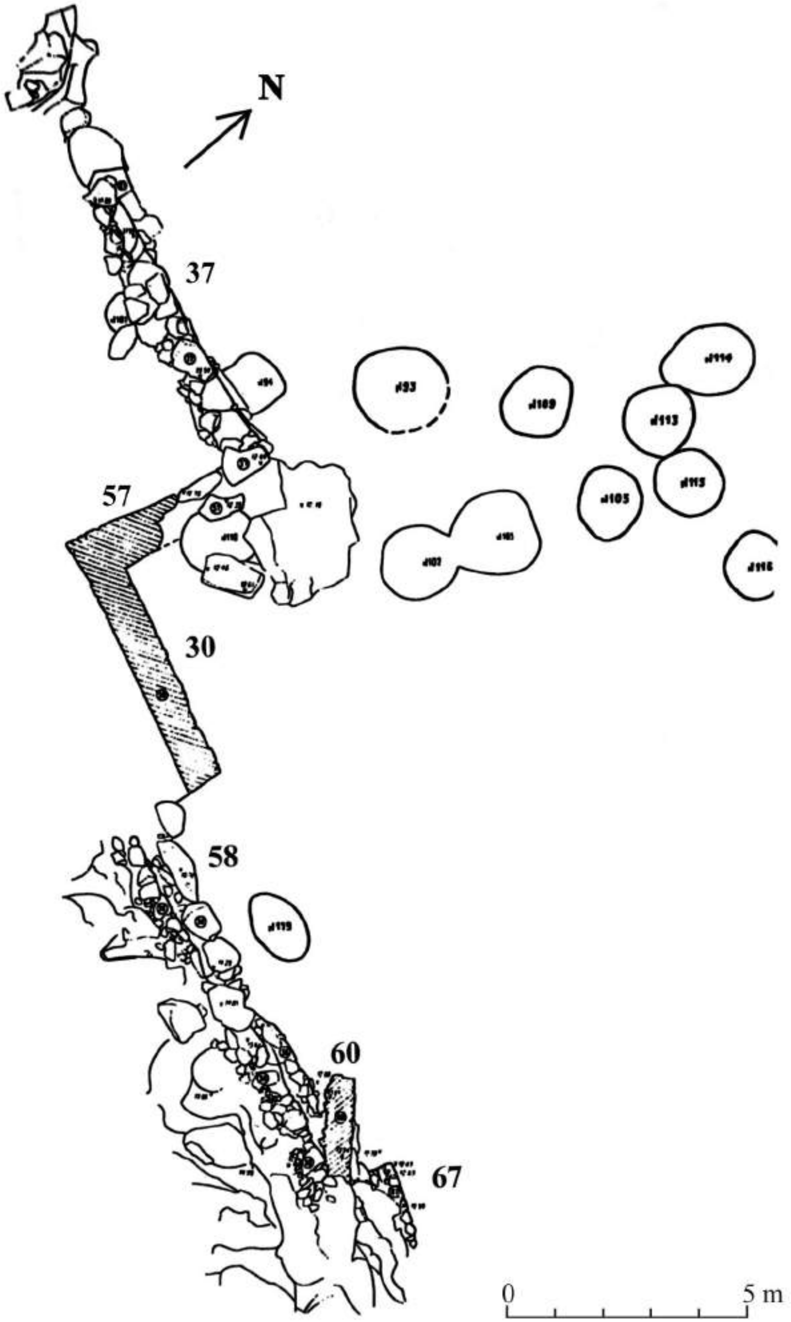
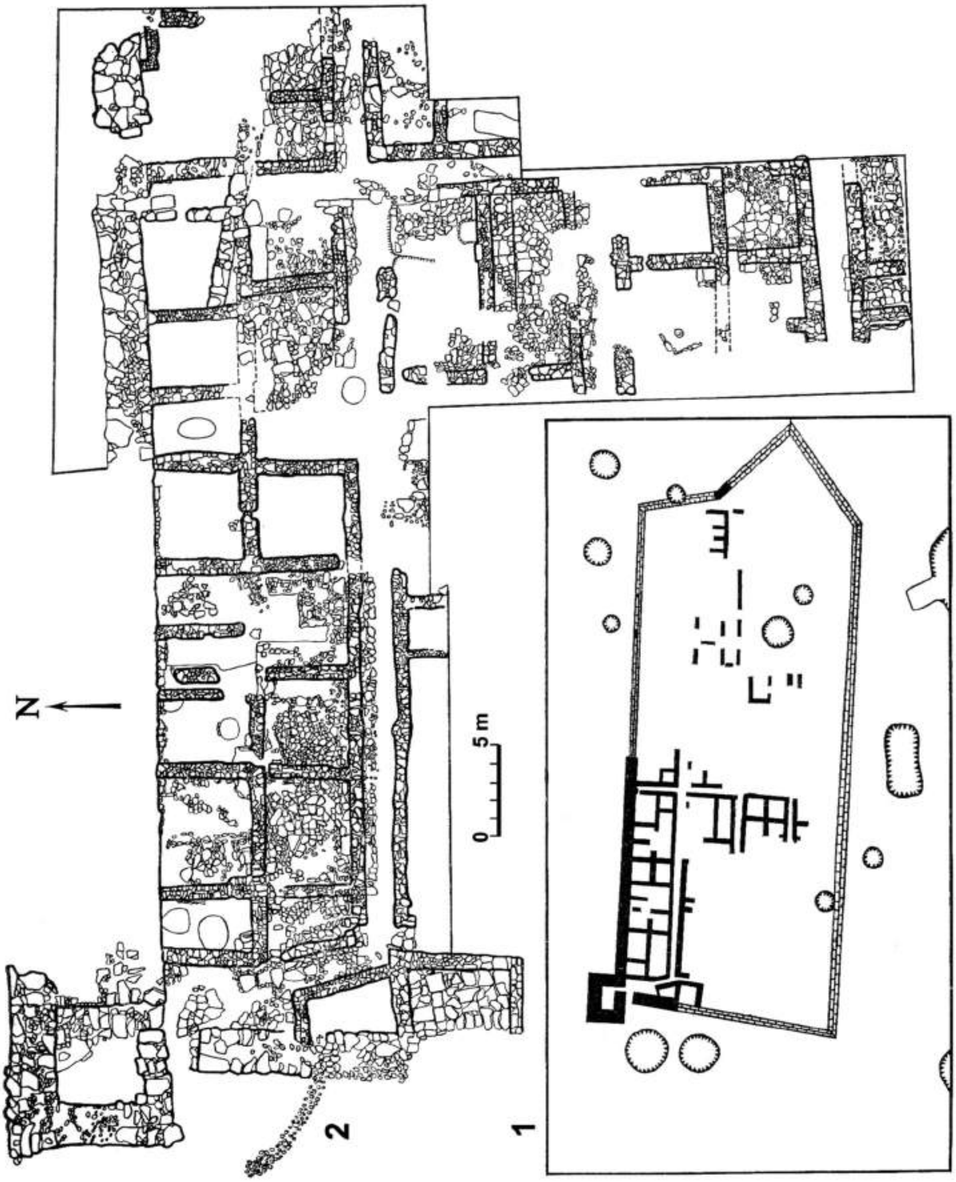
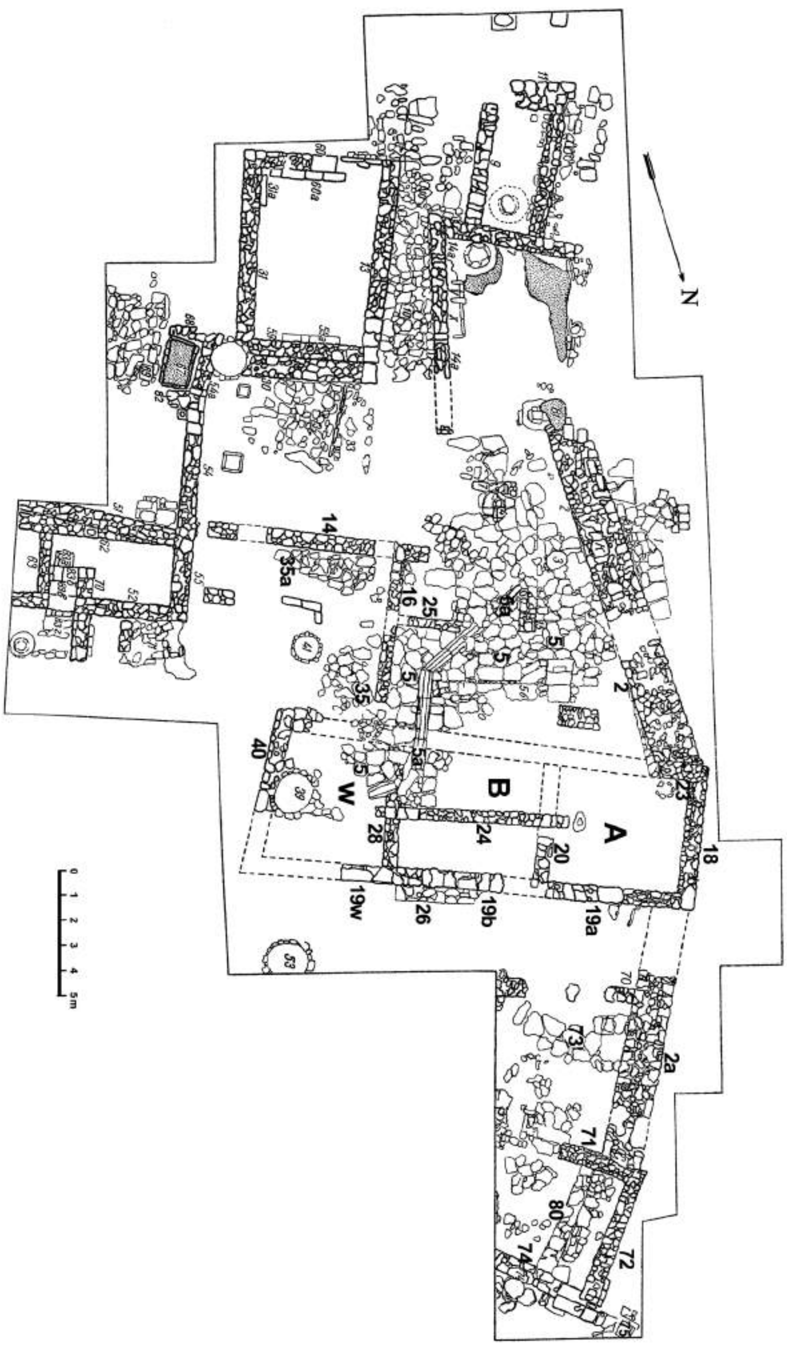
Pl. 2. 1 – Pantikapaion, First Throne of the Mithridates Hill, plan of the acropolis 500–485 BC. Reproduced from Tolstikov 2010a, 306; 2 – Myrmekion, plan of the acropolis. Reproduced from Butâgin and Vinogradov 2006, 4–5, рис. 1



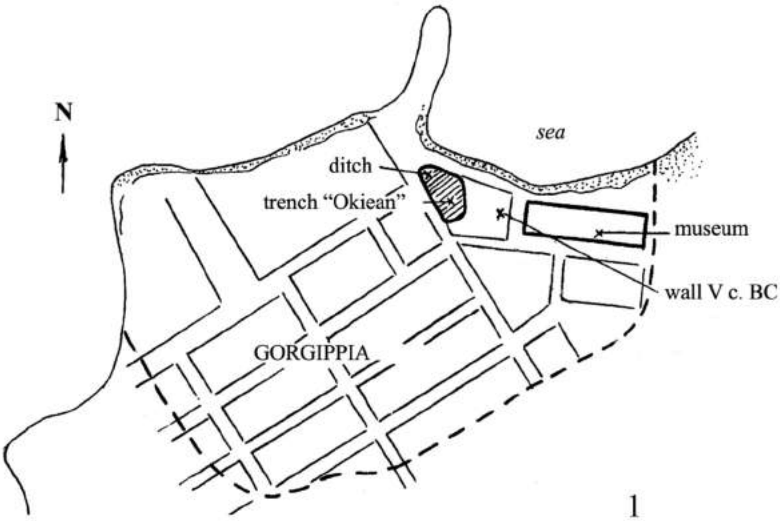

Pl. 3. Myrmekion, fortifications of the Akropolis.
Reproduced from Vinogradov 1999, 282, fig. 2




Pl. 4. Porthmion. Reproduced form Šurgaâ 1984, 131, таб. 33: 1, 2.
1 – Plan of the city from Classical period; 2 – Plan of northeastern part of the city




Pl. 5. Tyritake, trench XIV, Archaic period. Reproduced from Gajdukevič 1952, рис. 86

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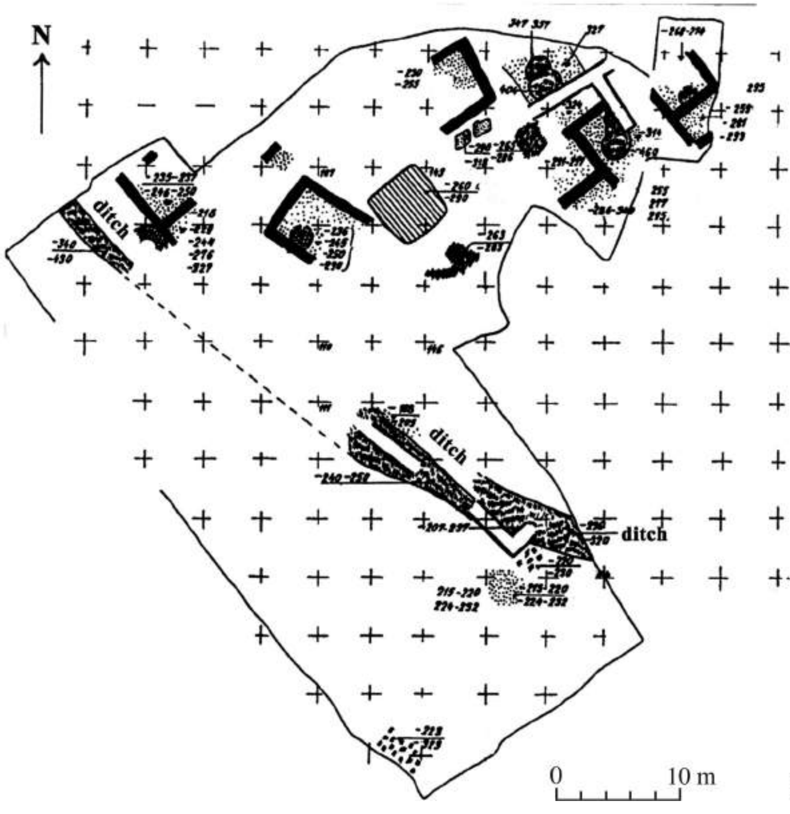


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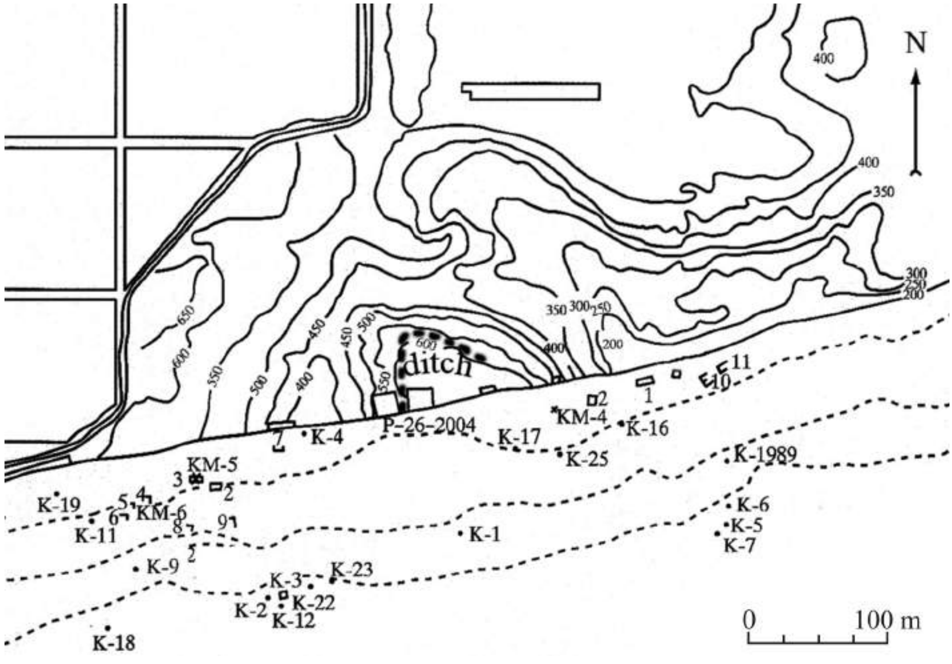
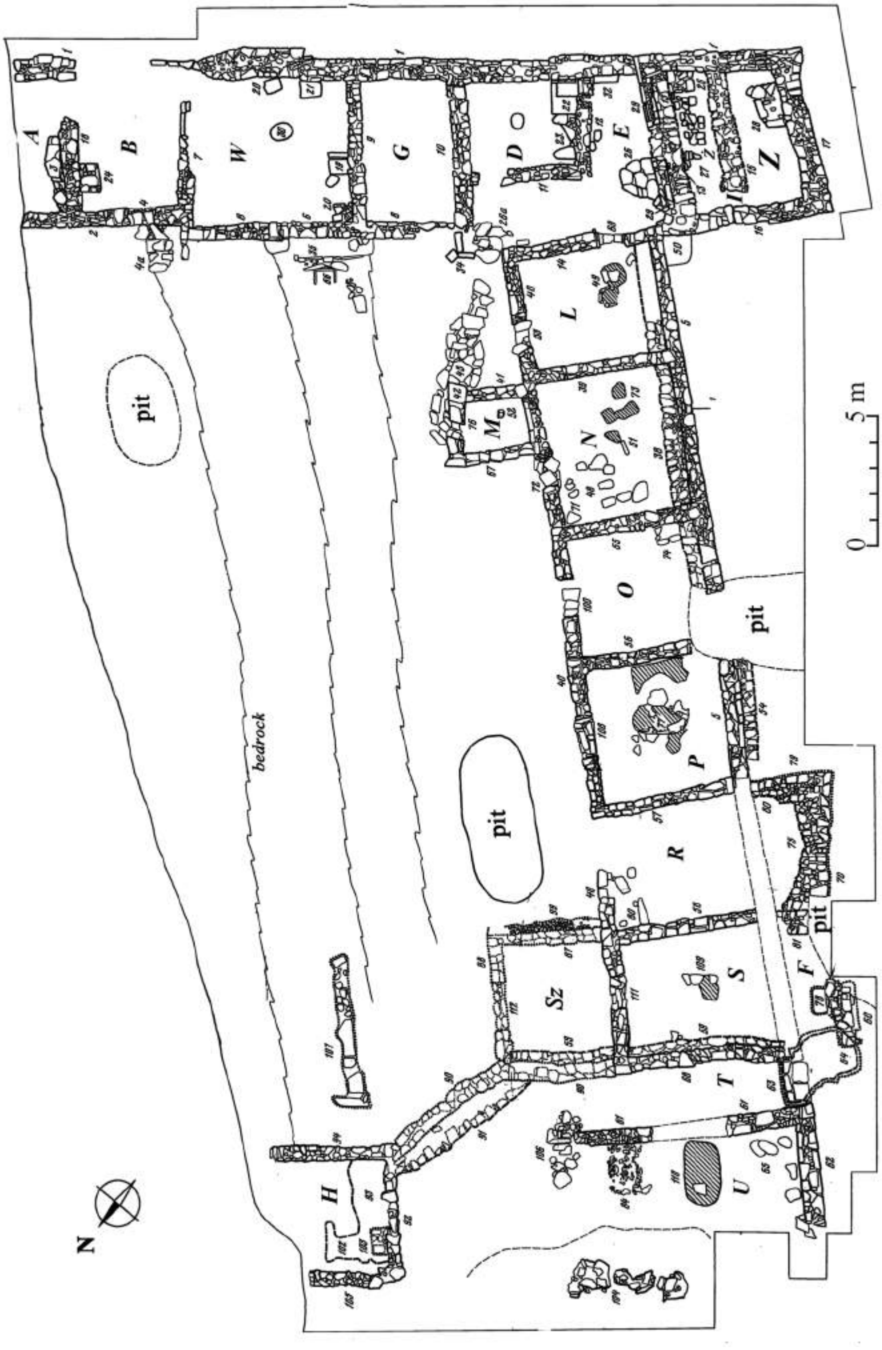
Pl. 6. 1 – Gorgippia, 'Okean' trench. Reproduced from Alekseeva 2003, 28, рис. 1; 2 – Gorgippia, ditch in the 'Okean' trench. Reproduced from Alekseeva 1997, 283, таб. 3




Pl. 7. Plan of Patrasis. Reproduced from Abramov 2010b, 530, рис. 1, and Paromov 1993, рис. 3: 153




Pl. 8. Plan of Torikos. Reproduced from Onajko 1980, рис. 4

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# MAPPING MISTAKES: THE CARTOGRAPHIC CONFUSION OF ANCIENT KLEITOR

**Abstract:** *The ancient Greek city of Kleitor lies in a small valley in north central Arkadia. Although only recently the target of systematic excavations, the first plan of its remains was published almost 200 years ago. While this earliest plan is essentially correct in the details, it is also a simple schematic representation with little topographical detail. When a revised plan of the site – comprising a much more skillful representation of the topography – was published in the late 19th century, it soon supplanted the original in the scholarship. Hidden behind its topographic accuracy and artistic flourishes, however, lies the fact that the mapping of the archaeological remains themselves was incorrect. Consequently, as this plan continued to be modified and reproduced throughout the following century, so too were its mistakes duplicated and exaggerated. Showing the cartographical evolution in the representation of ancient Kleitor and its reception by scholars, this paper demonstrates how scholars have constructed their interpretations of the remains around the unintentional predisposition to equate artistic quality with accuracy, and the consequences of this bias on the archaeological interpretations of the site.*

**Keywords:** *Kleitor; Arkadia; Greek fortifications; history of archaeological research*

The ancient Greek city of Kleitor lies in a small valley in north central Arkadia. Although only recently the target of systematic excavations, the first plan of its visible remains – that is, its fortifications – was published almost 200 years ago (Leake 1830, 2.258). While this earliest plan is essentially

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correct in the particulars, it is also a simple schematic representation with little detail. When a revised plan of the site – comprising a much more skillful representation of the remains and the topography – was published in the late 19th century, it soon supplanted the original in the scholarship (Reinach and Le Bas 1888, pl. 34). Hidden behind its topographic accuracy and artistic flourishes, however, lies the fact that the mapping of the archaeological remains themselves, whether intentional or not, was incorrect. Consequently, as this plan continued to be modified and reproduced throughout the following century, so too were its mistakes duplicated and exaggerated.

Before discussing the cartographical evolution in the representation of ancient Kleitor, this paper first considers the history of both the site and the scholarship, as well as the walls in their correct topographical and archaeological contexts. It is, of course, only after we are familiar with the accurate arrangement of the remains that it is possible to appreciate the inaccuracies which characterized most of the earliest plans of the site. Finally, after demonstrating how scholars have constructed their interpretations of the remains around the unintentional predisposition to equate artistic quality with accuracy, this paper address the consequences for the archaeological interpretations of the site with this biased way of visualizing antiquity.

## Historical background and early scholarship

The earliest attested event in the history of ancient Kleitor comes from an Archaic period dedication from Olympia recorded by Pausanias. He tells us that in the 6th century BC, the citizens of Kleitor erected a statue of Zeus to whom a tithe was dedicated from the spoils taken 'from many cities [they had] reduced by force' (Paus. 5.23.7). Unfortunately, like so many Greek *poleis* that existed on the periphery of what Baker-Penoyre (1902, 235) colourfully refers to as the 'brilliant and crowded pageant of Greek history', we know relatively little about Kleitor during the Classical and Hellenistic periods. Dodwell (1819, 2.444) perhaps captures this frustration best, writing 'the history of this little state is enveloped in obscurity and not much more is known of it than that it was sequestered in the heart of Arcadia and as it were excluded by its mountainous enclosure from the other states of Greece.' We are not completely in the dark, however, and owing largely to the ancient sources, we are able to shed some light on the history of this *polis*.

We know, for example, that Kleitor was a member of the Peloponnesian League (Xen. *Hell*. 5.4.36–37), a leading member of the Arkadian League (*IG* 5.2, 1.52), and later, a member of the Achaian League (Polyb. 4.19). Moreover, in 379 BC, during the Theban war with Sparta, Kleitorian mercenaries fought alongside the forces of Kleomenes in the hostilities directed against Orchomenos (Xen. *Hell*. 5.4.36). Finally, when, during the Social War, Kleitor refused to abandon its alliance with the Achaian league, Aitolian forces besieged the city, but upon 'meeting with a bold and determined resistance from the inhabitants' (Polyb. 4.19), and presumably from the fortifications as well, the Aitolian army abandoned their attempt to take the city.

Despite the relatively minor status afforded by history, the site and territory of Kleitor received a fair amount of attention from 19th century European traveler-writers, including Leake (1830, 2.257–259) and Reinach and Le Bas (1888, pl. 34). Such attention was almost certainly the result of the fact that the site was first visited by Pausanias, in whose footsteps many of these men followed. Although the city was still occupied to some degree at the time of his visit in the middle of the 2nd century AD, Pausanias (8.21.1–4) offers the reader a comparatively brief account of the remains, limiting his narrative almost exclusively to the extramural sanctuaries.[1] The brevity of this account did not prevent later travelers from wanting to see the remains for themselves, and in fact, Pausanias' passing description of Kleitor may actually have encouraged further exploration of the area. While the accounts provided by these 19th century travelers vary in both quality and quantity, the one thing they hold in common is their focus on the most significant standing remains – the fortifications (e.g. Dodwell 1819, 2.442–444; Boblaye 1836, 156–157; Curtius 1851, 1.374–377; Bursian 1862, 2.263–264).[2] Frazer's (1898, 4.264–267) detailed account of the site not only marks the turn of the century, but arguably also the point at which the focus on Kleitor can be said to have shifted from simple travel reports to what can be considered proper academic inquiry. Frazer's work, moreover, stands at the beginning of a long line of scholarship on Kleitor and its fortifications. While the site is mentioned briefly and in passing in the Arkadian itinerary of Hiller von Gaertringen and Lattermann (1911, 7–8), it is Papandreou (1920, 96–114) who picks up where Frazer left

[1] Some of the text from Pausanias' account of Kleitor is lost, possibly accounting for his brief description of the site.

[2] The one possible exception is Gell (1817, 130), who vaguely reports observing only the 'city [and] ruins...of Kleitor.'

off. Papandreou's detailed account of the local topography and geography, as well as the visible remains (e.g., the theatre and fortifications) remained the point of reference for scholarship on the site until relatively recently. Even 20 years later, Meyer (1939, 109–110) had little to contribute to our knowledge of Kleitor, stating '*Eine näheres Eingehen auf Kleitor erübrigt sich, da Papandreou eine ausfürliche Beschreibung gegeben hat*.' Although the topographical and background information pertaining to Kleitor provided by Jost (1985, 38–44) in her survey of Arkadian sanctuaries is very useful, it is the work of Winter (1989, 196–199), and later, Petritaki (1996; 2005) which are most significant for the present purposes.While Winter's brief, but succinct study of the fortifications of the ancient site provides important functional and chronological insight on the subject, it is the excavations and survey of the site by Petritaki (1996; 2005), which mark her as the principle authority on Kleitor. Focused primarily in the southwest area of the city between the city wall and the theatre, excavations have been carried out by the Greek Archaeological Service since 1987.[3] These excavations have added considerably to our knowledge of the site in all periods of occupation. For example, the collected evidence suggests that the city flourished during the Classical and Hellenistic periods and into the early Roman period (Petritaki 1996, 88) – despite the fact that Strabo (8.8.2) lists it among the deserted cities of Arkadia. Most significantly for the present purposes, the recent investigations of the site performed by Petritaki and her team, have identified a secure late 4th/early 3rd century BC date for the fortifications, as well as produced the first truly accurate plan of the site and its remains (Pl. 1: 1).[4]

## Geography and topography

The ancient site of Kleitor stands on the flat plain at the western end of a small valley in north central Arkadia.[5] The territory of Kleitor, encompassing an estimated 625km$^2$ was considerably larger than its closest

[3] For a summary of the results of these campaigns, see Petritaki 1987; 1988; 1989; 1991; 1992; 1993.

[4] Petritaki 2005, fig. 1. In the Winters of 2010 and 2011, I visited the site and walked the entire trace of the extant circuit, and can corroborate the existence of the towers and gates, as well as the general accuracy of this plan and its relation to the surrounding topography.

[5] Today, the area is part of the prefecture of Achaia, not Arkadia.

neighbours.[6] The immediate *chora* of the city, however, was comprised primarily of the valley in which it was located. This valley is not particularly large, measuring *c.* 6km from east to west and 1.5km north to south, and is surrounded on all sides by hills. While the hills to the south and west of the valley are relatively low, the hills bordering the north of the valley are more impressive, reaching heights of over 600m above the plain. The lower slopes of Mt. Chelmos, which rise steeply from the plain, reaching heights of over 1000m, define the east and northeast parts of the valley. East of the city, at the foot of this chain, the Kleitor valley opens onto the Aroanios valley, where the river flows south to meet the Ladon on its eastwest course. The mountainous terrain defining the territory of Kleitor also served to separate it from that of the surrounding *poleis*. The hills to the north and east marked the boundary between Kleitor and Kynaitha and Paos respectively, while those to the west separated Kleitor from the territory of Pheneos.

The site of ancient Kleitor, as mentioned, lies on the nearly completely flat plain at the western end of its valley, where, like nearby ancient Stymphalos, the city occupies almost the complete width of available land. As such, it is separated by only *c.* 250m from the hills to the north, by less than 150m from the eastern slope of Pantelemona Hill to the west, and in places, by less than 150m from the hills to the south. While to the west of the city, on the other side of Pantelemona, there is some arable land (*c.* 100ha), the majority of the farmland, some 500ha, lies east of the city. Today, as in antiquity, these fields were supplied by two primary water sources: the Kleitor and the Karnesi rivers. The former runs parallel to and just south of the city, and the latter, in a northwest to southeast direction to the north and east of the city. These rivers meet just outside the southeast limit of the settlement before heading south to meet the Aroanios river.

Finally, although there is little surviving evidence of the ancient road network traversing the territory of Kleitor, the topography does suggest a number of possibilities. For example, there must have been a road leading over the mountains from Pheneos to the Aroanios river valley. Not only was this the route taken by Pausanias, but on his journey from Lykouria to Kleitor, Gell (1817, 130) observed 'traces of an ancient road'. Where exactly on this route he noticed this road remains unclear. Still somewhere in the Aroanios valley seems as good a candidate as any, as this route

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[6] This estimate is based on the map in Jost (1985, fig. 1), and includes the territories of ancient Lousoi, Paos, Thaliades, and Halous. Such an estimate is probably too high, as it is not even certain whether these *poleis* were dependencies of Kleitor before the Roman period (Nielsen 2002, 560).

provided the easiest means of communication between Kleitor and Pheneos, Kaphyai, and eastern Arkadia beyond. Furthermore, the identification of two of the city gates – one in the northwest and one in the west of the circuit – is also suggestive (Pl. 1: 1). While the former lies south of another narrow river valley leading north toward ancient Kynaitha (modern Kalavryta), the latter was ideally positioned to provide access to the western end of the valley, and ultimately, to the Ladon valley, and the cities of Paos and Psophis to the southwest.[7]

## The fortifications

Although for the most part the fortifications of ancient Kleitor are relatively poorly preserved, at least 50% of its original course is still discernable on the ground to some degree (Pl. 1: 1). This extant section of the circuit is limited to the area south of the Karnesi river (and the modern agricultural road), which traverse the site from the northwest to southeast. Still, based on the survey of scattered architectural remains and modern field boundaries, much of the trace north and east of the river has also been plausibly reconstructed (Petritaki 2005, 352–353). It has been suggested that both the changing course and periodic flooding of the Karnesi river over the centuries are responsible for the destruction of the remains in the north and east part of the city (Petritaki 2005, 352–353).[8] Interestingly, a comparison of all the plans of the site published over a span of 175 years suggests that the parts of the circuit visible today appear to have always been visible (cf. the plans of Leake 1830, 2.258; Reinach and Le Bas 1888, pl. 34; Papandreou 1920, 113; Petritaki 2005, fig. 1). That is not to say, however, that the actual degree of preservation in the surviving sections has not changed. Indeed, the descriptions left to us by 19th century travelers to the site demonstrate that much more standing architecture was visible above the ground than today.[9]

The southern section of the circuit can be traced for *c.* 1.5km, and has been found to contain two gates and 14 towers, all of which are semicircular in shape (Pl. 1: 1). From the Northwest Gate, the western stretch of the

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[7] Jost (1985, 38) notes the strategic and communicative importance of these river valleys.

[8] The area north of the river is also much more intensely farmed, and mechanized cultivation must also have played a significant role in the removal and destruction of parts of the wall in this area.

[9] Petritaki (2005, 352) maintains that the only part of the wall standing above ground level to any appreciable degree is part of a tower on Kontra Hill.

circuit runs south and parallel to the eastern slope of Pantelemona Hill for *c.* 600m, where it meets the West Gate. From here, the wall continues south for *c.* 200m before turning east toward Kontra Hill. The southern stretch of the city wall (some 700m in total) then ascends to the top of the western (and highest) peak of this low hill, before descending once again. Curving slightly to the northeast and then southeast, the wall follows the downward contour of the hill before making a sharp turn to the north. Finally, the circuit makes an oblique turn to the northeast where it meets the bed of the Karnesi river, after which traces of it disappear.

Although the site of Kleitor did not contain an acropolis and the vast majority of its fortifications were laid out predominately on flat terrain, the circuit cannot be considered the true horizontal type of city walls – the type best exemplified at nearby Mantineia – as it does incorporate some elevated features (Maher forthcoming). The fortifications at Kleitor not only incorporated some elevated terrain, however diminutive or seemingly inconspicuous, but this terrain played an important defensive role in the city defenses as a whole. The importance of this section is established by the fact that here, a stretch of wall less than 500m in length accommodated eight of the city's 14 extant towers. Such a dense concentration of towers suggests that Kontra Hill played an active role in the general defensive strategy of the site, and consequently, the circuit at Kleitor is best understood as being of the uneven, rather than the horizontal type (Maher forthcoming).

The stone socle of the walls is about 4.25–4.5m thick throughout and is comprised of isodomic courses of trapezoidal blocks with what appears to be pointed-face surface treatment (Winter 1989, 198; Petritaki 2005, 351).[10] The relatively evenly preserved top of the foundations suggest they once supported a mudbrick superstructure – a fact consistent with the building materials employed in the fortifications of every Arkadian *polis* (Maher forthcoming). Furthermore, the curtain consists of an inner and outer facing of blocks with regularly spaced perpendicular courses of stone forming compartments within.[11] While Winter (1989, 198) surmised that the fill of the curtains was probably comprised of stone blocks, subsequent excavation has demonstrated the fill largely consists of densely packed rubble (Petritaki 2005, 351).

[10] Based on the photo published by Hiller von Gaertringen and Lattermann (1911, 8), Scranton (1941, 171) too lists the masonry at Kleitor as isodomic trapezoidal.

[11] For a colour photo showing recent excavation of parts of the wall, see Petritaki 1996, 83.

Despite their location in the circuit, all of the towers at Kleitor, as mentioned, are semicircular (see Winter 1971, 193, n. 110). With an average diameter of 7.5–8.5m, these towers project *c.* 4m from the adjacent curtains (Winter 1989, 198). As will be discussed in more detail below, the towers appear to have been strategically, rather than regularly spaced. For example, Tower 1 and Tower 2 are spaced *c.* 160m apart, with the former located *c.* 220m south of the Northwest Gate and the latter *c.* 180m from the West Gate (Pl. 1: 1). Moreover, approximately 80m from the West Gate is Tower 3 and Tower 4, themselves separated by 40m. The towers on the eastern half of Kontra Hill are the only ones that show any semblance of regularity in their spacing, averaging between 35m and 45m.

In the surviving sections of the city wall, two (and possibly three) gates are attested.[12] The first, located in the extreme northwest part of the city, is appropriately referred to as the Northwest Gate. This gate, oriented on a northsouth axis, appears from the plan to have been a simple frontal gate and had at least two different building phases (Petritaki 2005, 354).[13] The second gate, however, is much more interesting architecturally. Located some 600m south of the Northwest Gate, at the foot of Pantelemona Hill, excavations have revealed half of the so-called West Gate.[14] Oriented on an eastwest axis, the West Gate was of the gate court type. Essentially a large rectangle, it was accessed externally by a small frontal opening in the wall, which in turn led to two separate courts (Petritaki 2005, 354). The outer court was protected by a small semicircular protrusion on the south, on which defenders could mass, and was separated from the inner court by a small door (Petritaki 2005, 354). Also on the south side, excavators found the remains of four column bases, suggesting a propylon-like entrance for pedestrians, as well as traces of a ramp for carts (Petritaki 2005, 354). Finally, like the Northwest Gate, excavations have revealed at least two phases of construction on the West Gate.

[12] Interestingly, as noted by Petritaki (2005, 354–355), the locations of the two established gates are still traversed today by small rural roads. The discovery of an ancient cemetery just outside the southeast part of the circuit, where the walls meet the bed of the Karnesi river, has been taken as evidence for the possible existence of a third gate in this area.

[13] It is unclear from the plan whether a tower flanked the left side of the opening, though I suspect that this was the case.

[14] The southern half of this gate is preserved, from which the form of the other half can be extrapolated (Petritaki 2005, 354).

## The first plan: Leake's vision

William Martin Leake (known as Colonel Leake), was born in 1777 in London.[15] After he finished his training at the Royal Military Academy, he became a member of the British military mission to the Ottoman empire in Greece, where, between the years 1804 and 1806 he spent a considerable amount of time travelling through the Peloponnese and recording his observations of the ancient remains he encountered. It was during this time that Leake first visited the site of ancient Kleitor. While similar to Gell and Dodwell before him, Leake recorded his observations of the remains, he differed from his predecessors by attempting to map these observations, resulting in the first published plan of the site (Leake 1830, 2.258) (Pl. 1: 2).

At first glance, this plan obviously embodies a simple schematic representation of both the topography and the remains. There are no creative flourishes, no artistic embellishments, and only the visible remains and the most important topographical features are provided. Still, even if notable for its obvious simplicity, what is more important to take in (a fact that is less obvious) is its relative accuracy – indeed, of all the plans preceding Petritaki's, Leake's representation is the most accurate. For example, instead of trying to reconstruct the course of the walls that were not visible, a charge that later plans would be guilty of, Leake restricted his interpretation to the remains that he could actually trace on the surface. Thus, we see he mapped only the southern part of the fortification circuit, most of which, then, like today, was visible traversing Kontra Hill. While no scale is provided, compared to the known trace of the circuit on this hill, we see the course plotted by Leake is essentially correct, not only regarding the relationship between the topography of Kontra Hill and the fortifications, but also the cardinal orientation of the remains. Although simplified, the crescent-shape of Kontra Hill and its position in relation to the surrounding rivers as well as the adjacent Pantelemona Hill are also essentially truthful (Pl. 1: 1). While this plan would represent the most accurate of the site for over a century and a half, it is not perfect, and there are some inherent minor errors.

For instance, while Leake correctly placed Pantelemona Hill and the smaller Palatai Hill to the northwest of Kontra Hill, he drastically exaggerated the scale of the former – showing it to be around the same height as Konta Hill (i.e. *c.* 20m), when in fact, Pantelemona towers some

[15] The biographic details of Leake's life were obtained from Wagstaff 2004.

160m above the plain and completely dominates the ancient site. Moreover, although mostly correct in the details, his map of the remains themselves is not perfect. Not only did he fail to record Towers 8 and 9, but he showed Towers 4, 5, and 6 on the slopes of Kontra Hill, when in fact these towers are located on relatively flat terrain on the plain below. Furthermore, he added a tower east of Tower 13, where the wall swings to the north. This is an excusable addition, since even if not employed here, it was a common practice for Greek military architects to place towers at locations where the walls change direction.

For almost 60 years, Leake's plan remained not only the most accurate, but in fact, the only published plan of ancient Kleitor. The next plan to appear would, regrettably, come to supplant Leake's, and has the unfortunate distinction as representing the prototype for all subsequent plans – I say unfortunate, because all of the cartographic mistakes and exaggerations which characterize the later plans can be traced directly to it.

**The new model**

So influential was Leake's work, that some 50 years after its publication, it was still deemed the standard starting point for many archaeological investigations. Prior to the first excavations at Megalopolis by the British in 1890, for example, the project's co-director, Loring (1892, 106) tells us that Leake's account was the first work he consulted because Leake is where 'one naturally turns for information, and suggestions'. It is not surprising, therefore, that when Philippe Le Bas set out for Greece in 1842 on a two year mission devoted to the collection of drawings of ancient monuments and inscriptions, he made extensive use of Leake's account. What is surprising, however, is that while aware of Leake's plan of Kleitor – Reinach and Le Bas (1888, pl. 34) actually cite it – they seem to ignore it completely when devising their own plan of the ancient site; and such an omission, as mentioned, ultimately had an influential legacy for every plan that followed.

The first thing one notices when comparing Leake's plan to Reinach's and Le Bas' is the high degree of artistic quality characteristic of the latter (Pl. 3). The surrounding topography is rendered with much more detail and flourish, and unlike the earliest plan, we see the heights of Pantelemona Hill accurately represented. More importantly perhaps, again, unlike the previous plan, a scale is provided – one that is fairly accurate. Still, what is good and what is right about Reinach's and Le Bas' plan is easily outweighed by what is wrong with it. First of all, it appears that some of the artistic flourishes are greatly exaggerated. For example, it is unlikely that all of the modern field boundaries represented are accurate. If he took artistic license with these details, we are left to wonder about what else has been exaggerated. Well, we do not have to think too hard, because some of the errors are immediately obvious.

The most glaring problem with this plan is the cardinal orientation. Using the surrounding topography to properly orient the plan (largely Pantelemona and Kontra Hills), it is clear that for some reason this map is off by about 40°. Once it has been rotated the requisite degrees, we see that while it is much closer to Petritaki's correct plan, there are still a number of glaring differences. Regarding the course of the wall, we see that Reinach and Le Bas have added a short 90° jog in the southwest corner and a stretch of missing wall (represented by a dotted line). That they could not find this stretch of wall is understandable, since it does not exist in this location. Reinach's and Le Bas' mistake was that they interpreted the West Gate as a 90° turn in the wall, and searched (in vein, one imagines) for the wall emanating form the north of its internal terminus. In fact, as Petritaki has shown, they should have sought the wall immediately north of where he inserted the 90° turn (Pl. 1: 1).

Besides the incorrect orientation of the plan, the other most noticeable difference is the proliferation of towers which characterize Reinach's and Le Bas' plan. Based on the time of year and amount of vegetal overgrowth, it is easy to miss a tower or two on the ground, like Leake, who failed to observe two towers on Kontra Hill. What is harder to reconcile, however, is the fact that Reinach and Le Bas plotted some 31 towers, instead of the 14 which actually exist and were mapped by Petritaki and her team. Specifically, we see the addition (or perhaps invention is a better word) of 15 towers north of the west gate, when in fact there are only two, and similarly, he invented the existence of 16 towers in the southern section, when there should be only 12.

Reinach and Le Bas do not appear to have been troubled when they were unsure about their reconstruction, as demonstrated by those sections rendered with a dotted line. How do we explain the obvious invention, therefore, of so many important details? Whether intentional deception or not, the only way to explain the presence of these towers (which he could not have seen because they do not exist), is, I think, artistic license. Perhaps having made the difficult journey into the mountains of northern Arkadia, and being unsatisfied with the meager remains he found, Reinach and

Le Bas decided to attempt to complete the picture left unfinished by Leake. That this might be the case is hinted at by the fact that the greatest embellishment in Reinach's and Le Bas' plan is reserved for the northwest section, which Leake did not observe.

While we may never know the exact reasons why Reinach and Le Bas took such artistic liberties, we do know the legacy of their decision in the plans of Kleitor that would follow. Indeed, instead of turning to the Leake's plan, invested with the reliable reputation of its author, the scholars which followed turned instead to the problematic plan of Reinach and Le Bas. And this is perhaps where we can first see how scholars have constructed their interpretations of the remains around the unintentional predisposition to equate artistic quality with accuracy.

**Reproduction**

The next to contribute a plan of the remains of ancient Kleitor was a school master and amateur archaeologist named Georgios Papandreou. In 1920, he travelled around northern Arkadia, and published an article about several archaeological sites in the Kalavryta area, including Kleitor (Papendreou 1920). Like Reinach and Le Bas before him, while he acknowledged the debt owed to the earlier travelers, including Leake who he mentions by name (Papendreou 1920, 95), he failed to take advantage of the accurate plan that Leake had published almost a century earlier. Instead, Papandreou chose the plan of Reinach and Le Bas to both inform and accompany his interpretations of the ancient remains at Kleitor (Pl. 3: 1). Although he never acknowledges this application of Reinach's and Le Bas' plan anywhere in his article, that his plan is derivative (if not directly traced) from Reinach's and Le Bas' is clear. How can one be sure? Not only is Papandreou's plan wrong in almost all the same places as Reinach's and Le Bas', but when the former is superimposed upon the latter, the two plans line up perfectly (Pl. 2). If, for the most part Papandreou copied the plan of Reinach and Le Bas, it follows, therefore, that for the most part, he also duplicated the mistakes. Thus we see the same incorrect orientation of the remains as well as the inflated number of towers both north and immediately south of the west gate on each of the plans. That being said, there are some subtle differences between the two.

While content to trace the main course of the fortifications and to add the rivers, tributaries, and hills, Papandreou omitted all the internal artistic details. Thus we no longer see the clear delineation of the farmers' fields or individual trees, and in general, the topography of the hills are rendered in a much more simplified fashion. Arguably the greatest difference between the two plans, however, is the scale. This is also the hardest to explain. While Reinach and Le Bas provided a fairly accurate scale of their plan, Papandreou grossly inflates his scale by a factor of five. Finally, another way in which the plans differ can be found in the number of towers represented on Kontra Hill. While Reinach and Le Bas added a number of non-existent towers, in Papandreou's reproduction we see that he has removed these superfluous towers, bringing the number and spacing extremely close to the actual remains which are represented on Petritaki's plan (Pl. 1: 1).

Because Papandreou's partial correction of Reinach's and Le Bas' plan would appear to be a step in the right direction, we might expect the next plan to continue this trend of bringing the plan of Kleitor closer to an accurate representation of the remains. In fact, in the next plan, we see the opposite – we see the mistakes of Reinach's and Le Bas' plan actually amplified and supplemented by even further artistic license.

**Cumulative consequences**

The last and most recently published plan of Kleitor before Petritaki's, shows us two things: not only the cumulative consequences of the earlier mistakes, but that these errors are not the sole dominion of itinerate scholars or amateur archaeologists, and in fact, that these inaccuracies can be overlooked and propagated by leaders in the discipline.

In 1989, Frederick Winter, the author of the standard work on Greek fortifications (Winter 1971) and arguably the leading expert in the field, published a short article on the walls of the Arkadian sites of Mantineia, Orchomenos, and Kleitor (Winter 1989). Interestingly, in the pattern already established, while acknowledging both the accuracy of Leake's plan and the fact that the plans of Reinach and Le Bas, and Papandreou are 'approximate' (Winter 1989, 189, n. 1), Winter (1989, 197, fig. 3) explicitly states that his plan of Kleitor is based on that of Papandreou – although he attempts to adjust the inflated scale of that plan (Pl. 3: 2). Unsurprisingly, therefore, we see in this plan the duplication of the earlier mistakes. Specifically, we see the continued use of the wrong cardinal orientation, the invention of non-existent towers, and the remains of the West Gate incorrectly interpreted as a 90° degree jog in the southwest part of the circuit. Along with a increasing lack of topographical detail characterized by the absence of Kontra Hill altogether, we also see the continuing trend in the plans of pushing Pantelemona Hill further away to north. This trend was initiated by Reinach and Le Bas, exaggerated by Papandreou, and repeated by Winter. Although in reality, the southern limit of this hill should extend to the chapel of St. Peter, where the two agricultural roads meet, on Winter's plan, the terminus of the hill is some 200m to the north of this spot. Similarly, the eastern slopes of this hill continue to recede, and instead of being only 50–75m from the walls, they are now closer to 100m away.

Besides duplicating earlier mistakes, unfortunately Winter's plan introduces a number of new ones as well. While the 15 towers north of the West Gate are consistent with Reinach's and Le Bas' plan (both of which are wrong as there are only two), Winter inexplicably adds even more towers to the circuit south of the gate. Instead of the accurate 10 towers along this stretch, or even the 16 plotted on Reinach's and Le Bas' plan, Winter's plan shows 19 towers in this part of the circuit. Although, as mentioned, Papandreou removed a number of towers from Reinach's and Le Bas' plan to more accurately represent the remains, Winter's plan not only reinserted those towers, but added a number of others.

In addition to the adding of even more non-existent towers, the most obvious change in this plan compared to the earlier ones, is that no effort is made to depict the towers where they should be, and instead the towers are deployed regularly at equal distances throughout the circuit. This is indeed the most troubling part of Winter's plan, if for no other reason than he explicitly states that the towers are spaced *c.* 35m apart, adding that 'the spacing of the towers in the plain can best be observed in the west and southwest sectors of the circuit' (Winter 1989, 198, n. 25). This statement suggests he is speaking from personal observation, yet because it is a statement that is irreconcilable with the actual remains, it is clear his observation is based on the plan – the inaccurate plan. In other words, as only four towers exist on the west side, irregularly spaced over a distance of some 400m, we are left to wonder how can they be regularly spaced every 35m or so?

## Repercussions concerning the history of archaeological research of Kleitor

While archaeological excavation by Petritaki and the Greek Archaeological Service has confirmed the late 4th/early 3rd century BC date for the walls (Petritaki 2005, 353–354) proposed earlier by Winter (1989, 198–199), it should be noted that Winter's supposition was based, not on the flawed plan, but largely on the size of the towers he had personally observed on the ground. Winter, however, was less fortunate in his deductions that were made based on his plan, and unsurprisingly, like the plan itself, his inferences were also fundamentally flawed. For example, based on the large number of imaginary towers in his plan and their equally invented regular spacing, Winter (1989, 198) proposed that the 'towers [at Kleitor] were generally *c*. 35m apart, but at times under 30m – in any case more closely set than at either Mantineia or Orchomenos.' Winter was wrong here on both counts, as is obvious in the most recent plan published by Petritaki (Pl. 1: 1). Furthermore, it was this perceived abundance and regular deployment of the towers in his plan of Kleitor (not to mention its wrong cardinal orientation) that led Winter to a further erroneous conclusions.

First and foremost, it was his belief that the fortifications possessed a large number of regularly spaced towers that led Winter (1989, 199) to conclude that 'the walls of Kleitor… are among the most advanced anywhere in the Peloponnese, making virtually no use of natural defensive features, but relying instead on their strong artificial defenses.' The truth, however, tells a markedly different story – one that demonstrates that the fortifications of Kleitor are, in fact, not only relatively unsophisticated, but that like all Arkadian fortifications, the walls were consciously designed to best-exploit the strong natural defenses of the surrounding topography (Maher forthcoming).

As demonstrated, the spacing of the towers at Kleitor are anything but regular, and in fact, are best described as being strategically spaced – that is, the deployment of towers is limited largely to the most vulnerable points of the circuit. Far from being characteristic of Hellenistic period sophistication, as Winter maintains, the strategic, rather than regular, spacing of towers is actually reminiscent of much earlier defensive practices. Indeed the strategic placing of towers is a characteristic of the earliest Arkadian fortifications of the late 5th century BC, and is a tactic that all but disappears in Arkadia after the early 4th century (Maher forthcoming). Winter's second argument, namely that the walls of Kleitor make no use of natural defensive features, is not only false, but is an argument that could only have been born from looking at the incorrect plan of the site. On Winter's plan, for instance, we see that the walls were placed with little regard to exploiting the natural topographic strengths of the site. Specifically, we see that the entire west side of the city was wide-open, so-to-speak, and thus vulnerable. If this were true, then based on patterns observed at other Arkadian sites (Maher forthcoming), we might expect to see a number of closely spaced towers

– as appears on his plan. In fact, on all sides of the city – especially on the west – we see in the placement of the walls a conscious effort to take advantage of the surrounding topography, and this is a fact that is most obvious in the tactical deployment of the city's towers. But we can only truly appreciate this fact when the orientation of Winter's plan is corrected for.

Unlike the north and east sides which enjoyed the protection of the Kleitor and Karnesi rivers, we see the west side of the city was actually protected by the bulk of Pantelemona Hill, towering some 160m above the city along its entire western flank, forming an effective natural obstruction in this direction. We also see here tactical considerations designed to both complement the natural strength of the site and limit its weaknesses. Thus, in the western section of the circuit between the two gates, we find only two towers (Towers 1 and 2) – not the 15 envisioned by Winter. The relative lack of human-made defenses along this stretch suggests the confidence inspired by the Pantelemona Hill in keeping enemies at a distance from the walls. Indeed, the dimensions of this hill meant that any approach to the city from the west would be limited to a narrow stretch of land (*c.* 400m wide) defined by the southern slope of Pantelemona Hill and the banks of the Kleitor river; and because nothing in Greek fortifications is random, it is not surprising to find Towers 3 and 4 placed opposite this, the only practical approach to the city from the west. Despite the claims made by Winter, therefore, we see in the choice for the location of the site – one surrounded on all sides by hills and rivers – that the town planners and military architects effectively exploited the natural topography of the valley to a considerable strategic advantage.

## Conclusion

When the earliest plan by Leake (Pl. 1: 2) is placed side-by-side with the more recent plan by Winter (Pl. 3: 2), one might hardly guess that both plans represent the remains of the same site. While the 160 years separating these plans may, to some extent, explain the obvious divergence, I think the real culprit is, as mentioned, the unintentional predisposition to equate artistic quality with accuracy. Not only does this explain why Leake's simple schematic, which although essentially correct in the details was soon supplanted by the plan of Reinach and Le Bas, but also why all subsequent plans were derivative of this latter more attractive plan, instead of that produced by the otherwise traditionally reliable Leake.

As we have seen, the result of this bias in the different reproductions of the site plan has led to a fundamentally flawed picture of the remains of ancient Kleitor. Briefly, in the cumulative picture, the result of a century of duplicating and exaggerating mistakes, we see an inflated scale, inaccurate topographical details, the incorrect cardinal orientation, an exaggerated degree of preservation, and the misrepresentation of the circuit's different tactical elements (including the omission of the two known gates, a non-existent 90° jog, and the invention of a twice the number of actual towers). More than just trivial observations, these mistakes have had serious consequences concerning the history of archaeological research of the site and its remains.

The observations outlined above notwithstanding, it should be stated that the aim of the present work is not to criticize the scholarship of Winter or those before him. Instead, this paper is simply intended as a cautionary tale, one that highlights how easily simple modifications and mistakes can be reproduced, duplicated, and even exaggerated when visualizing the past, especially if scholars construct their interpretations of the archaeological record around the bias of equating artistic quality with accuracy. It is hoped that his paper also illustrates the importance of personal observation of the remains as an integral methodological approach to the study of ancient Greek fortifications.

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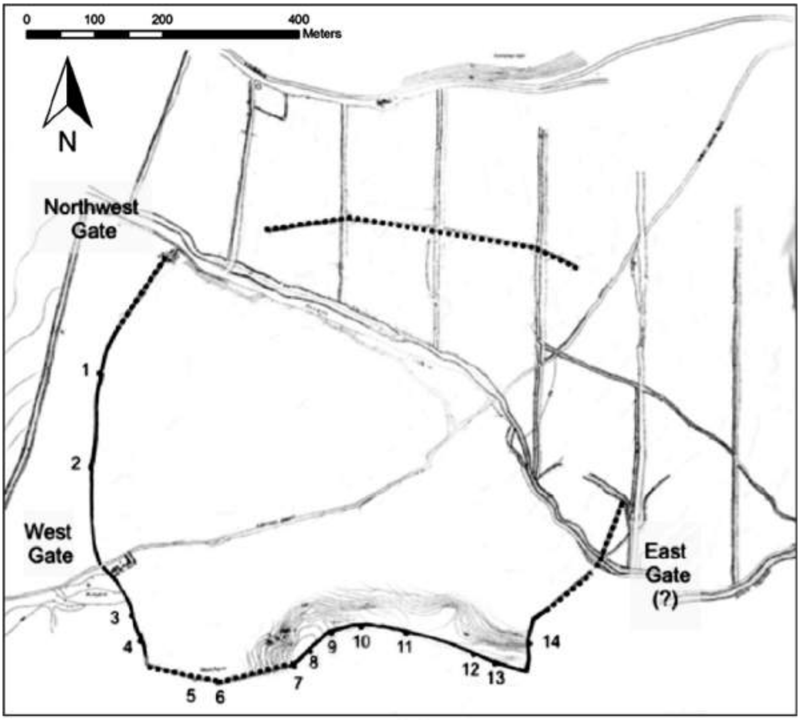
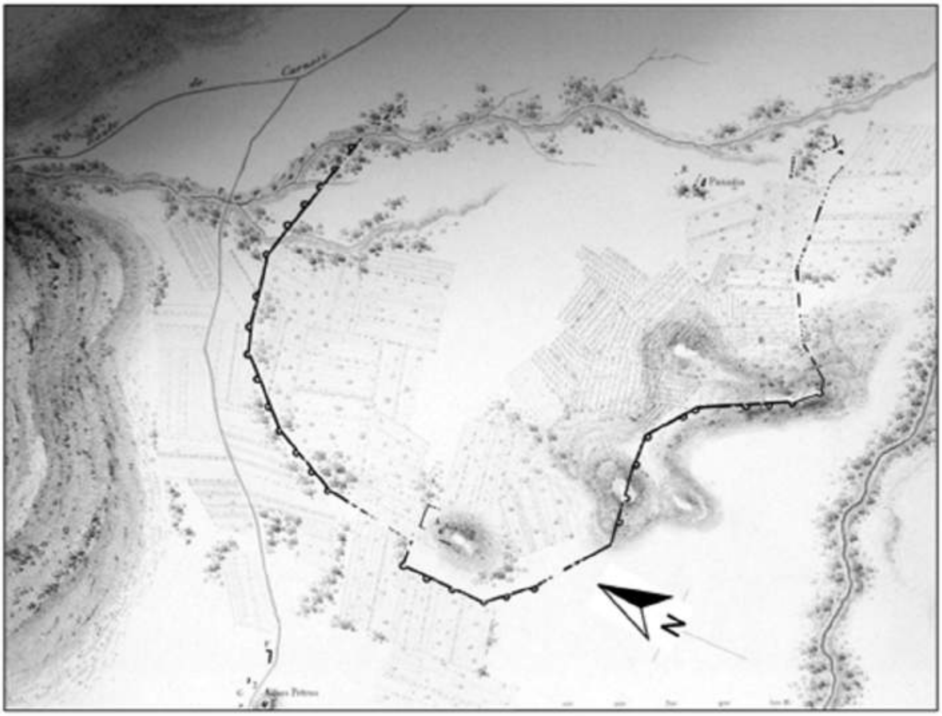


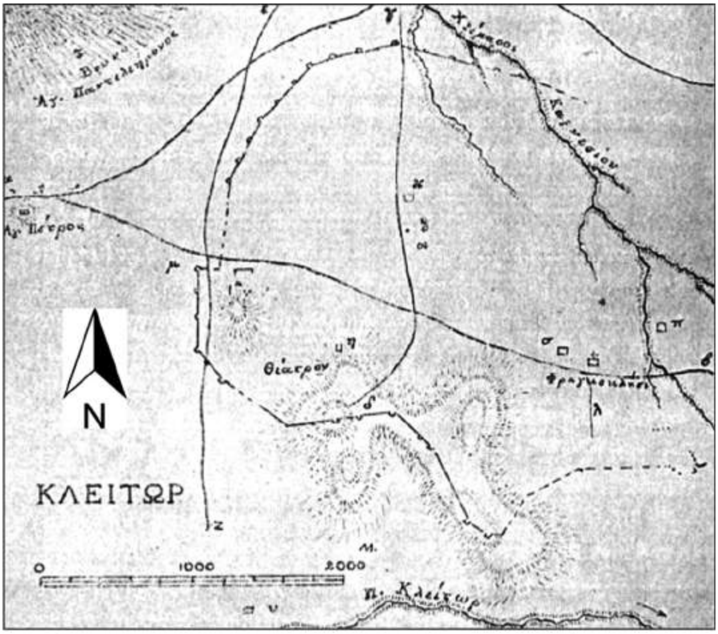

1


2

Pl. 1. Map of Kleitor
1 – Reproduced from Petritaki 2005, fig. 1; 2 – Reproduced from Leake 1830, 2.258



Pl. 2. Map of Kleitor. Reproduced from Reinach and Le Bas 1888, pl. 34

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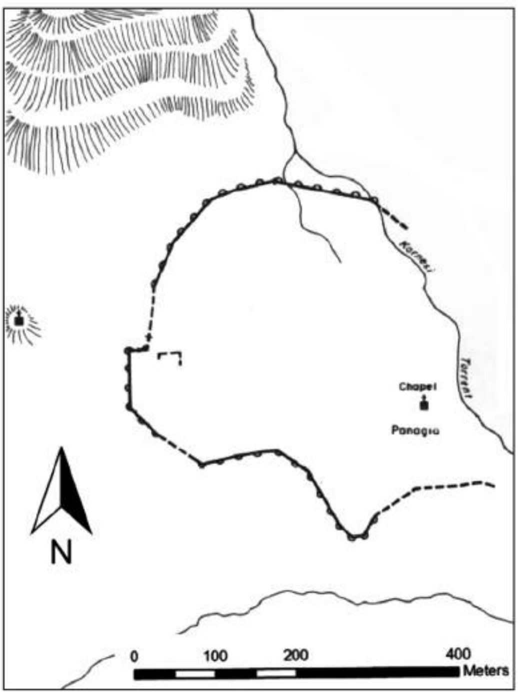


5

Pl. 3 Map of Kleitor
1 – Reproduced from Papandreou 1920, 113;
2 – Map of Kleitor. Reproduced from Winter 1989, fig. 3

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# BOTH SIDES MATTER? READING GREEK VASES USING PICTORIAL SEMIOTICS. THE PROBLEM OF SYNTAGMATIC AND PARADIGMATIC RELATIONS OF THE IMAGE[1]

**Abstract:** *This paper explores the possibilities of using methods of analysis from the field of pictorial semiotics in studying Greek vase painting, and thus resolving the problem of interpreting multiple scenes on a single vase. Its aim is to explain and clarify basic notions connected to this discipline, such as imagery, syntagmatic and paradigmatic relations, and how they relate to Greek iconography, using various examples. The main premise is that the separate scenes on the artifact are connected syntagmatically and not only paradigmatically as it is usually indicated, thus the joint interpretation always precedes the analysis of detached scenes, the latter being dependent upon the syntagmatic reducibility of the image.*
**Keywords:** *Greek vase painting; pictorial semiotics; Greek imagery*

Archaeology as perhaps no other discipline absorbs new methods and methodologies which enable it to expand its palette of research tools. This is not surprising, as at the center of the archeologist's attention stands the artifact, above all, a silent source. An archeological artifact can speak only through interpretation, and it is the researcher who gives it meaning. Artifacts have a dual ontology: they possess a textual aspect as well as a material one (Shanks 1996; Kucypera and Wadyl 2012, 621–623; Olsen 2013), and

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both of these can be explored using very different methods. Nevertheless, introducing novelties to already established research procedures often meets with a kind of backlash from the professional community, as some scholars adopt a skeptical approach for a variety of different reasons (see Jameson 1994, 193–196; Rotroff 1998). Instead of condemning the doubter's stance, let's do it justice and focus on the potential dangers that the introduction of certain novel methods could bring to the field of Classical archaeology.

Such malpractices are generally recognized under the term of 'cargo cult science'. R. Feynman (1974, 10–13; also reprinted in Feynman 1989, 308–317), when addressing the graduates of Caltech, gave a famous speech in which he coined this phrase for those disciplines/scholars/scientists who lack the most important trait: scientific integrity. The original cargo cults were formed in Polynesia after WWII, as the result of contacts between natives and the American army.[2] Soldiers built airfields to make possible the regular supply of cargo − hence the name. Due to culture shock, after the Americans' departure, the tribesmen started to mimic their activities. They constructed fake airfields and fake radios with headphones made from straw, and they were waiting for giant birds who would land on the islands and deliver the mythical cargo. They mimicked every activity of the Americans, but, of course, nothing happened. So, a branch of science that borrows methods from other disciplines without examining their applicability, without first checking them with the source material, science whose sole purpose is to produce a given outcome, is no science at all. It only mimics certain activities, but without a true scientific approach. Of course, this is the most extreme view, but adopting methods from other disciplines without the know-how of proper methodology could resemble those cargo cult practices of the Polynesians.

At first inspection, pictorial semiotics, when applied to various analyses of Greek vase painting, posses all the necessary features to question its adoption into Classical studies. Although it has been present in the discipline for more than 30 years (Hoffmann 1977; Bérard 1983, 5–31; Morris 1994b, 37), it is still practiced only by a few scholars who study ancient iconography (Bérard 1983; Bérard and Durand 1989; Lissarrague 1989; Lissarrague 1990; Beard 1991, 12–36; Hoffmann 1997; Stansbury-O'Donnell 1999; Shanks 1999; Hurwit 2002, 1–22; Steiner 2007), with the rest of the community presenting but marginal interest. Partially, this state of affairs is caused by the obscurity of the interpretations and the lack of coherence on the part

[2] Cargo cults are in reality a much more complicated issue, however this is still an acute depiction, cf. (White 1965).

of the scholars, who often do not give a proper explanation of their methods (see below). The purpose of this paper is to describe the basics of pictorial semiotic analysis in the most understandable manner, and to clarify all the ambiguities presented in the scientific literature.

Pictorial semiotics deals mostly with the metalanguage connected to the process of reading images within a culture (Beard 1991, 12–15; see also Leśniak 2013). In short, its task is to describe how we, as cultural agents, create and read images. Semioticians believe that the iconography, in this case monuments of Greek vase paintings, should be read as a part of Ancient Greek imagery (Bérard 1983, 5–7). Both these terms, image-reading and imagery, are essential, so let's explain them in detail.

How does the viewer perceive an image? M. Beard (1991, 12–15) presented an excellent analogy in one of her papers. Let's imagine a perfume advertisement in a newspaper. The scene depicts modern, beautiful, and independent-looking women chatting with a man in one of the atmospheric cafes of Paris, with the Eiffel Tower looming in the distance. The brand is so famous that it requires only its logo presented on a bottle of fragrance in the corner of the picture to be recognized instantaneously. This picture evokes certain sensations in the viewer, we read it as an ad connecting this particular brand with the glamorous life of the elite, the pleasurable Parisian life, as we often imagine it (Beard 1991, 13).[3] However, if we remove only one detail, the perfume bottle, and replace it with, let's say, the HIV awareness campaign logo, the whole picture will change rapidly. We would read a different scene, the connections would be transformed, and now the cafe scene would be read as a kind of warning against the shadiness of modern life, its superficiality, as a critique of sexual liberty, etc. The image is read by the viewer, constructed in his mind through knowledge about its structure, about the signs that it uses, the rules for its reading, and the iconic repertoire available for that particular culture (Bérard 1983, 5–9; Beard 1991, 12–15; Shanks 1996, 12–21). It is that repertoire, the total set of images that circulate in a given culture, and the rules used to create and read images using it, that we understand under the term 'imagery'. To grasp the particular image conveyed in the above mentioned advertisement one needs to be a member of a culture who recognizes the given perfume brand and creates specific associations concerning this scene. To understand the picture with the HIV awareness campaign logo, one not only needs to recognize the logo, but also the specific construction of such an image, i.e., that it is a transformed version

[3] See also probably the most famous reading of an image in the context of modern culture, R. Barthes' (1972, 116–117) interpretation of the cover of *Paris Match* magazine.

of a traditional advertisement. The play with convention is unrecognizable to someone who has no prior knowledge about the commercials that are the subject of parody in this particular example.[4] The notion that the image is constructed and read using imagery is the foundation of pictorial semiotics.

In a similar manner, the vase painting scenes are part of the imagery of ancient Greeks. If we want to explore Greek iconography, we should approach it via imagery. The very first question that this stipulation evokes concerns doubts about the possibility of a successful reconstruction of ancient Greek imagery (stressed already by Beard 1991, 18–19). Indeed, full comprehension of the rules which had guided the Greeks would never be possible. Still, this lack of completeness and even our inability to reconstruct the viewpoint of the Ancient viewer against every image are not sufficient conditions for disregarding this method of analysis. Because the rules of semiotic reading of images are present in all cultures, and each culture has a particular set of such rules, the image must always be accessed through these procedures; a neutral reading does not exist. If we would not make an attempt to perceive iconographic sources through the lenses of reconstructed imagery of the Ancient Greeks, we would be viewing those images through the imagery of contemporary occidental culture, often without even knowing it.

The simplest way to discuss the foundations of this method of research is to apply it to a specific artifact and explore the issues surrounding its interpretation. The iconographical sources are by far the largest cluster of data available for studying the warfare of the Archaic Greeks (Salmon 1977, 84–101; van Wees 2000, 125; Miścicki 2012, 90–91; Viggiano and van Wees 2013, 63). Despite that, the complex nature of the scenes is responsible for the rather perplexing reputation of Greek vases that persists among the scholars (Schwartz 2009, 20–21; Matthew 2012, 19–38).

The scenes shown in Pl.1 are drawings of the decoration of a protocorinthian olpe, dated to 650–640 BC, found in a tomb in Etruria, now in Rome, and attributed to the so-called Chigi Painter (Amyx 1988, 31–32), taken from E. Pfuhl (1923, Abb. 59) canonical works. The vase is commonly known as the Chigi vase or the Chigi olpe, and is believed to be the best depiction of a hoplite phalanx in Archaic Greek art (Nilsson 1929, 240ff.; Lorimer

[4] However, the recognition of the transformation in not requisite for understanding that this image is a warning against HIV; the extent of information that an image could convey varies. The reading is plural; the process takes place each time the image is being viewed, but the outcome is culturally determined.

1947, 80–83; Cartledge 1977, 19; Salmon 1977, 87; Hannestad 2001, 111; for the transitional phase of this formation: Anderson 1991, 19; Snodgrass 1999, 58). The drawing is very precise and perfectly reproduces the style of the artifact. Here we have three separate scenes: youths hunting hares (perhaps ephebes? see D'Acunto 2013, 48–52), two hoplite armies fighting, and, finally, adolescents (or adults, see D'Acunto 2013, 52–70) hunting a lion, who devours one of them, separated by the figure of double-bodied sphinx from other adolescents engaged in the cavalcade. A survey of publications referring to this vase in warfare studies reveals only interpretations of the warrior scene (Nilsson 1929, 240ff.; Lorimer 1947, 80–83; Salmon 1977, 87; Anderson 1991, 19; Snodgrass 1999, 58; van Wees 2000, 136–139; van Wees 2004, 170–173; Hannestad 2001, 111; Schwartz 2009, 126–127; Viggiano and van Wees 2013, 67–68). Although some warfare historians do show the close connections between the warrior frieze on the olpe and representation of warriors on other artifacts (van Wees 2000, 136–139; van Wees 2004, 170–173), they do not connect the images on the vase: each of them exists separately, occupying different zones of interpretation. The analysis conducted by Pfuhl (1923, 104) was based on similar principles. The absolute lack of inter-relations between the scenes is exemplified by the editing of the drawing. In fact, Pfuhl changed the sequence of the scenes from the olpe. On the vase, the youth scene is located on the lowest part of the decoration, the warrior frieze on the neck, and they are separated by the cavalcade/hunting scene which is located centrally (Amyx 1988, 31–32; Hurwit 2002, 8–17). It seems that the hunting/cavalcade frieze was the most important one: being the largest and located in the middle of the object, it also incorporates various elements and themes. For modern scholars, the warrior frieze was the most important because it is a unique image. Its dominant position in analysis becomes obvious when we look at the Pfuhl drawing. Because the hoplites frieze occupies the center of the picture, he could not fit the middle scene in full length, omitting elements like the badly preserved judgment of Paris (Miścicki 2014, 90–91). The original version of the drawing used by Pfuhl (Karo 1899–1901, pls. 44–45) presented all the scenes, uncut and in proper sequence, even the ornaments on the rim were depicted, hence the editing was a conscious choice. A specific reading was constructed which had re-created the artifact, shaping the paths of interpretation for many decades to come.

The first analysis which unified all the scenes on the Chigi vase was done only relatively recently, by J. M. Hurwit (2002, 1–22), thus opening the path to other interpretations based on the same methodology (D'Acunto 2013;

see also Mugione and Benincasa 2012). Hurwit believed that all the images on this object are strictly related and form a coherent narration (Hurwit 2002, 16–17). If we follow the vertical axis we can observe that the artist depicted the journey into adulthood, the various rites of passage which are essential for a boy to progress to being a page, and then to being a warrior – hoplite, seen as the culmination of a man's life (Hurwit 2002, 17–18). The vase could also be read horizontally, along the youths frieze. It depicts the years just before the initiation into becoming a warrior, formative for a youth male. Here, reality and myth come together: 'This axis, perhaps, shows what makes a man a hero: leonine courage and the company and favor of the gods. But it hints as well at the permeability of the boundaries between the mortal and divine and, with the ambiguous doubleness of the double-sphinx, the mauling of the youth by the lion, and the imminent, fateful decision of Paris, the dangers of such an existence' (Hurwit 2002, 19).

The differences between those two approaches are essential. Pfuhl, as well as warfare historians, explained the scene on the olpe separating it completely from the rest of the vase, but also connecting it with other representations of warriors in vase painting. Hurwit has read the artifact as a homogenous object, merging all three scenes into one narration, one image. The intrinsic nature of the warrior frieze cannot be analyzed separately from the rest of the scenes on the olpe, otherwise its meaning is changed, viewed differently. Do we always need to seek such connections between all the scenes on one object? Do both sides of the vase always matter? Those are fundamental questions that rise from these reflections.

Some scholars are rather skeptical about the possibility of reading all the scenes together. T. Rasmussen's (1991, 62) opinion about the Chigi vase could serve as an example: 'It is just conceivable that someone with sufficient ingenuity could find a connecting thread running through all the major scenes on the Chigi olpe; or they might be illustrative of some epic poem now lost. But it is unlikely. Many Greek vases of all periods show quite unrelated scenes at different levels or on opposite sides, and there is no need to search for unity of theme at this early date even on such a rigorously planned work'.

Despite the fact that without a doubt Hurwit discovered such relations between the scenes on this particular object, the overall uncertainty remains. It is easy to imagine a situation in which two scenes are placed on the same object even though they have nothing in common. Perhaps the not-so-crafty artisan was only able to paint two thematically unrelated scenes to a high technical standard. It is then probable that such images would still be placed on one object to enhance its commercial value. However, this method of approaching the problem is not in accordance with the principles of semiotics for three main reasons: 1. The notion of merging scenes 'randomly' does not correspond with the imagery system. Adjacent scenes are selected with accordance to the rules of imagery. Only particular sets of scenes could be put together truly 'randomly', that is, without conscious consideration of what they represent (Bérard 1983, 9–12). For example, if two scenes were set so far apart that merging them on one object would be viewed as crossing cultural norms, such a composition would not be perceived as random. Instead, the contrast and juxtaposition would dominate the reading. That leads to another reason: 2. it is the viewer who decides whether to merge scenes or not. The image exists only as a viewed image (see Frontisi-Ducroux 1989, 151–165; Beard 1991, 12–19; Miścicki 2014, 89–91); even if the viewer is trying to decode the author's message, such a process will never be an objective one. The author's intent is always an intention that is 'being read' by the viewer and exists only as such. In this sense, the author of the image is dead just as much as Barthes' author (the creator of literary works, see Barthes 1999, 247–252).[5] We do not recognize this on a regular basis due to communicative success: the intention of the sender (author) usually coincides with the intention of the receiver (viewer), after all, language works, and pictorial language works just as well. To recapitulate, the scenes are never truly 'random' and are always the scenes perceived by the viewer. Yet the most important reason 3. is the very ontology of the artifact. Although Hurwit pointed out inconsistencies in Rasmussen's (1991, 62) view, both of them, as well as other scholars (Small 1999, 570–571, n. 24; Stansbury-O'Donnell 1999, 124–126; Hurwit 2002, 1–3; Ferrari 2003, 43–44, n. 38), perceive searching for links between scenes as searching for one unifying theme, or treating them as illustrative material for a narrative, either created ad hoc or reflecting already existing texts. However, the scenes on the vase are not only related paradigmatically, but also syntagmatically, the latter being the principal connection.

Syntagmatic and paradigmatic relations are among the cardinal notions of semiotics, that is why their proper understanding is pivotal for understanding the methods of this discipline. Unfortunately, scholars working with ancient

[5] This does not exclude the author's perspective from the discourse. Vase painters are also viewers, members of Athenian or Corinthian society which used that imagery. In fact, since they do not posses any individual traits, apart from technical skills, they exist only as a by-product of their ancient society. Whatever can be said about the viewer could also be said about the maker, provided that they occupy the same social niche.

Greek iconography very rarely, or, at best vaguely, explain these relations in their papers (Hoffmann 1977; Bérard 1983; Stewart 1983, 67–68 ; Stewart 1987, 32–33; Hoffmann 1994, 80; Ferrari 2003; Steiner 2007, 12–13); sometimes they omit them entirely (Bérard and Durand 1989; Small 1999; Hurwit 2002, 1–4; Muth 2008, 15–24), or translate them in a very specific form, which is sometimes incompatible with the principles of semiotics (Stansbury-O'Donnell 1999).

M. D. Stansbury-O'Donnell's (1999) book could serve as an example. His work is conceived as a textbook for pictorial narrative, and syntagmatic structure as well as paradigms are specifically defined: 'syntagmatic relationships are those that admit the possibility of combination in a sequence of successive scenes from the same basic story (...). Paradigmatic relationships are those based on the principle of substitution and similarity, along the lines of analogy and metaphor. Hence a set of images would be selected from different stories, but would all involve the same kind of action, theme, or other form of similarity. For example, a series of wedding scenes, the loves of Zeus, combat duels, or heroic deaths from different battles or wars would be examples of paradigmatic relationship' (Stansbury-O'Donnell 1999, 118).[6] Syntagma[7] understood in this way is de facto a continuous or cyclic narrative, furthermore, following this definition, every syntagma is also a paradigm, because it is also based on the principle of similarity.

Semioticians have very different definitions of those terms. Following the basic textbook for the discipline (Chandler 2007), we find that both of these relations can be illustrated through a graph (Chandler 2007, 84, fig 3: 1), here (Pl. 2). An explanation follows: 'A syntagm is an orderly combination of interacting signifiers which forms a meaningful whole within a text – sometimes, following Saussure, called a "chain". Such combinations are made within a framework of syntactic rules and conventions (both explicit and inexplicit)' (Chandler 2007, 85). 'A paradigm is a set of associated signifiers or signifieds which are all members of some defining category,

[6] Since Stansbury-O'Donnell (1999) does not give the source of this definition, it is difficult to track the thought-process behind it. His work is based on the model of narrative structure proposed by Barthes (1977c), in an article translated as *Introduction to the structural analysis of narratives*. However, in this article the French scholar very clearly evokes the correct definition of syntagmatic and paradigmatic relations. It should be also noted that the subject of the article is narration, not an image (or, in this case, not text, only its properties), hence the Stansbury-O'Donnell book is restricted to narration within images and not the images themselves.

[7] 'Syntagm' is also a correct form.

but in which each is significantly different. (...) Whereas syntagmatic analysis studies the "surface structure" of a text, paradigmatic analysis seeks to identify the various paradigms (or pre-existing sets of signifiers) which underlie the manifest content of texts' (Chandler 2007, 84–86). If we look at the picture, the differences and similarities become apparent. 'The plane of the syntagm is that of the combination of "this-and-this-and-this" (as in the sentence, "the man cried"), while the plane of the paradigm is that of the selection of "this-or-this-or-this" (e.g. the replacement of the last word in the same sentence with "died" or "sang")' (Chandler 2007, 84).[8] Although these distinctions go back to the times of F. de Saussure ([1916] 1983, 121–127) and R. Jakobson (1971a, 599; 1971b, 719–720; see also Barthes 1986, 58–89), they are still valid. Only the perspective has been transferred from the inherent value of the message to the receiver. And although these distinctions refer originally to texts, or sentences, the principles of pictorial semiotics are exactly the same (Barthes 1977b, 46–51). C. Bérard (1983, 5–14) applies them frequently in his studies of Greek iconography.[9]

Nevertheless, let's explain these concepts on an example. This kylix, a drinking vessel now in the possession of the British Museum (Pl. 3; Casson 1958, pls. 5–6), is decorated with two strictly related, very similar scenes. On each, a merchantmen is depicted which is being pursued by a pirate galley. In the first scene, the sailing ship is caught off guard with its sails down, in the other, presumably concluding the action, the sail is set, but her fate is inevitably sealed, as the crew of the galley appears to be putting down the mast, which was done before the attack (Casson 1967, 86–87; Ducrey 1985, 197). Let's examine the syntagmatic relations of one of those scenes. It consist of three elements (Pl. 3: 1): 1. the sea, 2. the sailing ship, 3. the galley. We could test this syntagma using one of two types of transformation: addition and deletion (Barthes 1986, 62–89; Chandler 2007, 88–93). Here we will solely be interested in deletion; our goal is to reduce this image without changing its meaning. On this condition we can remove only one element, the sea, indicated by a wavy line. Without it the scene would work just as well, as the viewer would just imagine the only possible setting for such action. However, we cannot reduce any of the vessels. The image of a sailing ship alone means something different

[8] They are strictly connected; for instance, the sentence: 'He was the man, the hero, the villain, the devil' has a paradigmatic extension used as a part of the syntagma.

[9] Since semiotics is the study of symbols, it goes beyond text analysis into anthropology and archaeology.

than the same ship being pursued by a war galley, and a war galley alone has a different meaning than when it is depicted chasing a ship. Only the combination of the two of them creates this particular image. The scene on the other side of the cup is almost an exact copy of the first (Pl. 3: 2), but since it depicts a later moment in the pursuit, they both align into a narrative structure. The paradigmatic similarity between them traditionally serves as the grounds for the connection, yet let's assume that the scene from the other side is part of the syntagmatic structure of this image (Pl. 3: 3). If we do so, we can try to reduce it, cut it out completely. But if we did, we would change the meaning of the whole image, the action would be left without a conclusion. If we reduced this scene, the reading would be significantly changed, therefore we must leave it as it is.

It has been proven that the second scene on the Archaic kylix is in fact an irreducible part of the syntagma, still we can ask what would have happened if this other scene was completely different, a separate and distant image? Perhaps a more thorough analysis would be needed to prove the existence of a connection between the scenes? But what if even this means failed? The mistake lies in mixing the syntagmatic and paradigmatic structure. Hurwit (1985, 158; 2002, 16) in his analysis aimed to prove the existence of paradigmatic relations between the scenes, instead he proved syntagmatic irreducibility: the scenes on the olpe cannot be separated without changing its meaning.

Scholars almost unanimously attach great importance to the context of the image and the vase (Gill 1991, 29–47; Hoffmann 1994, 71–80; Shanks 1996; Shapiro 2000, 313–337; Hurwit 2002, 3–7): where it was found, in what type of site, its archaeological features, where it was made, how it is dated, in what particular circumstances it could have been used, etc. The context of the artifact is the key to its interpretation, because it is involved in the process of reading the image. The Christian cross implies certain connotations on its own, but when we see it hanged on a wall, for instance, in a room in a public building, its context changes, and so does the reading. Now the cross is not purely a religious symbol, but also a religious and perhaps a political manifestation; it challenges the notion of the separation of church and state, etc. The very fact that the cross is hanging on a wall in a particular place becomes part of the syntagma of the image.

Let's further imagine that our perfume/HIV awareness advertisement takes up only half of the page; below it we can find something different, a watch advertisement or something of that sort. At first, we would look at both of them at the same time, perceiving them together, then we would make a clear distinction between those two massages, or we would connect them if we found a link between them. It is the artifact with its context that is the equivalent of a sentence, not the image alone. In this case: vase (as a material object) = sentence. The set of scenes on a particular vase serves as the closest analogy, the closest context for each one of those scenes. A description of an artifact in which the context is stressed, but simultaneously the other scenes on the vase are omitted seems to be self-contradictory. Each scene on a vase, as well as the pot itself, together with its shape, its wider context, and the elements of its *chaîne opératoire* create the extensive syntagmatic structure of an image, and it is up to the researcher to discard those elements that are deemed redundant for the analysis, including scenes on the vase. However, such an action requires some explanation, and, most importantly, the scholar needs to be aware which part of the image and under what conditions he is addressing. The scholars who conduct analyses of the Chigi olpe from the perspective of warfare studies, focusing solely on the warrior frieze, could be interpreting a different artifact than the one before the reduction. In turn, L. Casson (1958, 15–16), when writing on the details of rigging of ancient ships on the basis of the cup from Vulci, does not have this problem, as the reduction of the image to this particular detail does not change its meaning with the addition or deletion of the rest of syntagma.

Given that the image is supposedly being constructed by the viewer, we need to present some support for this argument using examples of such practices from Ancient Greece. Stansbury-O'Donnell (1999, 128) claims that the sources are inconclusive: 'Indeed, such connections go beyond the focus of literary accounts-description of the narrative, and move beyond the realm of interpretation.' He cites the Ancient *ekphrases* like the description of the shield of Achilles (*Il.* 18.478–608), where it is hard to find one unifying theme apart from the detailed description of the scenes. Yet, the very act of describing all of the scenes together reaffirms the existence of a syntagmatic relation between them. The lack of a persisting thematic connection is not an obstacle to the act of reading them as an entity. Despite that, we also have some reliable evidence for the intentional collocation of separate scenes to create narrative chains, even though the images are spread over various objects (Marconi 2004, 27–40).[10] One of excavated graves

[10] Marconi is analyzing the consumption of Attic vases outside Attica, whether Attic imagery was recognizable in other parts of the Greek *oikumene*. Here his case study is used only as a reference to a syntagma. Generally, see Marconi 2004, 27–40, for further reading on this case.

of the Contrada Mose cemetery near Akragas, marked n. 2, contained rich offerings (De Miro and Fiorentini 1980, 113–137). Among the artifacts found there was a bronze greave, which characterizes the deceased as a warrior, and a series of vases: a band decorated amphora, a black-glazed amphora, and three Athenian black-figure amphorae. There was no visible alteration to the grave, so it was probably a cenotaph. All the images on the black-figure amphorae were connected with the life of a warrior, forming a coherent narration. First, the scene of departure, then of fighting, represented by a duel, and finally the body of a warrior being retrieved from the battle. There is also a scene of races, which could also be connected with the death of a hero. The vases were probably exhibited at the ceremony, and thus where carefully picked. The dominant scene, the carrying of the warrior's body, probably served as an assurance to the family that the young *aristoi* had been buried with honor, after the battle, as a piece of his armor would demonstrate (Marconi 2004, 27–40). This set represents one syntagmatic structure build from various artifacts, based on the paradigmatic relations between them. One long sentence/image was created for the particular purpose of a burial ceremony.

If we know that the syntagmatic relations between elements of an image are used to the build the narration forming that particular image, then where is the paradigmatic structure situated? Properly understood paradigmatic relations refer to other images within the imagery (Barthes 1986, 58–59;[11] Chandler 2007, 83–90). The majority of the efforts put by semioticians into the analysis of images is dedicated to the paradigmatic transformations of the image, and the creation of its meaning through this process (Chandler 2007, 87–88). It is usually done via substitution and transposition of the elements, with special attention paid to what is missing from the picture (Chandler 2007, 87–88). The absence of certain elements compared to other images helps to define the meaning through difference. With the changes of the syntagmatic structure, paradigmatic relations change; when paradigms are tested, the syntagma changes accordingly. We could ask a handful of questions about the paradigmatic structures of Greek vases. How would the reading of the scene change if instead of a merchant ship we had a second galley? How can we read the specific context of that scene – a drinking cup, probably connected with a symposion – together with other images presented on similar cups? How can we connect this scene with other marine images? Switching attention to the Chigi vase, we could add paradigmatic relations to Hurwit's syntagma. For instance, the rather peculiar selection

[11] Barthes uses de Saussure's term 'associations', which is, perhaps, more intuitive.

of animals demands some kind of explanation, i.e. a ‘panther’ animal typical for Corinthian art (Shanks 1996, 73–150) is not represented. The figure of the sphinx could be characterized through its presence in the imagery (Hoffmann 1994, 72–77), through similarities and differences simultaneously, as the olpe bears a rare representation of a double-bodied sphinx. The warrior frieze could be contrasted with other vases attributed to the Chigi Painter (Smith 1890, 167–180; Amyx 1988, 31) (Pl. 4), (Washburn 1906, 116–127; Amyx 1988, 32) (Pl. 5). If we compared the syntagmatic structure of those three works, we would find strong connections between them, however, the hoplite scene on the Macmillan Aryballos is often considered to be an unsuccessful representation of the phalanx (Salmon 1977, 88), as it lacks the main features of this formation. Yet perhaps this difference could be turned around and explained if we reduced syntagmatically the supposed phalanx on the remaining two vases, and after that the image would not change markedly? Where is the olpe situated when it comes to depictions of warriors in Corinthian vase painting? Finally, the warrior frieze lacks various types of warriors, such as the mounted hoplites (Dunbabin 1962, 146; Greenhalgh 1973, 85–88), the cavalrymen (Dunbabin 1962, 151; Greenhalgh 1973, 85–88; Amyx 1988, 163), the light armed (Snodgrass 1965, 113; Snodgrass 1999, 50–55), or the archers (Snodgrass 1999, 50–55). Thanks to the richness of Greek imagery these interpretations could be immensely extended.

The differentiation between syntagmatic and paradigmatic relations, together with an understanding of the characteristics of imagery, forms the backbone of pictorial semiotics. The rules of analysis are not particularly difficult, however, they do require great knowledge of the source material and a conscious approach to it. Iconography is not just a transparent window through which one can gaze upon an ancient society. The contact is made via the distortive prism of imagery, which itself is a product of a past culture, and that is why we can still access antiquity through it. One has to be constantly reminded that the products of imagery do not reflect reality, but the way reality should be. Iconography is not history, but poetry, in the Aristotelian sense (*Poetics* 1451b; see also Small 1999, 563). When we read ancient images without this knowledge, it is we who are practicing cargo cult science. Just like the tribesmen observing an unfamiliar and exotic object, the airplane, using their own eyes, their own imagery. The method that was in danger of being pulled into this trap turned out to be the only reasonable escape from it.

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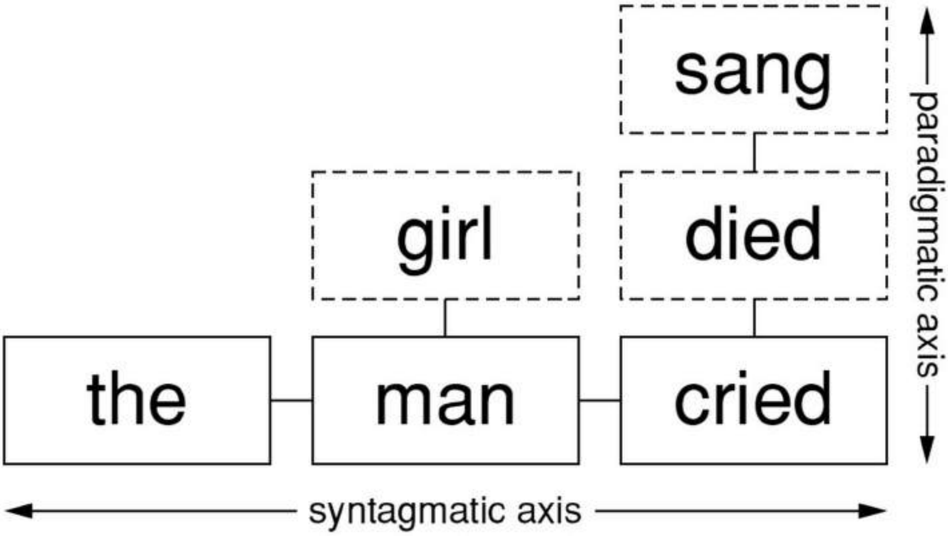
Pl. 1. Friezes from the Chigi vase. Protocorinthian olpe, Chigi Painter *c*. 650–640 BC, Rome, Villa Giulia 22679. Reproduced from Pfuhl 1923, no. 59.




Pl. 2. Syntagmatic and paradigmatic axes and relations between them.
Reproduced from Chandler 2007, 84. fig. 3: 2.

1

2

3

Pl. 3. 1 – Athenian black-figure kylix, merchant sailing ship attack by pirate galley, from Vulci, 520–500 BC, London British Museum 1867,0508.963. © Trustees of the British Museum; 2 – Other side of kylix, pirate galley closing in on the merchantmen. © Trustees of the British Museum; 3 – Both scenes on the vase shown together. © Trustees of the British Museum

Pl. 4. The Macmillan aryballos, Chigi Painter, *c.* 640 BC, London British Museum 1889,0418.1. © Trustees of the British Museum

Pl. 5. Friezes from Berlin aryballos, Chigi Painter *c.* 650–640 BC, Berlin Staatliche Museen 3773. Reproduced from Washburn 1906, pl. 2

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# A GREEK FIBULA IN THE COLLECTION OF THE ARCHAEOLOGICAL MUSEUM IN WROCŁAW

**Abstract:** *In the collection of the Archaeological Museum in Wrocław is a Greek fibula, which was donated by Wilhelm Grempler, a Wrocław doctor and researcher of antiquity well-known for his contribution to Silesian archaeology. It belongs to the 'millwheel' fibula group, which is characterised by the distinctive decoration of its bows. Fibulae of this type have been found in modern Bulgaria, Macedonia and northern and central Greece, although they seem not to have reached its south. Observable differences in the shapes of the decorative elements of these fibulae are of a regional nature and allow two varieties to be identified within the type: North Balkan and Greek. The best analogies for the Wrocław 'millwheel' fibula can be found in objects of the same type found at Halai in central Greece, which can be dated to the mid-5th century BC.*

**Keywords:** *A Wrocław fibula; 'millwheel' fibulae; Wilhelm Grempler; Archaeological Museum in Wrocław*

The Archeological Museum in Wrocław possesses a Greek fibula that is a remnant of the collection of antiquities of the former *Museum Schlesischer Alterthümer* in Breslau.[1] The museum was founded in 1899, with one of its co-founders being Wilhelm Grempler (1826–1907), a Wrocław doctor and researcher of antiquity, who was the donor of the object under discussion

[1] Before the World War II, Wrocław under the name Breslau was part of the German State. It should also be mentioned that Dr. Paweł Madera of the Archaeological Museum of Wrocław was the first to correctly describe the object as a hinge fibula. 19th century scholars considered it to be a pendant.

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(Pl. 1).[2] The beginnings of Grempler's interest in archaeology date back to 1873, when he became a member of two German scientific societies – *Deutsche Gesellschaft für Anthropologie, Ethnologie und Urgeschichte* and *Berliner Gesellschaft für Anthropologie, Ethnologie und Urgeschichte*. In the same year, he joined the *Verein für das Museum Schlesischer Alterthümer* and then served as its chairman from 1884 until his death in 1907. Grempler not only actively participated in international archaeological conferences, but also conducted excavations at many archeological sites, the results of which were published in 1887 and 1888. He was also the author of numerous papers on archaeological finds from the Silesian region. All of his publications were collated into one study, which was published in 1902 (see Verzeichnis 1902). In addition, Grempler contributed to the recognition of Silesian archaeology as a specific scientific discipline dealing with the remains of the rich material culture of this historical region.

Grempler's contribution also included the donation of many ancient objects to the *Museum Schlesischer Alterthümer*. He had acquired a sizeable collection of antiquities as a result of the many trips he took across Africa, Asia and Europe after definitively abandoning medicine to fully devote himself to archaeology in 1890. This collection, which contained works of art of African, Asian and European provenance, was subsequently donated to the museum. Among the objects he donated were some Greek fibulae, mentioned by Hans Seger (1899a–c) in the museum management reports from the 1895–1898 period. The first mention refers to fibulae from Kerch and Greece (Seger 1899a, 33), whilst the next records the acquisition of a valuable collection of Egyptian and Greek fibulae, alongside other ornaments (Seger 1899b, 110). It is therefore possible that the fibula now kept at the Archaeological Museum in Wrocław comes from one of these two donations. However, a third possibility also exists. The report for 1898 states that Grempler donated his collection of findings from Larissa to the museum in this year (Seger 1899c, 476). The town, located in central Greece, could also (as will be demonstrated later) very plausibly be the place of origin of the object, although the abovementioned report does not specify if the finds from Larissa included any fibulae.

Unfortunately, we do not have any information concerning either the place where the Wrocław fibula was obtained or the circumstances surrounding

[2] I am very grateful to Mr. Krzysztof Demidziuk from the Archaeological Museum in Wrocław for his help in uncovering information about the donor of the fibula and the circumstances of its acquisition by the museum.

its acquisition. It is a very specific kind of fibula, which allows us to have a general idea of where it could have been found or acquired, based on data from the abovementioned reports and the limited area of occurrence of millwheel type fibulae. The name of the type derives from the characteristic decoration of its bow, which can be seen on the Wrocław fibula (Pl. 2: 1–2). Its bow is decorated with a series of eight cylindrical projections in five groups, which create structures clearly reminiscent of a mill wheel. The two central 'millwheels' have one of their projections broken off. On both sides of the 'millwheels', rings with short parallel lines are incised. The hinge plate takes the form of a five-petal palmette emerging from a double volute. The catch of the needle is decorated with two hollow balls, flattened at the back, which are placed on either side of it. The needle itself has not been preserved. The fibula is made of silver, its length is 3.3cm and its height at the highest point of the bow is 2.4cm.

Fibulae of the millwheel type have almost exclusively been found in the Balkans, specifically in present-day Bulgaria (Filow and Welkow 1930, 309, fig. 30; Venedikov and Gerasimov 1975, figs. 210–212), Macedonia (Cassirer and Helbing 1928, pl. VII; Popovič 1956, 104f., pl. XI) and northern and central Greece (Marshall 1911, 335, pl. LXVII, nos. 2841–2844; Walker and Goldman 1915, 425, fig. 2; Amandry 1963, 203, fig. 109 left). The find locations indicate that this type of fibula was in use within a limited area throughout which it seems to have been produced during the same period. The only information concerning millwheel type fibulae found beyond the area outlined above comes from the catalogue of Greek, Etruscan, and Roman jewellery in the collection of the British Museum, published in 1911 (Marshall 1911). In this publication, two fibulae are said to have been found in a tomb at Elis in the Peloponnese in western Greece (Marshall 1911, 335, pl. LXVII, nos. 2845–2846). The small number of finds of millwheel type fibulae in the territories of northern and central Greece may further indicate that these pins, described by some scholars as typically northern Greek (von Bothmer and Mertens 1982, 18), were not in fact of great popularity in this region. Archaeological evidence indicates that these fibulae were produced from at least the mid-5th to the end of the 4th century BC. The oldest objects of this type, found at Halai in central Greece, may be dated to the mid-5th century BC.[3] A. Oliver Jr. (1966, 272) stated that the end of the 6th century was the time when the first millwheel type fibulae

[3] These fibulae have not been worked on so far. I received information on their dating from Dr. George Kavvadias, Head of the Department of Vases, Minor Arts and Metalwork of the National Archaeological Museum of Athens.

appeared, probably based on older proposals of the dating of fibulae found at Trebenishte in Macedonia (see Vulić 1932, 1) by L. Popovič (1956, 86). It seems more likely, however, that the second half of the 5th century BC is the correct period. The latest known objects of this characteristic type can be dated to 330–300 BC. They form part of a set of ancient ornaments, known as 'The Ganymede Jewelry', which was found near modern Thessaloniki (Richter 1931, 290f., fig. 2). Taken together, the preserved examples, which date to different periods within the time of the fibula's use, indicate that the millwheel type remained fairly uniform throughout the entire duration of its production. The differences that may be observed mainly concern the shape of the projections forming the 'millwheels' that decorated the bows. It seems that their form depended on the area of production. Projections of fibulae produced in ancient Greece are cylindrically-shaped, straight or slightly narrower towards the top (Walker and Goldman 1915, fig. 2), while projections of 'millwheel' decorated fibulae made in ancient Macedonia are shorter, wider and strongly flattened, causing them to more closely resemble the petals of a flower (see Richter 1931, fig. 2; Popovič 1956, pl. XI; Amandry 1963, fig. 109 left). Additionally, in some cases, the hinge plates take the form of rectangular boxes decorated with a relief (see Richter 1931, figs. 2 and 5). The bows of the fibulae found in Bulgaria are embellished with flanges consisting of short, flattened and pointed projections, whereas their hinge plates are in the shape of a triangle with rounded corners and beaded edges. Their surfaces are decorated with engraved palmettes (Filow and Welkow 1930, 309, fig. 30).

The object under discussion is most similar to the millwheel type fibulae found during the American excavations at Halai of Locris in central Greece carried out in the years 1911–1914.[4] According to the information provided by A. L. Walker and H. Goldman (1915, 426), who led the excavations at Halai, the fibulae, like other jewellery from the site, were found in graves. However, in their report published in 1915 (Walker and Goldman 1915), no information is given on when the graves and the fibulae themselves date back to. A stylistic analysis of the fibulae from Halai (which have not yet received the attention they are due) demonstrates their obvious similarity to the Wrocław pin; this is particularly visible in the case of the largest objects in the set, which consist of 14 silver fibulae of different sizes

[4] They are now kept in the National Archaeological Museum of Athens, collective inv. no. Χρ. 981. This information was received from Dr. G. Kavvadias, to whom I am very grateful for his assistance.

(Pl. 3).[5] The projections forming 'millwheels' are almost identically shaped and they take the form of cylinders rounded at the top. Strong similarities are also observable in the shape of the hinge plates, which are formed by five-petal palmettes rooted in double volutes. The smaller objects in the set from Halai have similarly shaped projections, but are shorter and distinctly narrower towards the top and the palmettes forming their hinge plates consist of more petals, which are long and slender. Another similarity between the Wrocław fibula and objects of the same type from Halai is the shape of the catch accompanied by two hollow balls. However, it should be stressed that both the shape and the ornamentation of the catch is typical for all known fibulae of the millwheel type regardless of the place in which they were found. Almost identically shaped and decorated catches may be seen on fibulae found in Thessaly, which in ancient times was a part of northern Greece (Marshall 1911, pl. LXVII, nos. 2841–2844), as well as on pins found in the territory of the ancient Macedonian kingdom (Richter 1931, fig. 2; Vulić 1932, fig. 20). Catches of the same shape also occur on millwheel type fibulae from Bulgaria (Filow and Welkow 1930, fig. 30).

The analysis above clearly shows that the fibula kept at present in the Archaeological Museum in Wrocław was very probably made in central Greece and that it is an example of a very recognisable type of fibulae, known as 'millwheel' for its unique bow ornamentation. Differences within the type, mainly noticeable in the decoration, seem to be regional. Northern Balkan fibulae are characterized by 'millwheels' consisting of strongly flattened projections, whereas the protrusions of 'millwheels' decorating bows of fibulae produced in ancient Greece are round. As indicated above, observable differences in the shape of the hinge plates may also be considered regional variations.

The millwheel type fibulae found in a grave in Elis in western Greece are very similar to the Northern Balkan variant of the type (Marshall 1911, pl. LXVII, nos. 2845–2846). However, it seems that they were not produced locally and that they reached Elis as imports. This was perhaps from the area of Macedonia, since they show a striking similarity to objects of the same type found at Trebenishte (see Vulić 1932, fig. 25).

The closest analogies to the object in question can be found in fibulae of the millwheel type found at Halai, which date back to the mid-5th century BC. It is therefore very likely that the Wrocław fibula was made

[5] In the picture presented here as Pl. 3: 13, some fibulae can be seen. However, Dr. G. Kavvadias has informed me, that a total of seven pairs of silver fibulae from the American excavations at Halai are kept there.

at approximately the same time, which would thus make it one of the oldest known objects of the type discovered so far. In addition, it does not differ from the examples cited above in terms of the material used to make it. Silver was the metal most frequently used for the production of millwheel type fibulae, regardless of the time and place in which they were made (Olivier Jr. 1966, 272), and almost all of the examples cited above are made of this metal. The only exceptions are the millwheel type fibulae from the set called 'The Ganymede Jewelry', which are made of gold (Richter 1931, 290). The shape and decoration of the Wrocław fibula, as well as the material it is made of, clearly confirms its place within a very interesting class of fibulae named after its unique bow ornamentation, a class which has not yet received the attention it is due. Northern Balkan finds of such fibulae show that they may have been paired with a braided chain, sometimes decorated with pendants, which further emphasised their decorative nature (see Filow and Welkow 1930, fig. 30). They seem to have served as decorative rather than utilitarian objects and were probably used as modern brooches are today.

It is neither possible to determine which of the donations mentioned above was the source of the fibula under discussion, nor how it came into the hands of its donor, Wilhelm Grempler. It is also not possible to establish if it was purchased or found during fieldwork. However, it is very likely that the place of its acquisition was Larissa (the largest city of Thessaly, which in ancient times was a very important metropolis in northern Greece) or its surroundings and that it was donated to the former *Museum Schlesischer Alterthümer* as part of a set of ancient objects described in a report of Seger (1899c, 476), which were found at this Greek city. If the Wrocław fibula formed part of one of two earlier donations (see above), the place of its production must have been a centre located either in northern or central Greece.

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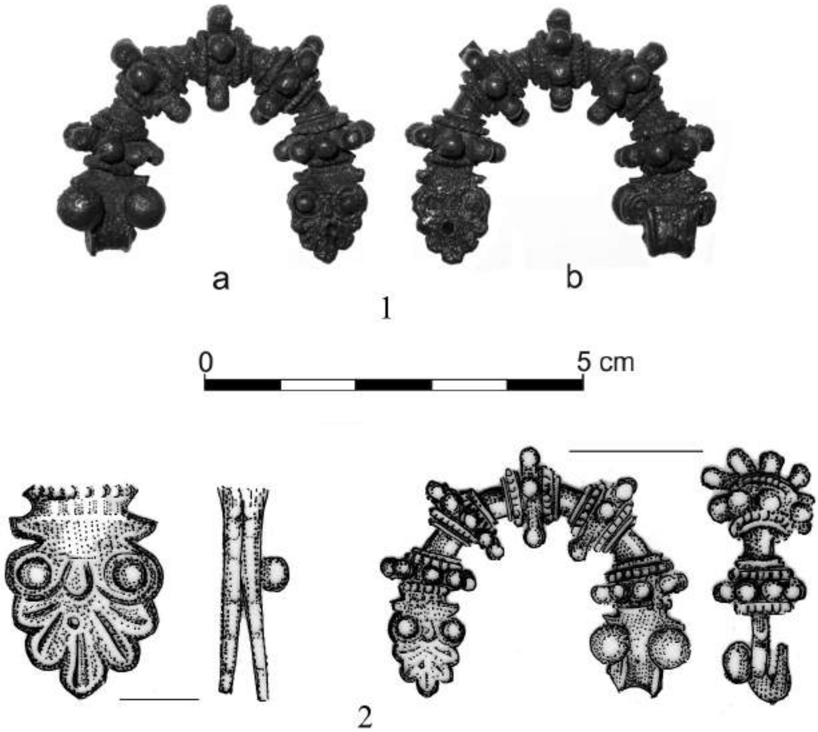
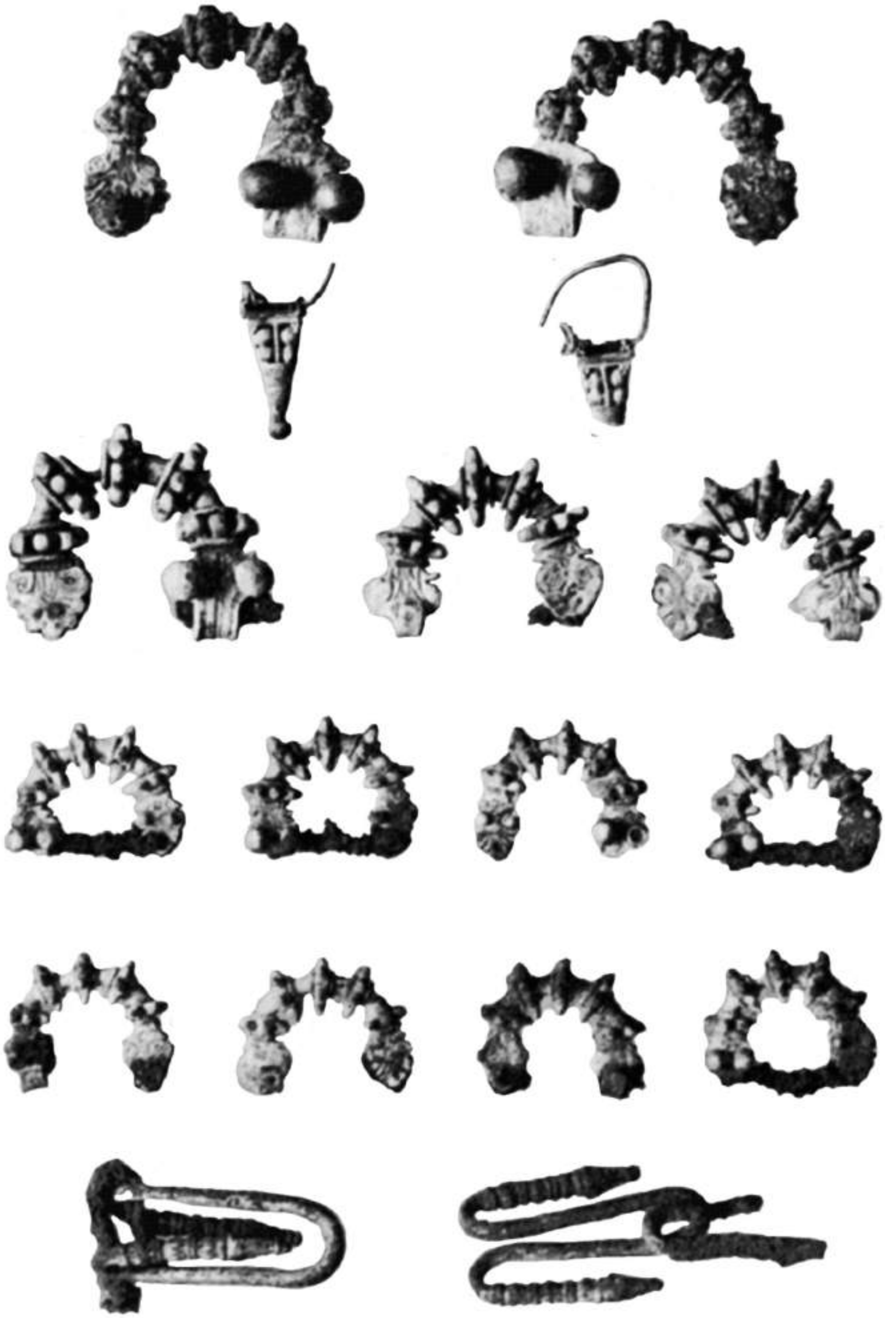
Pl. 1. Wilhelm Grempler.
Photographic Archive of the Archaeological Museum in Wrocław




Pl. 2. Fibula of the millwheel type, silver, length 3.3cm, inv. no. MNW/A/III/2601, mid-5th century BC(?). Courtesy of the Archaeological Museum in Wrocław.
1 – View of the upper side and the underside
2 – Drawing by Teresa Demidziuk



Pl. 3. Fibulae of the millwheel type found at Halai.
Reproduced from Walker and Goldman 1915, fig. 2

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# THE BRONZE CALYX-KRATER FROM THE 'HEUZEY B' TOMB IN VERGINA (ANCIENT AIGAI)

*For my friend and colleague Professor E. Papuci-Władyka*

**Abstract:** *The calyx-krater with masks of Maenads on the handles was found in the small built tomb 'Heuzey B' on the east side of the necropolis of ancient Aigai (Vergina). The tomb belongs to the burial group Heuzey and is dated to the last decades of the 4th century BC based on archaeological evidence. The new crater from Vergina (krater 'Heuzey') complements the small group of bronze krater of the second half of the 4th century BC, which served as the urn (Urne). It seems no coincidence that all of the examples come from Macedonia, as shown by the excavations (Vergina-Aigai, Pydna) or the comparative study (Athens, ex White Collection).*
**Keywords:** *4th century BC; metal work; bronze vases; Aigai-Vergina; Heuzey*

## Prologue

In 1998–1999, during the clearing of the remains of a Macedonian tomb in Palatitsia (first researched by L. Heuzey in 1856),[1] two small burials were discovered at the eastern limits of the large cemetery of Aigai (Vergina), which are now known as 'Heuzey A' and 'Heuzey B'. Unfortunately, 'Heuzey A' had been looted. 'Heuzey B', however, was of great interest, as all of its burial objects had been preserved. This fact, combined with the burial's

[1] See Heuzey and Daumet 1876, 226ff. (= Descamps-Lequime 2011, 325ff.); Drougou 1999; Drougou 1995–2000; Kottaridi 2013, 78–79; Drougou *et al*. forthcoming.

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spatial relationship to 'Heuzey A', ensured that a strong chronological estimate could be made of both.[2] The small cist grave of 'Heuzey B' was built in full view of 'Heuzey A', directly to its north, which places its dating within the same period. This is confirmed by its clay vase funerary offerings, which come from the last quarter of the 4th century BC (around 320 BC). The weapons discovered inside this small cist grave reveal it to be the burial of a military male, whose bones were kept inside a large calyx-krater after his cremation. It is this krater that will be the subject of this article. The metal vases and the burial ware are wholly typical of tombs dating to the end of the 4th century BC in Macedonia. Nevertheless, it is the tomb's clay vases that contribute most to the relative chronology of the burial complex, although this dating cannot be entirely certain. The most important item to this end is a small terracotta plain lamp of the Drougou ΠΛ1 type dating to the end of the 4th century BC.[3]

The bronze calyx-krater, which was used as an ossuary, stands out from the other clay and metal vases of 'Heuzey B' due to its size and shape. It joins the very limited group of known 4th century bronze calyx-kraters (cf. below Appendix and n. 1). A feature of this particular period is the black-glazed clay calyx-krater, which is usually adorned with overlaid gold decoration and floral motifs (Kopcke 1964, 33ff.; Zimmermann 1998, 82ff.; Papanastasiou 2004, 32ff.; Agapaki 2005, 13–35; Barr-Sharrar 2008, 97ff.; Simon 2010, 146ff.; see also n. 1). This seems to be the most appropriate equivalent of contemporary red-figure calyx-kraters in terms of value and impression. Despite their large number, the latter can be considered equally significant only on a few occasions.[4] However, the study of calyx-kraters

[2] The big Macedonian tomb, L. Heuzey's discovery, has already lost most of its stone structure; still, it retains its archaeological value due to the reports of L. Heuzey and H. Daumet. It is evident nowadays that the three tombs belong to one burial complex, where another built tomb excavated by the 17th Ephorate of Prehistoric and Classical Antiquities should be also included (see Kottaridi 1998, 408ff.). It is noteworthy that a few tens of meters south of the 'Heuzey' graves, there are the 'Bellas' Macedonian tombs ('of the Generals') which in a sense represent the chronological 'continuity' of the 'Macedonian tomb' type in the 3rd century BC (see Andronikos 1984, 34–37; Drougou and Saatsoglou-Paliadeli 2005, 200ff.).

[3] On the clay vessels of the tomb, see above n. 1. It is worthy of mentioning in the current study as well, the discovery in 'Heuzey A' tomb of a gold Carian coin issued by the king Pixodaros which offers the *terminus ante quem* of the 'Heuzey' burial group. See forthcoming publication of Drougou *et al*.

[4] Kugioumtzi 2006, 148ff. Still influential the work of Schefold 1937. Also, see Campenon 1994, 35ff.; Kathariou 2002, 8, 90ff. (kraters); Papanastasiou 2004, 31ff.; Barr-Sharrar 2008, 97ff.; Simon 2010, 146–147. Previously, see Frank 1990. On the use of kraters in

is most certainly of worth, as they represent a characteristic element of the 4th century BC.

**Bronze calyx-krater**

(Item nos. 26+27+38+39+41+42+28) (Pls. 1: 1, 2 and 2: 1). It possesses a lead, discus-shaped cover with a ring as a handle in its centre (item nos. 28+34). It is completely preserved except for one of the two heads on one handle. In many places, the body has been oxidised without any serious damage being caused apart from some small holes in the wall and the bottom of the vessel. Ht. 0.398m, lip diam. 0.455m, base diam. 0.15m, base ht. 0.25m [0.15m]. Handle ht. 0.1m, handle w. 0.077m, handle component w. 0.025m, head ht. 0.09m, head w. 0.055m, lip ht. 0.018m.

**Lead disc cover of the calyx-krater**

(Pl. 1: 1). Intact. Diam. 0.43m, thickness 0.015–0.02m. Irregular lead disc with a rough ring serving as a handle. See for example: similar lead caps (covers) of vases or vessels containing bones in Pydna (Besios and Athanasiadou 2014, 132) or in Amphipolis (Lazarides 2014, 109, fig. 77 = Deschamps-Lequime 2011, 332–333, figs. 533, 534).

The krater's body consists of a uniform hammered sheet, whereas the base, the handles and the lip are cast and ornamented. According to analysis conducted, the body's alloy differs from that of the handles and the base, as it contains more tin. Cast parts were adhered to the body by silver soldering. On cleaning the vase, the incised letters of M and N were revealed, which were obviously indicators of the correct placement of the handles (they are no longer visible). On the base's standing surface and at the point that corresponds to one of the heads, the letter Δ can be seen. There are also incisions that would have rendered details on the heads of the handles.

On the whole, the krater is both tall and rather narrow, but with heavy cast handles and a heavy base (Pl. 2: 2). The latter has a conical shape with a wide ring on its lowest part, whilst its surface is decorated with

the 4th century BC see Fless 2002, 27ff. Worthy of note are the miniature clay calyx-kraters, the majority of which appears in the 4th century BC and the Hellenistic period, a phenomenon possibly associated with burial practices, cf. examples from Apulia, see Kotitsa 1998, 146ff., no. 107; Agapaki 2005, 31. For the special symbolism of the large-scale kraters and particularly in the 4th century BC in relation to contemporary philosophical views and in connection with burial practices, see Ignatiadou 2014.

a complex relief ornament formed by a Lesbian *kymation* with lotus flowers in between its heart-shaped elements. The individual features of the *kymation* are rendered using double grooves and strongly curved intermediate surfaces. The composition of the lip decoration is similar: a ring with a relief strip of beading (*astragal*) is positioned around the top of the lip's wide outward dropping curvature. The lip surface is adorned by an Ionic relief *kymation*, in which the large convex element of the egg is surrounded by double relief grooves.

The lower section of the vase (which can be termed its bottom) is relatively short and rounded on the outside, but at the transition point to the calyx-shaped section it forms a narrow 'shoulder'. The calyx-shaped upper section of the vase ends in a lip that opens up significantly outwards and slightly downwards with an overhanging *kymation*.

The large, cast Π-shaped handles (Pl. 3: 1, 2) both components of which are attached at the point where the two sections of the body are joined, strongly curve outwards and then turn towards the body.

The handles are formed by grooves and relief or flutings that terminate in long 'tongues' at the point where they adhere to the vase's body. In the same spot, there is a floral motif of acanthus leaves and flower-rosettes formed in such a way that the female head reliefs at the adhesion of the handles could be fitted. Between the lower parts of the handles are two half-leaves and a space that is covered by rosettes and a heart-shaped design. In contrast, there is simply one rosette with an accompanying half-leaf on each of the edges of the adhesions. The rosettes on the handles consist of six thick relief leaves joined in the middle by a relief button. Small relief leaves surround the 'tongues' of the handles above the arched heads.

The female heads on the handles (Pl. 4: 1, 2, 3), of which one is missing, are almost identical. The faces are oval or round. The surfaces of the forehead and cheeks are relatively large and curved with large eyes and nose and a small mouth acting as the bonding features that form the reverse triangle of the face's centre. Below the forehead and the large, wide incised arch of the brows, the large eyes are shaped by two modelled arches (the eyelid and the lower part of the eye) that face each other. The incised circle of the pupil is visible between them. The large nose is rooted between the eyes and the forehead and ends above the mouth, where it retains its large size. Contrastingly, the mouth, with its pronounced modelled lips, is small in size and its length is equal to that of the nose with its open nostrils or to one eye. The hair covers the head liberally and ends in two long free locks, one on each side beneath the ear. The forehead is completely bare and the locks here are shaped in small incised or modelled groups of hair. The eyes, the ridges of the nostrils and the sides of the mouth form distinctive modelled bulks on the face thereby highlighting its plasticity vis-à-vis the wide curves of the cheeks and forehead. The result is a young female face with large heavy eyes and dishevelled hair, all the features typical of a young maenad. Thus far, archaeological research has discovered a small number of preserved bronze calyx-kraters dating to the 4th century BC. Alongside contemporary black-glazed clay models, they represent a trademark product of workshop production during this century and provide clues to their interrelation.

**Bronze calyx-kraters of the 4th century BC**

*Catalogue*

1. Pydna. Πυ 207. Sevasti 'The Pappas Tumulus', tomb 2. Second quarter of 4th century BC. Besios 1987, 212, 213, figs. 8, 9; Vocotopoulou 1994, 189ff.; Vocotopoulou 1997, 261, no. 157 (340–330 BC); Barr-Sharrar 2008, 2, 98, fig. 89; Besios 2010, 286–287; Touloumtzidou 2010, 431–432, 440; *Il Dono di Dioniso* 2011, 149, fig. 2.; Sideris 2011, 288ff., 290ff.

2. Vergina. Tomb 'Heuzey B', (including excavation data). See Drougou and Saatsoglou-Paliadeli 2006, 198–199 (height corrected, instead of 0.7m read 0.4m [!]; fragments, handles etc. before the vase's conservation); cf. Drougou 1999, 540, figs. 3–5; Drougou 1995–2000, 242, fig. 8; Touloumtzidou 2010, 431–432, 440–441; Fox 2011, 169 (A. Kottaridi); Sideris 2011, 288–289; Kottaridi 2013, 78–79 (340–330 BC!).

3. Macedonia. Thessaloniki (currently?) (formerly White Levy Collection). See *Νόστοι* 2003, 208, no. 8 (330 BC); Chi-Gaunt 2005, nos. 9, 20; Touloumtzidou 2010, 432, 441; *Il Dono di Dioniso* 2011, 145ff.; Sideris 2011, 290.

4. New York. White Levy Collection B΄. Sideris 2011, 290.

5. Berlin. Antiken Sammlungen. No. 30622. From Maikop, Ukraine. Züchner 1938, 3ff.; Heilmeyer 1988, 136, pl. 136; Touloumtzidou 2010, 441.

6. Preserved masks from the handles of calyx-kraters found in Pella, Vocotopoulou 1994, 558, fig. 10, Louvre Br 1717 (from Galaxidi), Louvre MNC 1242 (Dodona?), National Museum, Karapanos Collection nos. 78–80 (Dodona); Touloumtzidou 2010, 433–434, 441.

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Vickers and Gill 1994, 174; Vocotopoulou 1994, 189ff.; Vocotopoulou 1997, 261ff., no. 157; Themelis 2000, 495–517; Barr-Sharrar 2008, 122ff. (see the last three works on relief decoration and passim); Touloumtzidou 2010, 427–441; Sideris 2011, 284–285.

On the 4th century BC clay calyx-kraters, see Schefold 1934, 25ff.; Kopcke 1964, 33ff., no. 55, pl. 201; McPhee 1981, 264ff.; Frank 1990, 23–35; Campenon 1994, 55ff.; Rotroff 1997, 135ff.; Zimmermann 1998, 82ff.; Kathariou 2002, 11ff.; Agapaki 2005, 8ff.; Touloumtzidou 2010, 427–441; Ignatiadou 2014, 55.

For lists of clay examples, see Kopcke 1964, 33ff.; Papanastasiou 2004, 111ff., mostly 147ff., pls. VIII–XXV. Also, Konstantopoulos 1986, 108, fig. 105 (Ialyssos); Riz 1990, 37, 4: 1 and 5: 1 (gilded clay example from a grave in Teano, Campania dated to 300 BC); Kotitsa 1998, 146–148 (Apulian, third quarter of 4th century BC), pl. 61, no. 104; Agapaki 2005, 8ff.; Barr-Sharrar 2008, 97–98; Simon 2010, 153ff.

The bronze calyx-kraters of Vergina and Sevasti-Pydna (Πυ 207)[5] are especially useful for researchers due to their documented provenance and their fairly accurate dating, based on excavation data. A third intact example, a bronze krater in the White Levy Collection with four Maenad heads on its handles, was stored at the Metropolitan Museum in New York until recently. In 2005, it was returned to Greece and has been kept at the Archaeological Museum of Thessaloniki since.[6] Another relatively unknown calyx-krater with Silenoi heads on the handles also belongs to the White Levy Collection.[7] Fragments of similar vases, which are scattered across various museums in Greece, Europe and America should be added to this tiny group of intact calyx-kraters; the fragments of the 'Krater of the Maenads', kept in the Antikensammlung in Berlin, originally came from Maikop in Ukraine (Züchner 1938, 3ff.; Barr-Sharrar 2008, 148ff., fig. 137, n. 12). A handle from the Pella Museum and a head-mask from Western Macedonia (Agia Anna, Kastoria, in the Archaeological Museum of Kastoria) are examples of calyx-kraters that confirm (despite the small

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5 On the Sevasti-Pydna krater see Vocotopoulou 1994, 189ff.; Vocotopoulou 1997, n. 157; Besios 2010, 287; Sideris 2011, 288–289.

6 Vocotopoulou 1994, 189ff.; *Νόστοι* 2008, n. 8; Sideris 2011, 289ff.; Ignatiadou 2014, 47, pl. 55.

7 Sideris (2011, 288, figs. 15, 16) refers to the calyx-krater of the 'Silenoi'. Based on the abovementioned photographs, the similarity with other bronze calyx-kraters under examinations is confirmed. See n. 6.

number of preserved specimens) the wider use of a metal version of the vase shape during the 4th century BC (Vocotopoulou 1994, 196, n. 25 and 26). However, the bronze kraters (both complete and in fragmentary form) dating to the 2nd and 1st centuries BC found in Pompeii and Boscoreale in Italy[8] constitute a substantial series that poses serious questions concerning provenance and chronology, as they could very well date to Hellenistic times.

Today, it is accepted by all that the shape of the calyx-krater (a disputed topic, best not discussed here) dominated 4th century production of clay and metal vessels. In addition, in the Hellenistic era, it appeared widely in funeral feast reliefs, or *nekrodeipna*, taking, for example, the form of architectural ornamentation. In relation to other objects and artistic works of earlier times, vases such as the krater acquired an ever increasing symbolic significance until they were finally incorporated into Hellenistic decoration. Finds at Pompeii and other Italian sites dating to the Roman Republic, as well as similar marble 'Neo-Attic' works, confirm that the shape persisted to this period, suggesting either the survival of specimens or that Classical models were copied (cf. Züchner 1938, 3ff.; Barr-Sharrar 2008, 148ff., fig. 137, n. 12; see also n. 8). The final phase of the Classical era (the 4th century BC) appears to have been a transitional period in which many changes occurred due to great economic, political and religious upheaval in the Greek region. The production of impressive red-figure clay vases with multi-coloured decoration ('Kerch vases') that were impractical for everyday use, were widely distributed outside Athens, and elaborate metal vessels, which competed against their splendid black-glazed counterparts, tended to predominate, just some of the changes taking place in the 4th century BC. It has been accepted by scholars that the relief decoration of later kraters has its origins in the work of the 4th century BC, since elements of it have been identified and attested in other 4th century BC relief metal vessels (e.g. the Berlin krater or the famous volute krater of Derveni). Furthermore, the view that Agapaki (2005, 37ff.; cf. Barr-Sharrar 2008, 98ff.; Ignatiadou 2014) expresses in her unpublished dissertation appears to be correct. She argues that these great and expensive vases were kept, even if in restored form, for many years, which partly explains the long preservation of the shape, at least symbolically. This is obviously not an isolated example of classical elements surviving into Hellenistic and miniature art. Indeed, it is a widely acknowledged fact that in Hellenistic times, at least so far

[8] Pernice 1925; Barr-Sharrar 2008, 70–71, figs. 69, 140, 141 and 210-211; On similar marble kraters of the 'Neo-Attic workshop', see Fuchs 1959; Grassinger 1991.

as vase shape and associated iconographic themes are concerned, there was a return to Classical models (in particular to those of the 4th century BC) in the production of clay and metal vessels. The use and application of this calyx- and volute-krater shape in 4th century BC products is, therefore, especially impressive. This exhibition of luxury and embellishment in terms of size and wealth of employed materials decisively influenced both Hellenistic and miniature art, as well as the symbols, depictions and decorative motifs associated with cults and other social issues that formed a critical element of the period (Simon 2010, 146–157 [in connection with the symposion and the cult of Aphrodite]; Ignatiadou 2014). In this way, precious metal vases and vessels from the 4th century BC were passed on to the Hellenistic era, during which time they were either used or copied in the 2nd and 1st centuries BC. In short, it can be considered fact that the use of a differentiated form of vase and vessel can be clearly identified from as early as the 4th century BC. This area is, however, in definite need of further study. Apart from the important fact that their find-spots are known, the similarity in terms of shape and decorative elements of the two kraters from Vergina and Sevasti-Pydna is also worthy of note. At the same time, however, the Sevasti calyx-krater and the repatriated krater of the White Levy Collection are alike in that they both have a complex 'monumental' base built next to the 'krater base', as well as the actual base of the vase itself. The column-shaped foot of the 'krater base' stands in the middle of a cuboid base and ends above in a circular socket at the base of the vase. The latter bears a form previously observed in red-figure pottery of the early 4th century BC (cf. the volute krater-dinos of the Meleager Painter), as well as in painted depictions on an ornate bed from a Macedonian tomb at Potidea (Sismanidis 1997, 56–57, pl. 24: with depiction of kraters that stand upon similar complex bases; also, Kathariou 2002, 8, pl. 386; Barr-Sharrar 2008, 80ff., fig. 74, 94ff.). The base of the second krater of the White Levy Collection with the Silenoi masks appears to be similar. It is now certain that the use of monumental bases on vases was not an exclusive feature of large stone and metal vases from the Late Hellenistic and Early Roman Imperial period. However, it is also evident that the complex 'monumental' form of large vases had begun as early as the 4th century BC.[9] On the Sevasti-Pydna krater, a simple *kymation* may be discerned on the lower part of the cube-shaped plinth's base sides, as well as a small step at the end of the tongue-shaped grooves

[9] Similar elements of the shape can be seen on other shapes, such as the clay volute kraters (the South-Italian ones in particular), cf. Barr-Sharrar 2008, 91ff. At the same time, an analogous trend is observed to the corresponding marble monumental vases.

on the foot. The Vergina krater does not possess an impressive 'krater base', although the real base of the vase is a perfect match to the Sevasti one in terms of shape and relief decoration.

The relief ornaments (primarily the Ionic and Lesbian *kymation* on the lip and base) and the large cast handles are the main characteristics that the kraters share. The two Macedonian examples from Vergina and Sevasti-Pydna in fact prove to be almost identical in this respect. The bronze handle of the krater from Pella could also be added to this small group. The lip is adorned with a 'drooping' relief *kymation* crowned with a thin astragal garland, whilst the base bears a Lesbian *kymation* relief typical of the time.[10] The large free handles form a large Π with deep and wide grooves and the long horizontal stem of the Π curves inwards towards the calyx-shaped body.

The handle grips on the body's surface are covered by large masks consisting of the heads of maenads, a well-known morphological theme of the second half of the 4th century BC. The facemask themes of the examples considered here all derive from Dionysiac iconography (Maenads, Silenoi) and this also applies to the larger depictions on the Berlin fragments and a wider group which includes the volute krater of Derveni. Based on excavation finds (i.e. the kraters of Vergina and Pydna), future research in this area should perhaps focus on burial practices when considering other examples of unknown provenance.

The rich finds from the area of ancient Macedonia and the more general region of northern Greece over the past 50 years constitute an impressive and multi-faceted collection of material that seems to confirm the belief of Vocotopoulou (1994, 190ff.; 1997, n. 157) and earlier scholars that it was of the utmost importance to the Greek world of the time. Nevertheless, a closer and more careful analysis demonstrates that theorising on particular origins or on production 'workshops' based on external morphological or aesthetic characteristics remains uncertain. This is because any classification

[10] Cf. on the usual decorative motifs, especially on silver vases, Zimi 2011, 142ff. Also, Pfrommer 1982, 119ff.; Pfrommer 1987; Pfrommer 1993, 26ff.; Barr-Sharrar 2008, 31ff. Cf. also, von Graeve 1970 on similar composition of decorative motifs on bigger monuments without ignoring the analogous trend observed in monuments of contemporary architecture. The composition of the *kymatia* and tendrils may comprise the most typical feature of 4th century BC, since it is found in almost all art forms from architecture, metalwork to miniature art, cf. for example, the instances from pottery-painting or the cloth from Vergina, Drougou 1984, recently Romiopoulou and Schmidt-Douna 2010, 74ff., 93ff. (decorative elements of the structure as well as of ivory objects). See Fox 2011, 147 (the throne from the tomb of 'Eurydice').

is made on the basis of other variables of interpretation, such as chronology or the technology employed. Recent research has focused on the modelled features of the attached masks, yet it seems necessary to first ascertain the method of production used and to identify the quality of the material. An attempt has been made to classify the decorative masks of metal vessels according to their typological and stylistic characteristics with the aim of identifying their craftsmen and production workshops.[11] However, the figural types are on many occasions similar or identical, although there are important dissimilarities in their depiction. As a result, it is beyond doubt that direct observation can reveal many differences that could allow the 'creator' or 'workshop' to be classified (see Themelis and Touratsoglou 1997, 171–182 [Themelis]; Themelis 2000, 511ff.; Sideris 2002, 173ff.; Sideris 2011, 289ff., cf. also Barr-Sharrar 2008, 178–186). For example, the satyr on the lantern of Vergina is similar to many equivalent toreutic works, but the difference in the craftsman's ability is clear and obvious (Andronikos 1984, 158; Sideris 2011, 288).[12]

The similarities between the kraters of Sevasti-Pydna and Vergina and their chronological and geographical positioning suggests a close connection in terms of their creation. This could perhaps mean they share the same production centre or 'workshop', located either in the vicinity of or inside one of the two neighbouring cities, to which other well-known examples of metalwork could also be attributed.[13] The kraters' large and deep eyes

[11] The decorative masks are affixedon the vase's wall below the handles with silver-soldering. The method of adhering the masks, the various complementary floral ornaments (see below) etc. constitute indications of both the intentional (ad hoc!) production process and the use (funerary?) of these bronze works in relation to other vessels for other purposes unknown to us. The factor of trading and distributing the molds of these works – a least known subject – should be also added. Cf. on the different interpretation suggestions, Sideris 2011, 286–288.

[12] The fact that the lantern of Vergina, in addition to the other vessels, remains essentially unpublished, hinders any discussion on or formation of 'hands' or 'workshops'. One example of such difficulties is the relation of bronze vases to silver ones. This can be easily observed on the masks of the silver oinochoai from Philip's tomb. Even though, their connection is certain their differentiations are notable. The decorative masks of the bronze vessels from Philip's tomb attest to significant craftsmen, like the creator of the lantern, and the similar or 'same' examples should be assessed with caution.

[13] It appears that the two cities had close relations. There are many findings from both areas indicative of this. Besides, the small distance between them accounts for the phenomenon while Pydna's harbour and the role played by Aigai created favourable conditions for the dynamic activities of their workshops. The connections observed in a variety of objects-finds from both excavations offer a wide field of research.

cover almost all of the upper half of the face, whilst the wide curves of the cheeks are positioned closer to the vertical nose and small, full mouth. The large round face is covered by a crown of dense curls made of thick, uneven, incised grooves that end up in long groups lower down. The heavy features of the face diminish towards its edges. The image is mainly dominated by the large cheeks and large eyes, exactly as is the case in other works, such as the female head of the earlier bronze oinochoe from Macedonian Tomb II ('Philip's') in the Great Tumulus in Vergina (Andronikos 1984, 158, fig. 124; Themelis 2000, 510ff.; Sideris 2011, 288. The chronological distance of these bronze vessels should be marked and interpreted). Sideris (2011, 288ff.), using an earlier study by Themelis (2000, 510ff.) on the formation of groups as a basis, distinguishes three large units to classify masks (and correctly not 'workshops'). This employs the concept of 'tradition' and uses the groupings of 'Macedonian' (with conservative tendencies), 'Athenian' and 'Corinthian'. Various individual groups are incorporated into these units, which use particular works, such as the Derveni krater or the Vergina lantern, to define their nature. Sideris (2011, 288ff.) places 'Corinthianising' works such as the Vergina krater, which he considers an indirect product of a Corinthian workshop (sic), in Themelis' (2000, 510ff.) '7th unit'. He also ascribes the masks of Dodona and the Louvre and the Maenads of the repatriated krater from the White Levy Collection to the same workshop. Nevertheless, the close relationship between the Pydna and Vergina kraters poses certain questions concerning the classification criteria of similar groupings. The relevance (or lack thereof) of several works from Vergina to certain examples from Pydna, Derveni etc. should be reconsidered through examination in-situ by researchers who possess knowledge of technical details (Andronikos 1984, 158, fig. 124; Themelis 2000, 510ff.; Sideris 2011, 288). Comparisons with corresponding silver examples from these places is important, but also in a way misleading. However, this issue lies beyond the scope of the present article. Indeed, the establishing of 'workshops' is a matter of interpretation, yet it ought not to be limited to purely morphological-aesthetic similarities or differences. It has already been acknowledged that 'common' forms (*topoi*) were created in the second half of the 4th century BC as the result of a fusion of many contemporary artistic trends and creations; this is a phenomenon that can mainly be identified in the work of craftsmen, vase painting, metalwork etc.[14] The fact that other scholars,

[14] Forms and trends, characteristics of various 'schools' or 'workshops' are identified primarily in miniature art but also in monuments of larger scale and significance while the difficulty in dating these monuments or other remains makes the whole issue even more

such as Barr-Sharrar (2008, 178ff.), detect influences from Athenian art in the same works of the 'Corinthianizing' group (according to Sideris) is of little surprise. As other scholars have noted (Sideris) however, it is true that stylistic and technical differences may be ascertained in the decoration of many similar vessels (Sismanidis 1997, 56–57, pl. 24: with depiction of kraters that stand upon similar complex bases; also, Kathariou 2002, 8, pl. 386; Barr-Sharrar 2008, 80ff., fig. 74, 94ff.; cf. also n. 10). Finally, it is worth noting that the distribution of all these goods (including works of art) created by artisans in the second half of the 4th century BC, shows that this Greek region was very attracted to the Macedonian court, which in turn brought about interaction and the development of common ways. Having expressed this general observation, it is nevertheless still necessary to closely examine the technical aspect of these works, in order that technology and other data (such as their use) can confirm current theories regarding the workshops that created such impressive metalwork.

The Vergina and Sevasti-Pydna kraters possess enough similarities to consider that they can both be attributed to a common tradition (or workshop) to which the White Levy Collection krater may also be added. The way in which the foot and the base of the krater were formed is similar, albeit with slight morphological differences. Similarities can also be detected on the Pella handle. However, it has already been mentioned that the decorative masks of the Vergina and Sevasti kraters can be connected with certainty. As far as basic characteristics are concerned, the mask of the maenad on the bronze oinochoe from Philip's tomb also seems to fit well, but the remarkably accurate and sharp rendering cannot be ignored, since it indicates either a better (or earlier?) mould or a more skilful hand.[15] It is necessary to compare kraters from the 4th century BC with corresponding clay examples,[16] since they appear equally as often in the second half of the century. This makes the relatively narrow, cylindrical, calyx-shaped body typical of the century's final decades (330–310 BC). The calyx's shape on the Vergina krater is rather narrow compared to the kraters of

complex. Nevertheless, it appears that in this interstice lies the beginning of the creation of the new Hellenistic trends in art.

[15] It is the same difference in quality noticed in the figures on the Derveni volute krater in relation to other bronze works of this period. Cf. observations by Andronikos 1984, 159ff.; Barr-Sharrar 2008.

[16] On the Sevasti-Pydna krater, see Vocotopoulou 1994, 189ff.; Vocotopoulou 1997, n. 157; Besios 2010, 287; Sideris 2011, 288–289. Cf. also *Νόστοι* 2008, n. 8; Sideris 2011, 289ff.; Ignatiadou 2014, 47, pl. 55.

the White Levy Collection. In contrast, the Sevasti-Pydna krater corresponds to the 'manieristic' shape of the Vergina vase, which, as mentioned previously, is similar in style to clay black-glazed kraters (see above).

The floral ornament[17] surrounding the masks is part of the composition of the kraters' handles. On the Vergina krater, curved acanthus half-leaves with open flower rosettes grow around the masks. This is an ornament notably different from those on the Sevasti-Pydna krater and the repatriated White Levy Collection krater. Despite the similarity of the iconographic themes of the masks on the calyx-kraters, the floral motifs on the Vergina krater are more elaborate and have more stylised elements (rosettes or flowers surrounded by half-leaves).[18] On the White Levy Collection krater, however, simple clear volutes flank and connect the masks with the edges of the handle, just as on the Pella handle. On the Sevasti krater, these ornaments are akin to the previously mentioned one, with a palmette as the connecting element between the two masks in the centre of the space.[19] It is therefore obvious that a certain degree of 'freedom' existed in the rendering of details and the completion of the vessel. This should be taken into account when determining the workshops of the kraters if no further information on their technique, the vessels' alloys, function or use exists. On the krater from the 'Heuzey B' tomb, the cast handles and the lip's ring are of excellent quality, whereas a very thin hammered sheet was used for the body. The result is that the elaborate and cast handles appear to be heavy on a vase with very thin walls. It is difficult to argue whether such a combination was adopted for the burial use of kraters given that other vases exist (as well as other vessels with ornate bodies) exactly like the White Levy one, which bears an ivy branch around the body at its mid-point.[20]

Alloy analysis has shown that the vessel contains a high percentage of tin, as was the case with the other large vessels within the burial group

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[17] The floral designs that adorn the 4th century BC metal vases and vessels comprise a huge topic that has not been studied adequately both in terms of their iconography and their function and symbolism. The same trends in decoration of clay vessels and in motifs should be included to this topic too. See above n. 10. Also, Möbius 1968; Valina 2006, 451ff.; Barr-Sharrar 2008, 39ff.

[18] Cf. relatively similar floral elements on the bronze oinochoe from Philip's tomb, Andronikos 1984, 159.

[19] Similarly see for example, the situlae, Teleaga 2008, 262–266, 446–447.

[20] Cf. similar decoration on the clay black-glazed kraters that bear relief-floral decoration, see n. 16.

of ‘Heuzey B’. A similar alloy quality can be found in the Sevasti krater, which may confirm the common provenance of the two vases.[21]

The Sevasti-Pydna krater contained a silver drachma of Alexander III. This find allows us to date the burial (and perhaps the krater, too) to the decade of 330–320 BC. Based on this information, Vocotopoulou (1994, 189–201, pls. 1–10, 11ff.; on the practical importance of the vessels in symposia, see Vocotopoulou 1998; Tsimbidou-Avloniti 2006, 114–134 [primarily 120–121]) placed the krater in the decade 340–330 BC. According to Price’s study of Alexander III’s coinage, this dating should probably be moved forward into the next decade (Touratsoglou 1988, 32, 33; Touratsoglou 2010, 116–120). The krater from the ‘Heuzey B’ tomb seems to confirm this chronological estimation, since the burial assemblage can be dated to the beginning of the penultimate decades of the 4th century BC on the basis of its pottery and on one clay lamp in particular (see Drougou *et al*. forthcoming). As a result, the kraters need not be considered earlier works, but rather vessels produced to serve the contemporary needs of symposia or burials. In this case, the relationship of the kraters (Sevasti and Vergina) appears to be most probable within the narrow period dictated by Alexander III’s silver drachma and the pottery from the ‘Heuzey B’ tomb. A gold coin of Pixodaros of Caria (341–336 BC) from the ‘Heuzey A’ tomb provides us with the required upper chronological limit (terminus ante quem) for the current study (cf. n. 3). Contemporary equivalent clay examples of this shape create an impressive context for the relatively limited group of bronzes, because they stand out for their distinct decoration on glossy black glaze and, even more importantly, their shape was rendered in a dynamic way. With this in mind, the differences with 4th century BC red-figure kraters are of particular significance, as the shape appears to have lost both its potential and unity. In fact, this century seems to have laid special emphasis on a different perception of both material and shapes to that of the previous century, which contributed to the new aesthetics of daily life created by new economic and political circumstances.[22]

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[21] According to information from the Museum of Thessaloniki, the Sevasti krater may have the same bronze alloy. The presence of tin at a higher percentage, traced in the other bronze vessels of the ‘Heuzey B’ tomb as well possibly confirms their common origin. See forthcoming publication of the ‘Heuzey’ tombs by Drougou *et al*.

[22] Cf. Züchner 1938, 3ff.; Barr-Sharrar 2008, 148ff., fig. 137, n. 12; see also variations or miniature tinplated vases, Agapaki 2005, pl. 35: 30. On the historical, economic and political context of the period, see Touratsoglou 2010.

**Appendix. The remaining metal vases and vessels of the 'Heuzey B' tomb**[23]

*Catalogue*

1. Bronze tin-plated oinochoe (item no. 35). Almost completely intact, but with small sherds and damage to the decorative figure on the handle and the base. Ht. 0.25m, body max. diam. 0.155m, base diam. 0.117m, lower part ht. 0.10m, lip l. 0.1m, lip w. 0.06m, handle w. 0.01m. Bronze. This vase consists of three sections: a cast handle, a decorative sheet on the handle and the body, which is formed by a sheet. The body is round with a concave cross-section and no base form. The wide standing surface of the vase bears concentric circle relief grooves arranged in a pair with a small circle as its centre. The body ends sharply at the shoulder, which is conical in the direction of the narrow neck and trefoil lip of the vase. The middle and larger lobes, which form the vase's spout, are surrounded at the back by two smaller ones that support the upper end of the handle. The large component at neck level bears parallel incisions and twists, thereby creating a handle with a circular cross-section; the end of the handle sits upon the vase's shoulder. The lower curved part of the handle bears an incised 'chevron' design lengthwise. There is a small, hammered ornament on the lower grip of the handle that depicts a considerably damaged, winged siren. The small female head at its centre covers the handle's grip. Type VI. Oinochoe. See Drougou 1999, 540ff.; Drougou 1995–2000, 247, fig. 9; Sideris 2011, 285; Zimi 2011, 37, n. 111. It is also noted by Touloumtzidou 2010, 519; Kottaridi 2013, 344 (Early Hellenistic times?). On the silver oinochoai of the Beazley VI type, see Andronikos 1984, 239, 240, fig. 172 (tomb of the 'Prince'); Rolley 2006, 314; Zimi 2011, 136ff., 182 (Vergina); cf. also Vocotopoulou 1997, fig. 177, 267; Kypraiou 1979, 57, no. 159, pl. 24; Krauskopf 1981; Krauskopf 1984, 83, 87; Bratsioti 1988, 282, no. 231; Lezzi-Hafter 1988, 306ff., pl. 191; Krauskopf 1995; Touloumtzidou 2010, 506–518.

2. Bronze stamnoid situla (item nos. 3+13). Complete. The movable arched handles have become affixed to the upper surface of the lip by corrosion with no possibility of being detached. Extensive wear on the body's wall with three holes in the lower section of the vase (from inside to out). Ht. 0.243m, lip and handle diam. 0.203m, base diam. 0.097m, base ht. 0.012m (standing surface w. 0.008m, base hole diam. 0.05m). Tin-plated bronze.

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[23] A full report on the metal vases and vessels from the tomb is included in a forthcoming publication on the 'Heuzey' tombs (Drougou *et al.*), which includes a complete bibliography.

The body is formed by a thin, hammered sheet, the base and handles are cast and the separate parts of the vase have been silver-soldered together. Round body, slightly curved at its lower section towards the base. Ring base with a curved outline and wide standing surface. A concave surface and small step are formed around its periphery on the interior. The lip takes no particular shape, but its upper surface is not visible. The formerly movable handles are supported on the lip by two pairs of diametrically placed rings. The rings are perforated and hold the components of the handles via two pairs of heads. At the back, between the nearly adjoining rings, a small free relief palmette can be discerned, which was made by incisions on the bronze. Below and in direct contact with the supporting rings of the handles is a large, heart-shaped leaf that is formed by two large discs, the edges of which overlap the leaf's oblate tip. See Drougou 2009, 69–70; Touloumtzidou 2010, 349, no. 13; Kottaridi 2013, 345 (depiction). See also Andronikos 1984, 146, fig. 104, 211, figs. 176, 177 (tomb of the 'Prince'), mainly fig. 176 on the form of the handles' grip; Zimi 2011, 196ff. (silver examples). On other examples of this category and type see, Besios and Pappa 1995, 83 (grave 3); Themelis and Touratsoglou 1997, 33, nos. A2, 73, B29 and 103, Δ5, figs. 79 and 112 respectively; Marazov 2011, 165–166 (see the ornament on the handles' grip with no excavation data, second half or end of 4th century BC). For general information on the types and categories of the situla (bucket) see Schröder 1940; Zahlhaas 1971; Candela 1985, 24ff.; Shefton 1985; Romiopoulou 1989, 195ff., no.1; Themelis and Touratsoglou 1997, 33ff.; Sideris 2000, 5 ff. with a different base; Barr-Sharrar 2002; Teleaga 2008, 264, 449, pl.16: 2 (*c*. 300 BC); Touloumtzidou 2010, 322ff. (for general information on situla), 353–388; Zimi 2011, 53ff. (bibliography). Clay imitation, see Vocotopoulou 1990, 61–62, pl. 35 (tomb in Aeneia AIII); Besios and Athanasiadou 2014, 131–132, fig. 8 (Makrygialos, cemeteries of ancient Pydna, grave 5); Kottaridi 2013, 327 (depiction).

3. Tin-plated bronze stamnoid situla (item nos. 4+19). Intact with only a little damage to the wall of the vase. The movable handles have become affixed to the upper surface of the lip and cannot currently be detached. Ht. 0.244m (without base), base ht. 0.015m, ht. 0.259m, lip diam. 0.225m, base diam. 0.12m. Tin-plated bronze. The base and handles are cast. The base is silver-soldered. In terms of its general characteristics, the vase is similar to situla no. 3. Cf. jar-situla, cat. no. 2.

4. Tin-plate bronze kantharos (item no. 6). Intact. Traces of patina on the vase's surface.

Ht. 0.11m, lip diam. 0.086m, lip ht. 0.02m, base diam. 0.058m, foot ht. 0.035m. Tin-plated bronze. The vase consists of four sections (a body, two handles and a base with a foot), all of which are cast. Its main characteristics are its large, free handles, the high foot of its base and its large, heavy distinct lip. The base is wide and consists of a large ring and upper disc, where the high stem of the foot stands. See Drougou 2009, 69–70; Kottaridi 2013, 346 (Early Hellenistic times!). Cf. also Andriomenou 1975, 568–570, figs. 38, 39; Vocotopoulou 1975, 767ff., nos. 15, 18, figs. 24–27; Vatin and Rolley 1976, 102, nos. B10–13, figs. 176–179 (third quarter of 4th century BC); Pfrommer 1987, 7ff.; Zimmermann 1998, 14ff., pl. 6, 7; Sideris 2000, 11ff., figs. 15, 16; Rotroff 2002, 87ff.; Zimi and Sideris 2003, 45ff., pl. 14 (London, British Museum M.1882, 102.2); Teleaga 2008, 270; Besios 2010, 312, 186 (Makrygialos, plot 951, grave 187), (Methoni grave 3); Fox 2011, 179ff., fig. 206 (cat. no. 474 – last quarter of 4th century BC); Zimi 2011, 67ff., 206ff. (silver examples). For general information on the shape of the clay or metal kantharos in the Late Classical and Hellenistic periods, see Kallini 2007, particularly 235ff. (here cf. type MB1) and for similar clay examples (type ΠΒ1), see Kallini 2007, 146.

5. Bronze kantharos (item nos. 11+12+14). Intact with patina on the surface. Ht. 0.115m, lip diam. 0.087m, base diam. 0.058m, (handle span 0.21m). The shape and its characteristics are similar to kantharos cat. no. 4.

6. Bronze patera (item nos. 33+36). Almost completely intact. Damage to the rim and the bottom of the vase, which contains traces of cloth. Ht. 0.045m, rim diam. 0.212m (rim w. 0.009m), base diam. 0.138m, handle l. 0.154m (tube l. 0.113m, tube diam. 0.025m). Bronze.

The phiale and the handle are both formed by a hammered sheet. The ram's head on the handle is cast. The vase's phiale is footless with a wide standing surface. The slightly curved wall ends in the horizontal rim. The handle is formed by a simple, smooth tube affixed to the body. The end of the handle bears the figure of a ram (finial) with an oblong head and practically no relief features. On silver examples, see Andronikos 1984, 213, 181–182 (Great Tumulus, tomb III); Kottaridi 2011, 57, 122, fig. 260; Zimi 2011, 59, 198 (before 311/311 BC!). On a clay example, see Vocotopoulou 1990, 60ff., no. 13, pls. 345, 346 (Aeneia). On the use of the vessel, see Vocotopoulou 1990, 60–61 (= Andronikos 1984, 157). Also, see Teleaga 2008, 277 (examples from the Balkan Peninsula and the Black Sea). On the shape, see Nuber 1968; Nuber 1972, 1, 354; Buchholz 1994, 150ff.; Touloumtzidou 2010, 610–620; Zimi 2011, 59.

7. Bronze wine-strainer (*ηθμός*) (item no. 18). Fully preserved with distinct patina. L. 0.212m, diam. 0.099m, rim w. 0.012m, handle base w. 0.05m, handle plaque w. 0.018–0.02m. Cast bronze. There are eight series of holes on the bottom of the strainer in a rotating shape. The shallow hemispherical cup is crowned all around by a broad, plain rim. See Drougou 2009; Kottaridi 2013, 346 (Early Hellenistic times). Other examples, Teleaga 2008, 276ff., 455, no. 1945, pl. 112: 2 1931; Touloumtzidou 2010, 310–312. Generally, Teleaga 2008, 276ff; Touloumtzidou 2010, 304–320; Zimi 2011, 85ff.

8. Bronze arytaina (*κύαθος*) (item no.10). Intact. Full l. 0.212m, cup diam. 0.099m, handle base w. 0.05m, component w. 0.018–0.02m. Cast bronze. The vessel consists of a small hemispherical *kyathos* (cup) with an oblate standing surface and handle. The latter is formed by a strip-shaped component slightly broader at the grip point with the *kyathos*' and at its end, where a finial in the shape of a duck's head and an additional small component are located.

Nikolaidou-Patera 2007, pl. 35 (= Nikolaidou-Patera 1996, 567–572). For general information on the object, also see Hill 1942, 41ff.; Crosby 1943, 211ff.; Strong 1966, 46, 91; Oliver 1977, no. 30; Teleaga 2008, 277, nos. 1047, 1048, pl. 79, 177: 2; Touloumtzidou 2010, 279–280; Zimi 2011, 89ff. On other variations of *kyathoi*, mostly strainer-like, see Tiverios 2009.

9. Lebes (item no. 1). Part of the lip and shoulder of the vase is missing (fragments were found inside the vessel). Heavy damage to the surface. Ht. 0.2m ±, lip diam. 0.178m, max. diam. 0.27m. Hammered lead. Round body without a base or handles, slightly flattened in its lower part to create a 'standing base'. In the upper part of the vase, echoing the horizontal shoulder, the lip curves slightly outwards. Cf. bronze examples of the shape, Andronikos 1984, 159, fig. 73; Pingiatoglou 1991, 146 (n. 14, ΜΔ 474, 4th century BC). Cf. Karamitrou-Mentesidiou 2010, 140 (Aiani, Hellenistic). On rare lead vessels, cf. lead pyxides, such as those from the Hellenistic graves in Veroia, Drougou and Touratsoglou 1980, 39. For an earlier, elaborate, bronze example from the 5th century BC, see Besios 2010, 268 ('Louloudia' Kitros plot).

10. Iron tripod (item no. 2). Intact but heavily corroded all over. Ht. 0.201m (full ht. 0.225m), rim diam. 0.188m, foot w. 0.02m, rim w. 0.018m. Cast iron. Its three wide feet are connected by a relatively broad rim. Four independent broad protruding stands are also supported by this same rim. A visible corner is formed at the mid-point of the foot's height, whilst the components curve outwards to better support the tripod in

their lower section. Cf. Andronikos 1984, 159, fig. 125 (Vergina, Philip's tomb); Besios 2010, 292 (Sevasti-Pydna, grave 3); Fox 2011, 139, fig. 158 (cat. no. 199, *c*. 500 BC). The bronze example from Philip's tomb predates this by one century and is of a very different type, see Andronikos 1984, 159, fig. 73.

*Clay vessels*

The group of clay vessels discovered inside the tomb includes two black-glazed plates, six skyphoi, some bowls without handles and one askos of the Guttus type, in addition to the clay lamp (Drougou *et al*. forthcoming).

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Pl. 1. The bronze calyx-krater from the 'Heuzey B' tomb at Vergina, Aigai. Archive of the Vergina excavation 1 – View with a lead disc cover; 2 – View of the calyx-krater sites

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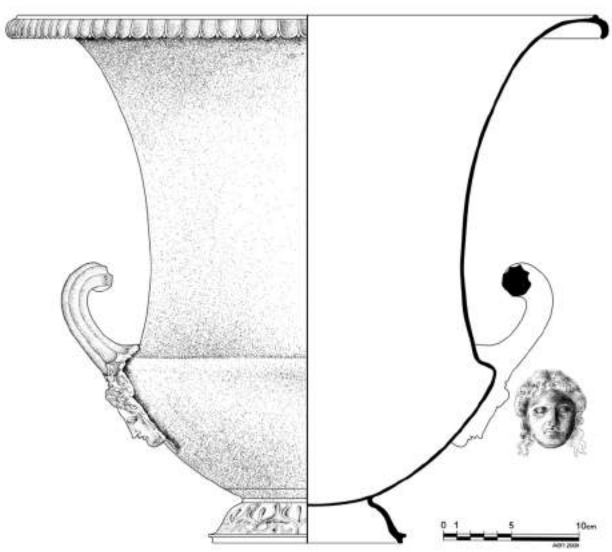

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Pl. 2. The bronze calyx-krater from the 'Heuzey B' tomb at Vergina, Aigai 1 – View of the calyx-krater site. Archive of the Vergina excavation; 2 – Drawing by T. Papadogonas

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Pl. 3. The lower section of the Vergina calyx-krater – details. Archive of the Vergina excavation 1 – Vergina calyx-krater base; 2 – Vergina calyx-krater handle

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Pl. 4. Female heads on the handles of the Vergina calyx-krater. Archive of the Vergina excavation

STUDIES IN ANCIENT ART AND CIVILIZATION 19
Kraków 2015

*Craig Barker*
Sydney

# SOME INITIAL OBSERVATIONS ON A BUILDING EXCAVATED ON FABRIKA IN NEA PAPHOS IN CYPRUS BY THE AUSTRALIAN ARCHAEOLOGICAL MISSION

*Dedicated to Jolanta Młynarczyk*

**Abstract:** *The Australian archaeological mission to Nea Paphos in Cyprus has begun exploring the remains of a structure to the rear of the cavea of the ancient theatre on the southeastern edge of the hill known as Fabrika. The preliminary results of this excavation suggest a significantly large post-medieval building constructed using stone taken from the former theatre. The building appears to have been used in some sort of industrial production, the precise nature of which is not yet determined, and is perhaps the source of the etymology of the name of the hill. This paper discusses a need for a reassessment of this area of the city of Nea Paphos in its more recent history, and discusses the needs for a better understanding of the urban relationship between Fabrika and the theatrical precinct during the Hellenistic and Roman periods.*

**Keywords:** *Hellenistic and Roman urbanism; medieval and post-medieval Cyprus; ancient theatre; the archaeology of post-medieval industrial architecture*

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## Introduction

A team of Australian archaeologists from the University of Sydney[1] have since 1995 worked at Nea Paphos alongside our colleagues and friends from the University of Warsaw (Meyza and Zych 2015) and the Jagiellonian University in Krakow (Papuci-Władyka 2015) exploring the archaeological remains of the Hellenistic and Roman capital city of Cyprus. Working on the southern slope of Fabrika hill (Pl. 1) in the northeastern quarter of the ancient city, the Australian mission has concentrated their efforts on the excavation and study of a Hellenistic-Roman theatre and its surrounding theatrical precinct. Until recently however, we had completed little investigative work on the top of Fabrika immediately behind the *cavea* of the theatre. Since 2012, however, the Australian team has put greater effort into exploring the architectural remains in this area at the rear of the theatre. This paper aims to present some of the preliminary findings from our recent investigations. It must be stressed that ceramic and other finds have not yet undergone detailed analysis and study, so more interpretation, along with further excavation in coming field seasons is anticipated. However preliminary work has confirmed evidence of a major building of the medieval and/or post-medieval periods and this is already providing us with exciting fresh evidence of activities in the city's more recent past.

## The theatre of ancient Nea Paphos

The findings of the excavation of the site of the theatre are well documented elsewhere (Green *et al*. 2004; Barker 2015), so only a brief summary of our knowledge of the use of the theatre and later activity on the site is required here.

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[1] The Australian excavations were inaugurated by Emeritus Professor J. Richard Green. Our work in Cyprus was initially financed by an Australian Research Council (ARC) grant, in more recent years the project has been self-financing with support from the Nicholson Museum at the University of Sydney and the Australian Archaeological Institute at Athens (AAIA). The project works under the auspices of the Department of Antiquities of the Republic of Cyprus, and enjoys the support and collaboration with our colleagues in the Paphos District Archaeological Museum, the Paphos Municipality, and the Australian High Commission in Nicosia. This paper is the result of discussions with many colleagues, but all ideas are preliminary at this stage, until further excavation and study takes place. Gratitude is expressed to Candace Richards for assistance with the preparation of this paper.

Archaeological evidence suggests the theatre at Nea Paphos was constructed around 300 BC and was used as a venue for performance and entertainment by the Paphians for over six and a half centuries (Pl. 2: 1, 2).

If this early construction date is accurate, and all evidence, particularly epigraphic,[2] confirms this is the case, then the theatre is one of the first public buildings constructed after Nea Paphos had been founded formally in the very late 4th century BC.[3] It is a clear demonstration of the significant role of theatre in the creation of a new Hellenised *koine* of the eastern Mediterranean, and of the ready reception of Cypriot audiences to the concept of performance in the wake of Alexander the Great's conquests.[4]

Not much can be said about the earliest phases of the theatre's use, layout and architectural impact upon the bedrock of Fabrika. However, the creation of artificial earthen embankments on the western and eastern sides of the *cavea* held in place by support walls from the very earliest phases demonstrates considerable alteration to the natural shape of Fabrika on the southeastern slope of the hill (Green and Stennett 2002, 160–164). Throughout the lifespan of the theatre there was considerable alteration to the appearance of this section of Fabrika, particularly during the Roman period which saw a massive expansion of the *cavea*, and the construction of a significant outer perimeter wall, of which a small section has been excavated by the Australian team on the northwestern exterior of the theatre (Green and Stennett 2002, 164–165 and 168, fig. 7 on the perimeter wall). The discovery of deep bedrock cuts on areas of the theatre that would later be the location of the western and eastern *parodoi* (Green *et al*. 2015, 324–325)[5] indicates that the significant quarrying of stone seen elsewhere on Fabrika, was likely occurring on the southern side either before the construction of the theatre or during its earliest phase of use.

The second phase of the theatre is Ptolemaic-influencedand so must be dated to the middle of the 2nd century BC by the dedicatory inscription on

[2] Green *et al*. 2015. M. J. Osborne will publish the epigraphic remains from the site in the final publication, including the early letters carved in the upper level of the central *cavea.*

[3] For a discussion on the foundation date of Nea Paphos see Maier and Karageorghis 1984, 226–230; Daszewski 1987; Młynarczyk 1990, 67–70; Bekker-Nielsen 2000.

[4] For discussion on Late Classical and Early Hellenistic adoption of Greek theatrical tradition see Green 2013, 35–57; Green 2014, 339–369. On theatre in Cyprus more generally see Antoniadou 2014.

[5] The western *parodos* cut is at least 3.3m deep and 2.2m wide.

a statue base from the Dionysian *technitai* (Green *et al*. 2015, 325)[6] discovered in the early 20th century on the site. The construction of a stone stage building and of a subterranean passageway (a so-called 'Charonian tunnel') from the stage to two-thirds of the length of the orchestra represented a significant expansion of the infrastructure of the theatre and probably brought it into line with contemporary Alexandrian architectural styles (Green *et al*. 2015, 328–331 on the orchestral passageway; see also Green 2000, 115–126; Green 2007, 3–16).

Some evidence for minor architectural developments is associated with the Augustan period and is most likely related to repairs needed following an earthquake of the late 1st century BC.[7] A major renovation of the theatre, however, was undertaken during the Antonine era of the mid-2nd century AD where the stage building is enlarged and façaded with columns of imported marble and imperial statuary (Barker and Stennett 2004, 257–258; Green *et al*. 2004, 13–16), the *parodoi* are extended and now barrel-vaulted and painted with elaborate frescoes (Wood Conroy 2003, 275–300) and the *cavea* expanded outwards with a new support wall to compensate for the enlargement, part of which was excavated by the team in 2001 revealing evidence of a *vomitorium* connecting the rear of the theatre to Fabrika (Green and Stennett 2002, 164–165). The theatre was at its largest at this stage; the *cavea* had a seating capacity for over 8500 spectators and measured over 90m from side to side (Green *et al*. 2004, 5).

The entire theatrical remodeling was commemorated with an dedicatory inscription placed across the front of the stage building, measuring over 12m in length and honouring the emperors Antoninus Pius and Marcus Aurelius for the theatre's Imperial makeover. The marble inscription survives in two fragments now in Paphos District Archaeological Museum, one of which was recovered in 1916 from the property of Ioannis Zenieris who owned land across the former orchestra of the theatre. The second larger piece was recovered by the Australian excavations in 2001 lying face down as a threshold to the orchestra for the final phase of the theatre's usage before its destruction (Green and Stennett 2002, 188; Nicolaou 2003, 305–308).

The entire 2nd century appears to have been a period of profound infrastructure construction and consolidation in the northeastern quarter

[6] The inscription by the Guild of Artists of Dionysos on a statue base that was recovered in 1927, but subsequently lost, is the oldest theatrical document found in Cyprus and thought to date to *c*. 142 BC. We have suggested it is associated with an opening festival of a remodelled theatre. For the inscription: Le Guen 2001, 300–330.

[7] The earthquake was recorded *c*. 15 BC and caused considerable damage: Dio Cass. 54.23.7.

of the city beneath Fabrika: the team has uncovered a nymphaeum[8] to the southeast of the theatre facing onto a major colonnaded Roman paved road (Barker 2016, 14–17)[9] that is over 8.4m wide and which we suspect leads past the theatre to the North East city gate.

The final phase of the theatre seems to have occurred from some point in the 3rd century AD until its final destruction by earthquake in the 4th century. The orchestra was raised and waterproofed, and a barrier wall built between the orchestra and the seating of the *cavea* to allow for flooding of the orchestra or displays of exotic animals to the citizens of Nea Paphos (Green and Stennett 2002, 172–175; Green *et al*. 2004, 16–17).

After the earthquake that destroyed the theatre, the site was then put to other purposes. It became a centre of quarrying activity; firstly the marble remnants of the theatre were stripped to be reused in the nearby Early Christian basilica of Chrysopolitissa, then architectural elements from the stage building and the nymphaeum were removed, and then eventually the bedrock of the *cavea* was itself quarried.[10] The landscape of the theatre was considerably altered, and much of the architectural evidence of the various phases of the theatre was strewn across the site towards the east. After the end of quarrying activities, the former theatre precinct remained active for a number of centuries for a range of semi-industrial activities until the 7th century AD, before being abandoned for some time.

Excavations by the Australian Mission demonstrate that the site of the former theatre became an area of major activity once the economy of Paphos boomed again during the Crusades. The slope of the former *cavea* was terraced for agricultural use (and remained so until excavation began). A series of domestic structures, built on foundations of reused masonry, and associated courtyards were constructed across the area of the former stage building and orchestra. Evidence for the production of sgraffito ceramics (Cook and Green 2002, 413–426; Cook 2004, 275–285), as well as hand-

[8] The nymphaeum measuring 2x5m with plastered walls and a simple mosaic lying in water-proofed mortar was found to the southeast of the theatre. Its dating is not certain, but it is either late 1st or early 2nd century AD, as the Antonine expansion to the eastern *parodos* abutted the rear of the nymphaeum (Barker 2012, 8–11; Barker 2013, 18–19).

[9] A publication discussing the colonnade of Paphos by J. R. Green and C. Barker is forthcoming.

[10] For a summary of the quarrying of the theatre following its destruction and abandonment in the late 4th century AD see Green *et al*. 2004, 22–25. Inscriptions bearing the name Eustorgis found at the theatre give a tantilising clue as to the commercial nature of the removal of the stone and the gradual transference of the site from a theatre to an industrial zone (Green and Handley 2010, 197–211).

made coarse pottery (Gabrieli *et al*. 2001, 335–356; Gabrieli 2004, 287–298), and possibly glass production (McCall 2009, 165–170) indicates a continued use of the theatre area for centuries for a range of low scale industrial activity. These finds and other significant and considerable archaeological evidence show that this area of Paphos was burgeoning during the Crusades (Green *et al*. 2014).

While much work remains to be done, the excavations by the Australian mission demonstrate the important role the southern slope of Fabrika played throughout the city's history: firstly as the venue for the theatre and then later as an industrial zone. As the team begins to archaeologically investigate the area to the north of the *cavea* it is important to note that the relationship between the activities on the hill and those on the southern slope was seemingly always integral to the success of this quarter of the city.

## Fabrika

The rocky area known as Fabrika is one of two major hills within the ancient city wall; the other, Fanari, is located on the western coast of the town and separates the agora from the sea. Fabrika is located in the very northeastern corner of the ancient city, and the hill itself formed part of the city wall. Geologically the hill is of the local hard calcified sandstone originating in the Pliocene seen elsewhere in Kato Paphos.[11]

The modern shape of the hill is certainly radically different from its natural state because of earthquakes and the quarrying and building activities that have been going on since antiquity. Most obviously the construction of the theatre *cavea* (Pl. 3) and exploitation of stone as a resource during the Hellenistic and Roman eras. One can see a series of at least 14 subterranean chambers carved into the western side of the hill, although there were undoubtedly more of them. Their function and chronology, however, remains debated.[12]

In 1966, in his landmark topographical study of Nea Paphos, Kyriakos Nicolaou (1966, 601, n. 93) stated that Fabrika hill and its puzzling underground chambers were in desperate need of detailed survey and excavation. Jolanta Młynarczyk's (1990, 215) masterly study of Hellenistic Paphos likewise describes how the hill had never 'been the object of such research (systematic archaeological research), and it has not been sufficiently

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[11] Młynarczyk (1990, 18) referencing Bellamy C. V. and Jukes-Browne A. J. 1938. *The Geology of Cyprus*, 37, 58. Nicosia.

[12] See Młynarczyk 1990, 216, fig. 30 for a plan of the chambers.

described either'. Fortunately this situation has changed since 2008, with a team from the University of Avignon working at various locations across the hill (Balandier 2012, 151–164). The excavations directed by Claire Balandier (2012, 160) have revealed amongst other materials, domestic structures on the northern side of the hill, a cistern on the southeastern side (most likely used as a reservoir for water storage for flooding the theatre in the final Roman phase of the theatre's use[13], and considerable evidence of medieval activity, including a burial. It is also quite likely that the eastern side of Fabrika was also the point at which a Roman aqueduct, running from Ktima Paphos and probably originating in the villages of Tala in the hilly hinterland of the region, provided an outlet for water supply across the town. The remains of the aqueduct were noted by a number of early travelers and sections of it were at least still partially visible in the 19th century (Młynarczyk 1990, 222–223, esp. n. 262). Amongst Fabrika's rock-cut chambers, a number of cisterns with visible traces of water-proof plaster were noted in early traveler accounts suggesting water was stored on the hill,[14] in addition to the cistern excavated by the French. The hill of Fabrika with its height certainly could act as 'pressure tower' channeling the water in various directions to be used for a variety of purposes, such as supplying the nymphaeum discovered by the Australian mission (Barker 2013, 18–19), in terracotta pipes discovered in association with the theatre[15] and probably supplying the rest of the town.[16]

There has been much speculation on the ancient uses of Fabrika, particularly by Jolanta Młynarczyk (1985, 286–292) in relation to the possible

[13] We are estimating that a volume of 346.1m$^3$ would have been required to fill the orchestra of the theatre in its final phases (based on the calculation of the orchestra area being a space approximately 227.7m$^2$ and the depth of the water of the containment wall being 1.52m. The rock-cut cistern on the top of Fabrika at 10.7m by 6.5m and a depth of 5m provides a storage capability of 347.75m$^3$. These initial calculations by Bruce Brown of the Australian National University will undergo further detailed analysis in future, but they are suggestive of the relationship between the water and water-based spectacles taking place within the theatre in the 3rd century AD.

[14] Młynarczyk 1990, 223: Pococke, Peristianis and Philippou all describe the plaster traces.

[15] Green and Stennett 2002, 182, 184, fig. 1 for a discussion on the use of water sprinklers at the theatre. Also note the discovery by Peristianis in the 1920s of terracotta pipes found 2m below the soil level in a field belonging to Ioannis Tsenieris, located on the site of the ancient theatre (Młynarczyk 1990, 222).

[16] Potentially explaining the reoccurring local legend often told, of underground passageways linking Fabrika to the area of the later Saranda Kolones fortifications, as they may represent original ancient drainage and water supply facilities (Młynarczyk 1990, 223).

existence of a Hellenistic temple dedicated to Aphrodite Paphia, which we shall return to shortly. That Fabrika was built upon in antiquity is undeniable from the number of structural foundations still visible on the ridge, some of which have been planned (Pl. 4).[17] An early Hellenistic mosaic, for example, was found on the western part of the hill in the late 1990s. It also seems likely given the high levels of activity in Paphos during the Crusades that there may well have been architecture of the medieval and post-medieval periods as well on the top of the hill.

To the best of our knowledge there has been no archaeological activity in the section of Fabrika to the rear of the theatre until the Australian excavations, and, with the exception of a viewing platform constructed by the Department of Antiquities in the late 1990s to provide stunning views of the theatre and across modern Kato Paphos, no modern construction in this area either.

Early travellers' accounts of visits to Paphos give tantalising clues as to the nature of structures on this area of the hill, but the details are often unclear and confused, and most commentators focused solely on the subterranean chambers. Młynarczyk has collated many of them, but in all cases any description of buildings are vague at best.

Richard Pococke (1745, 225–226), visiting Paphos in 1738 is one of the earliest accounts of the area likely to be Fabrika; in it he describes caverns, quarries and a cistern as well as traces of an aqueduct in the area. Subterranean rock-cut chambers are mentioned by Josef von Hammer (1811, 134–139) who visited in 1800, and he thought the chambers were sources of building materials but that their original function in antiquity was not clear. More significantly, von Hammer describes a large structure built of beautifully dressed stone which he thought was either a public assembly hall or a private palace (Młynarczyk 1990, 46). There is no clear indication however where in the hill this large carefully dressed masonry building was located.

William Turner in 1815 gives a more detailed account, describing the ruins of three vaulted rooms, probably from the Venetian period, located on the top of the hill *Afrikee*, above the rock chambers (Cobham 1908, 442). This has led Młynarczyk (1990, 217) to suggest that the building was in the western part of the hill. Turner also notes elsewhere on the hill 'some marks of foundations of buildings' (Młynarczyk 1990, 217). In 1841 W. H. Engel mentions the remains of a large building of well-hewn blocks

[17] Młynarczyk (1985, 291, fig. 2; 1990, 219, fig. 31) published a sketch plan of foundations visible on the surface. These plans were made in 1978 by Krzysztof Kamiński.

with great grottos nearby (i.e. Fabrika), but gives little further detail (Młynarczyk 1990, 47). Englishman John Thompson's (1879, photos 43 [mislabelled Paleokastro] and 45) 1878 photographs show a number of images taken on or from Fabrika, although it is not possible to determine any details of architecture on the hill.

Early 20th century publications continue the discussion about the foundations on the hill. In his 1936 publication, L. Philippou (1936, 21), discusses how Fabrika was named after a cotton thread factory 'which existed there during medieval times and relics of which were in existence 60 years ago, together with the arches of a large building.' As late as 1927, Peristianis writes about foundations of a large building on the hill, although he does not locate where, and it does contradict Philippou's (1936, 24–43) statement from a decade later. It is difficult to determine the validity of the two later accounts; whether they are accurate accounts or whether they are fictionalising a building to match the local myth of a factory.

None of these walls survive on Fabrika today, although in certain areas of the rocky surface, outlines of foundations are still visible.[18] Jolanta Młynarczyk (1990, 218) describes how on the rocky ridge immediately behind the *cavea* of the theatre, cuts marked out a regular space 6 to 8m wide and approximately 31m long following a NE-SW axis. She argued this was a portico or a square adjacent to a stoa of similar length found to the east, with further rectangular outlines in the bedrock cut to serve as foundations visible further to the north and to the northeast.[19] She also notes a square outline cut for the 'foundation of a small building(?) 5m to the side' (Młynarczyk 1990, 218).

Further to the west from these foundations, separated by a rock cleft,[20] she notes a platform with cuts forming the outline of a rectangular building measuring *c.* 23x15m, and suggests this was most probably was a temple with a *pronaos* to the east and a *cella*, with a suggested construction date of no later than the 3rd century BC (that is contemporaneous with

[18] It is these outlines plotted in 1978 that appear in 1990, fig. 31. Of particular interest are the generally N-S running lines of stone immediately to the rear of the *cavea.*

[19] These are still visible today.

[20] This cleft today features a pathway which today marks the western edge of the theatre site, although in antiquity this area was taken by the rear seating of the western section of the *cavea*. It is difficult to determine what the actual edge of Fabrika looked like in the Hellenistic and Roman eras, but it must be assumed that there was some degree of pedestrian access from the southern side of Fabrika from the lower city to the top of the hill, given the theatre presumably had access through the western *parodos* and western *vomitorium*.

the initial construction of the theatre), and coinciding with W. A. Daszewski's hypothesis of a temenos of Paphian Aphrodite (Młynarczyk 1985, 289–292). Two early statue bases dedicated to Paphian Aphrodite found in the area of the orchestra of the theatre in the early 20th century support this identification of a temple dedicated to the goddess on Fabrika,[21] and can further suggest the significance of the road identified to the south of the theatre by the Australian team as connecting the architecture of Fabrika with the North East city gate and the start of the *hierahodos* (processional road) connecting Nea Paphos with the sanctuary of Aphrodite at Palaepaphos (Strabo 14.6.3.).

I would suggest further that the epigraphic evidence found on the southern slope of Fabrika, near the theatre in the first decade of the 20th century,[22] associated with Septimius Severus and Caracalla and dated to AD 196 to 198, is significant to the understanding of the Roman era usage of the southern slope. It appears it is evidence of Roman Imperial cult worship related to Aphrodite, which was located to the west of the theatre; that is as close as possible to the Temple of Paphian Aphrodite without being built upon the hill itself. It remains to be seen what, if anything, of this Imperial temple survives and its precise location. Either way they are probably related to significant infrastructure construction and improvements throughout the 2nd century AD in this quarter of the town, including the nymphaeum, the colonnaded road and the major remodeling of the theatre.

In summary, on the southeastern section of Fabrika near the theatre we have conflicting historical accounts of ruins and bedrock cuts of foundations of sizable buildings with little evidence of function and

[21] One inscription of the 3rd century BC is a statue base of Charitime dedicated to Aphrodite Paphia by Charitime's mother, the second is 1st century BC and was a marble pedestal of the proconsul M. Vehilius dedicated to Aphrodite Paphia (Młynarczyk 1990, 157–159, table B, no. 3 and no. 23). Both were found in the area of the former orchestra of the theatre which suggests that the movement of valuable stones towards the east of the city in Late Antiquity was not restricted to just the architecture of the theatre, but possibly the entire area including Fabrika.

[22] The fragmentary inscription on a marble architrave was recovered from Ioannis Tsenieris's property on the area of the former theatre. The inscription mentions a large temple with approaches and imperial statues dedicated between AD 196 and 198 to Septimius Severus and Caracalla (van Buren 1908, 198, n. 31; Nicoloau 1966, 589, n. 67). Despite some initial confusion in an early publication by T. B. Mitford, there is no mistake that the findspot of the inscription was in the area of the theatre. The base of a statue of Caracalla of AD 211 was also found on the Tsenieris property and probably associated (Młynarczyk 1990, 217, n. 244).

chronology without proper investigation. The Australian excavations have at last begun slowly to reveal more of the large structure closest to the rear of the *cavea*.

**Australian excavations on the southern edge of Fabrika**

Three small trenches have been opened on this area of Fabrika. The first Trench 2A was an exploratory trench excavated in 1996 in order to explore the area where the Department of Antiquities would build a viewing platform the following year. The two other trenches, 12C and 14A are both larger, and have been opened in more recent years towards the eastern edge of the ridge.

*Trench 2A*

This trench was 4x7m in size and opened in 1996.[23] It was located on the western side of the rear of the *cavea*, and quickly revealed the foundations of a masonry wall running N-S. This wall (structure 018) coincidentally represented the eastern baulk of the trench, and was revealed quickly beneath the topsoil: indeed the entire trench was not at all deep. The wall was about 80cm wide, and could be seen protruding south of the trench over the *cavea*. Both this N-S wall, and a second wall (structure 032) with a small opening was found: both walls created by cutting into the bedrock, with at least two rooms created by the foundations. Room 1 is the closest to the theatre, the room behind the wall 032 was only partially revealed. The superstructure of both walls was bifacial with a rubble core. One of the blocks in wall 018 had a mason's mark in the shape of an angular *psi* symbol carved into it. A very hard and compact mortar/cement floor (structure 056) was found lying over the bedrock of Room 1. The function of this floor surface was suspected to be related to both walls. A series of drainage channels quarried into the bedrock (structure 057) were filled with a red-brown silt (deposit 055). Within the fill of Room 1 was found a series of stone blocks, including a keystone block 29cm by 41cm, and 17cm wide at the one end and 8.5cm at the other which is suggestive of an arch within the structure. A substantial quantity of a plaster mortar was noted on these architectural blocks and the angling of the blocks suggested a collapse of the wall towards the south (Pl. 5: 1).

No clear occupational deposit was identified given the limited soil between the bedrock and topsoil, however amongst the finds from Room

[23] Excavation supervised by Jennie Lindbergh.

1 were a series of medieval glazed ceramic sherds. It was assumed by the excavators that unless the rooms were cleaned out on a regular basis, that the structure, or at least this section of it was only used for a relatively short time during the medieval period.

*Trench 12C*

In 2012, the Australian team opened another trench on the edge of Fabrika. In the intervening 16 years much of the *cavea* had been cleared and a series of walls over the upper rows of seating were revealed: initially it was thought they were rubble terracing walls associated with agricultural usage, but it soon became clear that these were architectural, if somewhat ruinous. Investigation on the bedrock cutting of the *cavea* made it clear that this structure was post-theatrical. The retaining wall (structure 2986) marks the southern edge of the building (Pl. 5: 2), which from the visible surface lines of the same walls depicted in Młynarczyk's plan, show that the building was large and significant.

Trench 12C was opened as a 5x5m strench at the northeastern corner behind the theatre but was soon extended.[24] The trench was designed to explore bedrock cuts exposed by wind erosion that may have been associated with the structure of the theatre but quickly following the removal of topsoil it became apparent that there were significant walls being exposed. The first wall running E-W (structure 2855) was soon followed by a N-S wall (structure 2857). Aware of Młynarczyk's plan and the walls found in Trench 2A these walls became the primary focus of the investigation and extended clearance to the north (2x5m) and to the west (7x2m)[25] quickly followed. Additional work included the removal of small soil deposits over the last of the *cavea* seating to the south.

Wall 2857 was the first part of our large building to be exposed with any clarity (Pl. 6: 1). It was exposed for a length of 11.7m, and has a maximum width of 1.25m, surviving between 0.2 and 0.85m in height. The wall is remarkable well built, with the rectangular blocks making an incredibly straight edge on its eastern side (Pl. 6: 2). Mason's marks were visible on some of the blocks. The western side is not so well-hewn, but again the wall is impressively well built, and constructed directly onto earlier Roman architecture (Pl. 7: 1). A fill deposit (deposit 2901) to the immediate east of this wall included many painted plaster fragments, predominantly

[24] Excavations supervised by Kerrie Grant.

[25] All still within the Department of Antiquities fenced area of the ancient theatre.

pale blue in colour but with some darker colours which may be associated with the theatre, rather than our large building.

Further west another N-S running wall (structure 2907) was uncovered. This wall is also clearly marked on Młynarczyk's plan and is visible event today from the surface running over 30m to the north. Excavation in 2012 exposed it for a length of 5.6m to a maximum height of 0.85m and is 0.75m wide. Like the eastern wall, the blocks are large cut rectangular stone. The alignments of walls 2857 and 2907 are the same, but the construction technique varied somewhat. 5.5m apart and joined by the retaining wall 2986, it is clear they formed the walls of a room constructed over the ruins of the theatre. Although no clear floor surface was determined,[26] the deposits between the two walls were filled with much tumbled stone.

It was clear the large structure was constructed over top of the ruins of the theatre, when excavation in the western area of Trench 12C revealed the large Roman ashlar blocks of the foundation wall of the rear of the theatre (structure 2965) (Pl. 7: 1). This wall exposed for a length of at least 7m and a width of 1.2m and the later structure was built directly upon this wall which provided foundation support. The wall 2965 continued to be cleared in 2014 and it was clear that there was at least another coarse of the wall yet to be exposed by the end of the season.

Two small E-W walls were recovered on the eastern side of the excavations abutting wall 2857: structure 2855 (surviving to 2.2m length and 0.75m wide), and to its north structure 2856 (surviving 2.7m length and 0.95m wide) which are both in alignment with the Roman wall 2965 and may have been associated with the rear of the theatre despite their higher elevation, rather than our later structure.

*Trench 14A*

The second season of excavation in this area took place during the next field season (Pl. 7: 2). Trench 14A[27] was a continuation of Trench 12C with particular focus on removing soil to the south of the area excavated in 2012 between walls 2857 and 2907 towards the retaining cross-wall above the *cavea*. To the west of the wall 2907, a further extension was added as well.

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[26] In 2014 it was speculated that deposit 2987 may represent the floor surface of the large building in this room at least. 2987 was a rough layer of hand-sized pebbles, in some limited areas with mortar preserved, and it abuts with the southernmost wall over the *cavea* 2986.

[27] Excavations supervised by Kerrie Grant.

This further western extension exposed another area associated with the structure. However, a couple of key differences were noted. The retaining wall (3010) is further north than 2986 in the section to the east.

The westernmost N-S running wall (designated structure 2990 during excavation but it is the same wall as 018 excavated in 1996), is 0.8m wide but does not survive to the south as far as the two more eastern walls, presumable having collapsed and tumbled down over the *cavea* in previous decades. It does not appear to be as substantially constructed as the other two parallel walls.

Although the wall foundations are all substantial, it should be noted that none have been built using the exact same construction methodology – all are similar but not identical. Whether this observation has any chronological implications remains to be seen.

The room explored between walls 2907 and 2990[28] was filled with tumble. Beneath that tumble E-W wall 3007 was revealed to the south of the room, which explained the large amount of plaster fragments that were being recovered in the upper fills. The wall was constructed of flat rectangular blocks, well-fitted and mortared.It was held in place to its south by a retaining wall (3010), which seems to fulfilla similar function to wall 2986 further east, although they are not aligned. Wall 3007 was faced with plastered benches (Pl. 8: 1), and small plaster niches in the east end return (structure 3017) and a similar one in the west (structure 3018). Both niches are approximately 30–35cm long, 20cm wide and 20cm deep (Pl. 8: 2). The function of this space is not known and the area requires further excavation to define the room more clearly.

Meanwhile excavation continued to the eastern room (between walls 2857 and 2907), and in the fill deposit 2981[29] the fine pale greyish silt soil was filled with plaster fragments and plaster powder. This seems to be associated with wall collapse and architectural block tumble. Amongst these architectural fragments are what maybe the remains of an arched roof, with blocks reminiscent of the keystone found in Trench 2A (Pl. 9: 1, 2). There is no clear evidence at this point for what this building was being used.

Continued clearance of the ash pit (deposit 3006) found in 2012 in the north extension, found it densely filled with bone, pottery (especially cooking pottery), metal (nails) and an extraordinary hand-made Hellenistic terracotta head of Alexander the Great which is obviously in a secondary

[28] Some 5.5m separates the two N-S walls.

[29] Which sits above what may be the floor surface 2987.

context. The rest of the material seems to be of a late post-medieval context, but awaits full analysis.

To the north east of the area of excavation (the north-north extension) the two walls (structures 2997 and 2998) noted by Młynarczyk, were cleared which appear to suggest some sort of small room or structure, but not enough of the area was opened to answer any questions, and it is hoped they can be cleared in future investigations. Both walls are well constructed like the other longer walls (Pl. 10), but unusually in a few courses of the foundation rectangular blocks are laid vertically not horizontally. A considerable number of metal finds were discovered between the walls and a number of cavities of the bedrock appear to have been filled with plaster to flatten the surface.

Chronology has been difficult to determine without detailed analysis of the finds; many of the coarse wares and cooking pots found, particularly in ash pit 3006, seem to be datable to the 15th or 16th century. To date, there has not been the same degree of medieval glazed ceramics found in Trench 2A further east. However, the majority of the material does seem to confirm the post-theatrical dating of the structure, and we hope that future analysis will assist with tightening of the date of activities in this area.

## Some comments on the building

A photogrammetric image of the site of the Paphos Theatre taken by Guy Hazell in 2015 (Barker 2016, 17) clearly indicates the line of the foundations of the large building to the rear of the cavea (Pl. 11) and give an indication of the size and scale of the building, complementing Młynarczyk's published plan of the 1970s.

To date, three walls running N-S have been revealed to the rear of the theatre (from east to west structures 2857, 2907 and 2990/018), with some rubble evidence of the cross-wall constructed approximately above the six top rows of seating of the *cavea* (this E-W cross walls 2986 and 3010 are very fragmentary). These walls are positioned 5.5m apart, and are each around 1m wide, or slightly smaller (Pl. 12). Each wall is slightly different in construction, but it is not possible at present to tell if that represents chronological developments. The outer facing of the easternmost wall (2897) is extraordinarily well-hewn. Plastered floor surfaces in some of the rooms and the use of a plaster mortar in the building is also noted. The function of the plastered edges of the walls in the south room of the central section of the building is not yet clear.

Overall the building appears to be long (at least 20m in length) and positioned with a clear view across the village of Paphos and the coastline. It is directly N-S in alignment (Pl. 12). It is divided into three long sections: eastern, central and western, but with no signs of a fourth N-S wall to the very west of the area (west of Trench 2A). The southern sections of most of the wall use Roman theatrical architecture as supports. Each of the sections appears to have been divided into smaller rooms with cross-walls. The surfaces of some of these rooms are plastered with a mortar, and in the case of the southern room of the central section there are plastered benches lining the southern and parts of the eastern and western walls. There is no clear evidence of arches or indeed any other roofing support as only lower course foundations have survived, but the recovery of keystones in Trenches 2A and in deposit 2981 suggests that the structure was in least partially vaulted.

The foundations of the long building are extraordinary in that they are clearly built above the rear rows of seats of the Roman theatre's *cavea*. Therefore the structure must post-date the cessation of theatre activities in late 4th century AD, which means they cannot represent the foundations of the Hellenistic or Roman temple of Aphrodite Paphia, which was instead probably located further to the west on the hill.

At this point, acknowledging that further research and investigation is required, we speculate that some of the historical accounts of Fabrika have confused modern interpretation of the area. There was no temple directly behind the theatre, and it is not possible that the structures represent a stoa and associated courtyard. It is extremely likely, however, that there was an entranceway to the theatre seating from the rear in this general area from the top of Fabrika which has yet to be uncovered, but may be associated with wall 2965. It seems apparent that the building we are beginning to investigate represents a medieval or post-medieval structure, the ruins of which were seen by von Hammer, Turner and Engel in the 19th century and reminisced about by Philippou in the early 20th century. Whilst the building's exact purpose is not yet clear from the excavations, it seems it was industrial in function.

### 'Fabrika'

It is difficult to determine at what point in the town's history that the hill began to be known locally as Fabrika. The first modern usage of the name Fabrika in reference to the hill of northeastern Paphos in comes from the written account of E. Oberhammer published in 1891; the only earlier mention is the 1815 account of W. Turner who calls the hill *Afrikee* and can probably be discarded (Młynarczyk 1990, 51). The word *fabrika* is Turkish, taken from the Italian *fabbrica*, and originating from the Latin word *fabrica*, and is generally taken to mean a factory, workshop or place of industrial manufacturing. It can be assumed with some degree of confidence that Philippou (1936, 21) and Peristianis (1927) were correct in their assumption that at some point in the history of the site there was some degree of industrial production taking place on the site which has given the location of the hill its modern etymology. We believe this building is associated with that industrial activity. J. R. Green (personal comunication) has associated the original use of the word to the Crusader-period activity in the orchestra area and the manufacture of sgraffito ceramics. An industrial building of Venetian or later date may have reinforced this association of the area with industrial production of some sort.

## Conclusions

The construction of the theatre on the southern slope of Fabrika in the later 4th or early 3rd centuries BC radically altered the natural shape of that southeastern section of the hill, and caused the architects to create earthen embankments sloping from the hill on both the western and eastern sides of the *cavea* in order to create the shape required for a performance space. Continual development of the theatre throughout its six centuries of use saw further expansion of the *cavea*, the creation of more substantial exterior support walls and at least one *vomitorium* on the northwestern side, with presumably a symmetrically placed northeastern *vomitorium* in an area where the rock has now been completely quarried away. The pedestrian passage to the theatre from Fabrika was significant. Although we have yet to excavate evidence for one, it is highly likely that there would have been a rear entrance to the seating from the back of the theatre along the central axis of the performance space, with access to the *cavea* from Fabrika. From the levels of the upper rows of seats of the *cavea*, the theatre was an integral part of activities taking place on the Hellenistic and Roman Fabrika, including at least pedestrian access and water storage, and the theatre helped link Fabrika to the urban activities of the northeastern part of the town behind the stage building.

This relationship between the area of the theatre and Fabrika continued after the abandonment of the theatre. The Australian Mission has detailed evidence of rich agricultural and semi-industrial activity taking place on the site of the former theatre from the period of the Crusades onwards. It makes sense that Medieval Paphians used Fabrika, too. The masonry being cleared by the Australian Mission demonstrates an incredibly well built and substantial structure once existed there. We are tentatively suggesting that this building may be the medieval or post-medieval industrial structure that gave the hill its very name Fabrika, and is likely to be the large vaulted building mentioned in early 19th century travel accounts. It can be suggested with some confidence that the structure is not a Hellenistic or Roman temple dedicated to Aphrodite, although that does not preclude that there may have been connections between the theatre and the religious activities honouring Aphrodite on the hill. Future investigation and excavation of the walls and rooms should provide better definition of the size of the large building, and proper analysis of finds, which will begin in the 2016 field season should assist with the gaining a more accurate chronology of the usage of the building. At this point however, it is an exciting addition to the architectural remains of the rich archaeological heritage of Nea Paphos.

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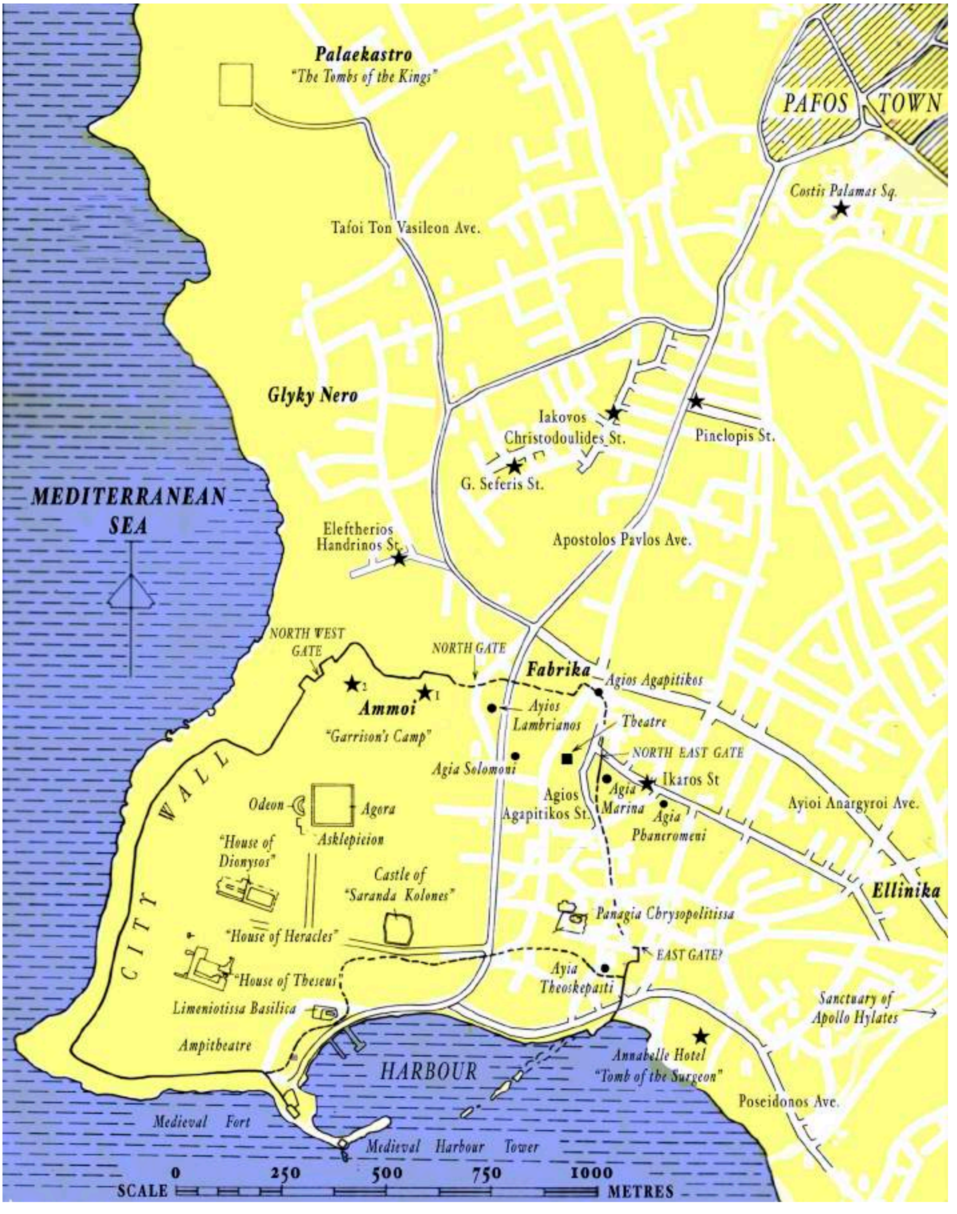
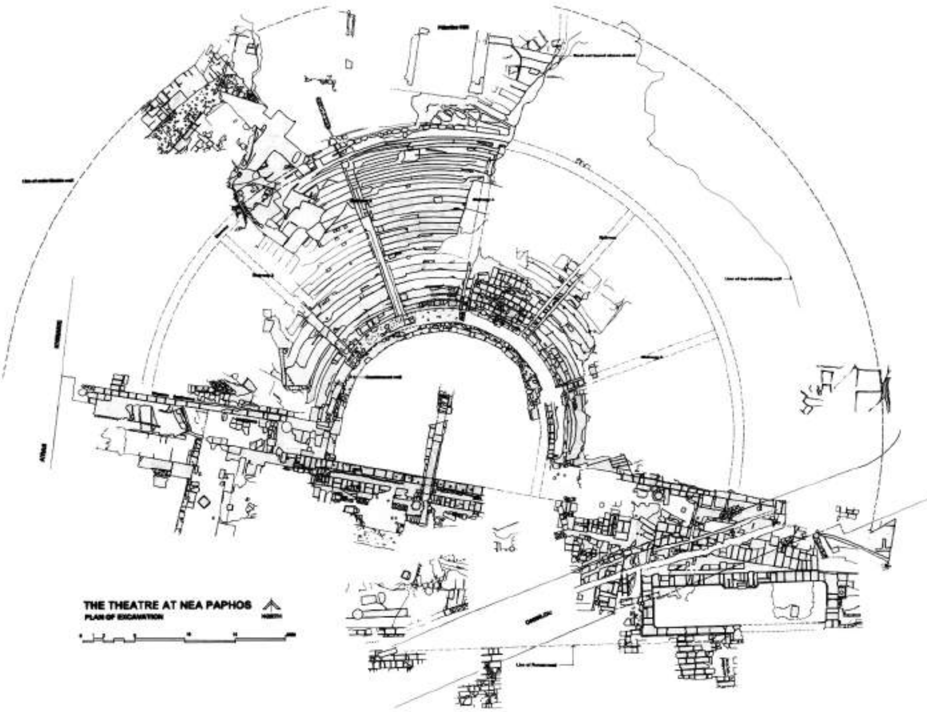


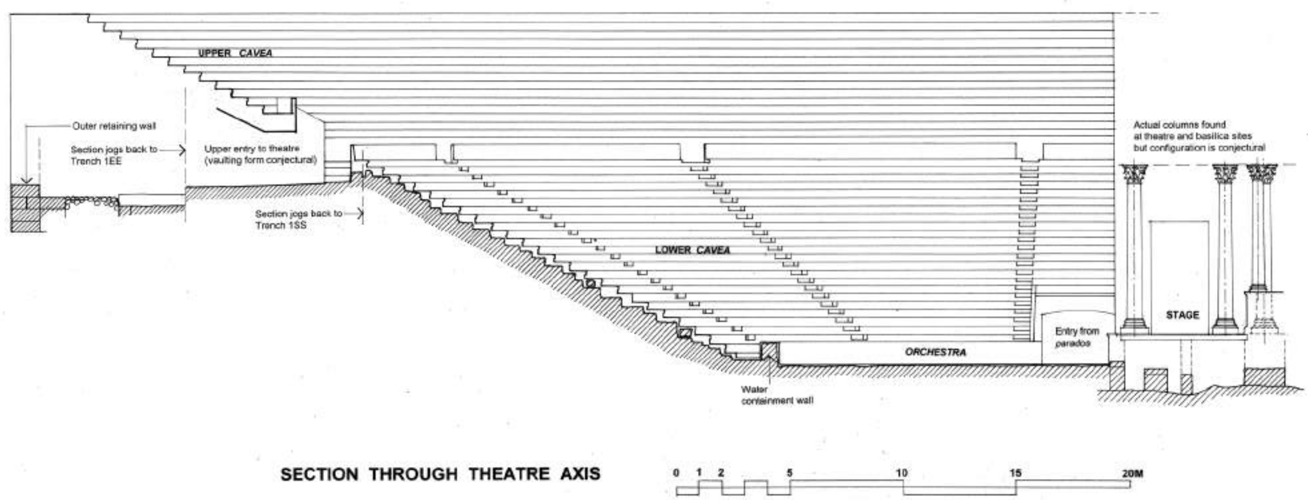

Pl. 1. Map of Nea Paphos laid over modern Kato Paphos. Fabrika is in the northeastern corner of the ancient walled city. Illustration by the University of Sydney archaeological mission to Paphos

1

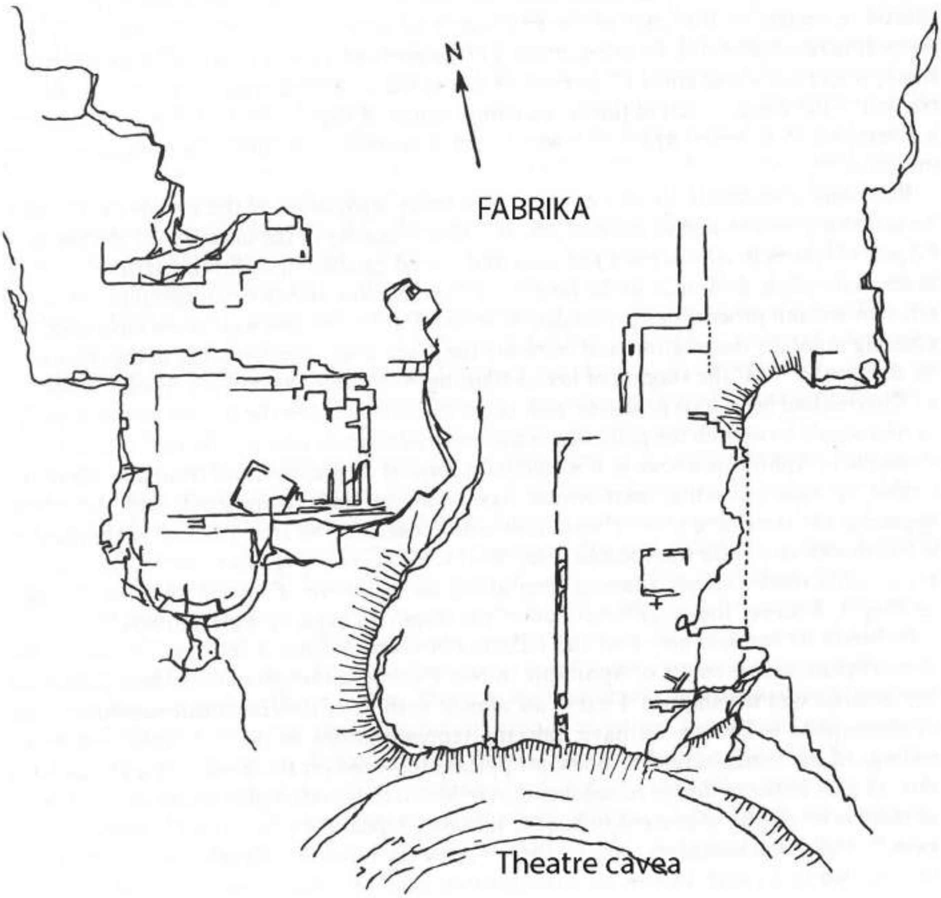



2

Pl. 2. 1 – The theatre of Nea Paphos viewed from the south following excavation of the southeastern slope of Fabrika by the Australian mission. The viewing platform is visible in the left of the photo. Photo by B. Miller; 2 – The plan of the theatre and surrounding precinct including nymphaeum and road to the south, following excavation. Drawing by G. Stennett




Pl. 3. A hypothetical cross-section of the theatre during the Antonine phase of the 2nd century AD. The construction of the *cavea* created considerable alteration to the bedrock of Fabrika's south. The upper *cavea* was artificially created on the eastern and western sides, but in the centre was carved from the bedrock of Fabrika and the upper rows represent the level of the foundation of the large building under investigation. Drawing by G. Stennett




Pl. 4. Foundation walls and bedrock cuts visible on the surface of the southern side of Fabrika in 1978. Reproduced from Młynarczyk 1990, 219, fig. 31 from Krzytof Kamiński's original sketch plan

1

2

Pl. 5. 1 – Trench 2A during excavations in 1996 facing towards the east. Wall 018 is visible at the rear of the image and wall 032 on the left. Photo by S. Cashman; 2 – Rubble wall 2986 was initial thought to be part of a medieval retaining wall and part of the agricultural terracing of the slope of the *cavea*; it is now known to the southernmost edge of the long building. View towards the north. Photo by K. Grant

1

2

Pl. 6. 1 – Part of the well-hewn outer exterior of wall 2857 – the easternmost long wall of the building. Photo by K. Grant; 2 – Wall 2857 from the eastern exterior of the large building is visible in the foreground of this view toward the west. Behind it and parallel, run walls 2907 and then wall 2990 (just before the circular viewing platform). Photo by K. Grant

1

2

Pl. 7. 1 – View facing east across Trench 12B. The Roman wall 2965 is visible in the left of the photograph running in an E-W direction. The easternmost wall of the long building (2857) is clearly built over top of the earlier Roman structure. Photo by K. Grant; 2 – The location of Trench 14A in relation to the ancient theatre and its *cavea*. Photo by the author

1

2

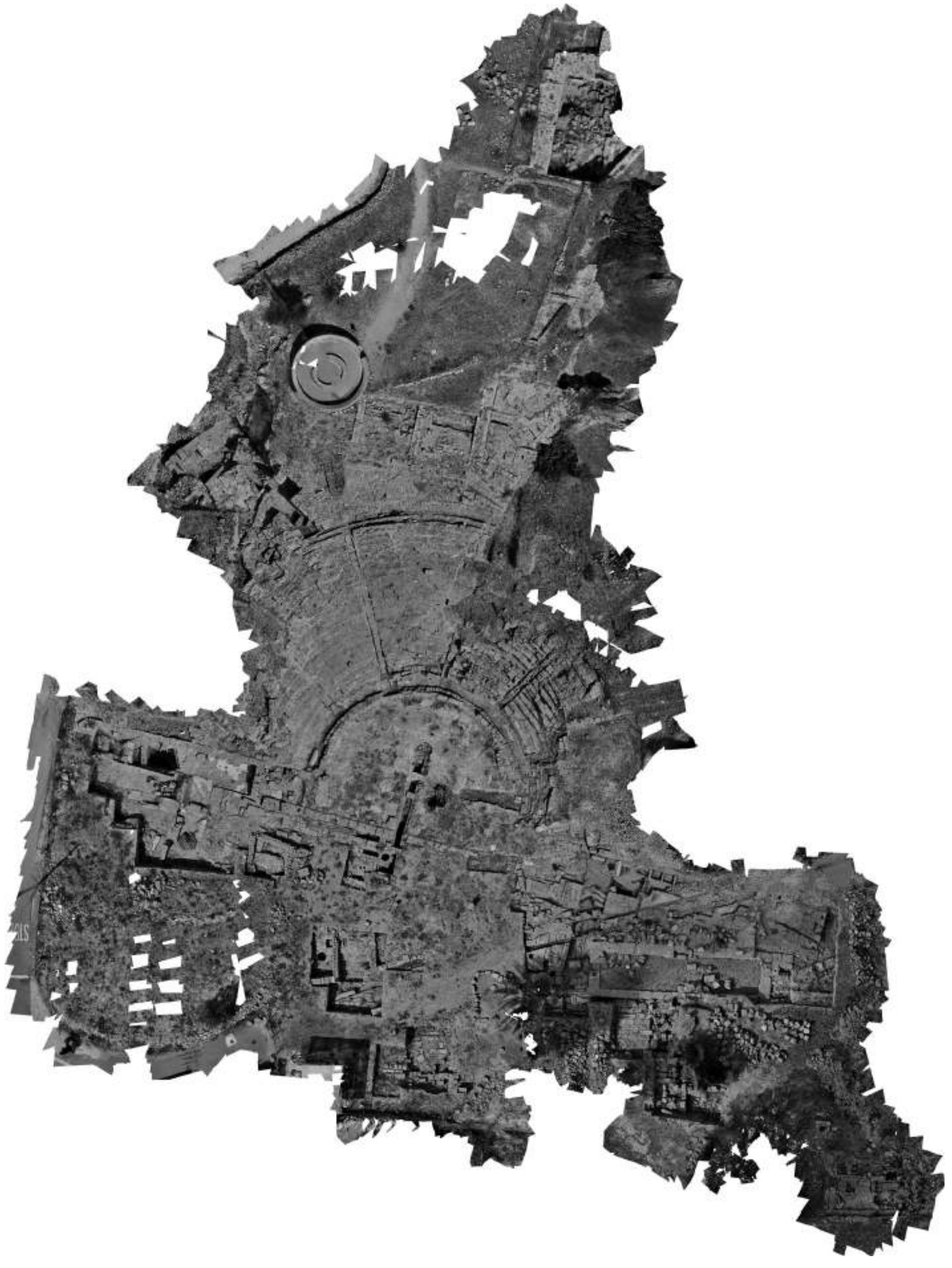
Pl. 8. 1 – Plastered ‘benches’ along the interior of wall 3007 in the western extension of Trench 14A. Facing south. Photo by K. Grant; 2 – The westernmost plaster niche on the floor of this room. Facing south. Photo by K. Grant

1

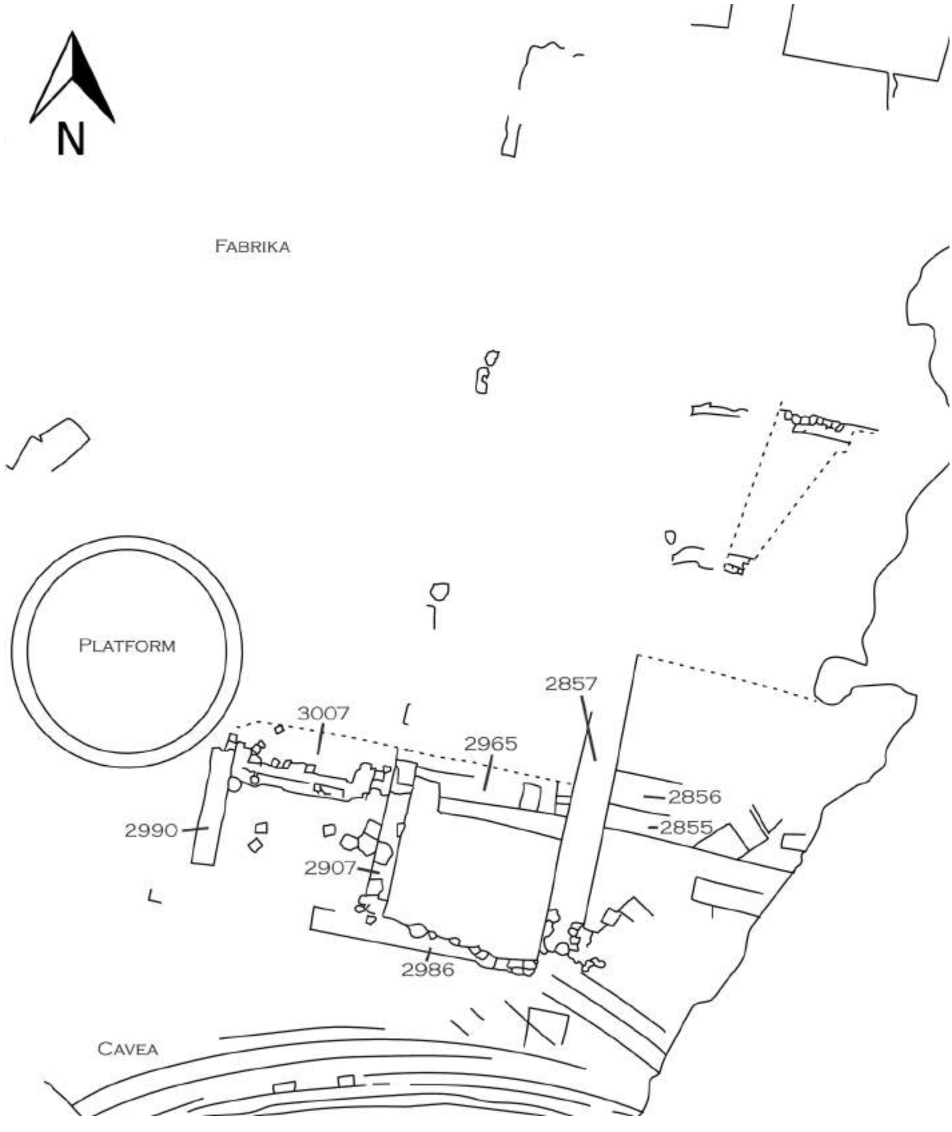
2

Pl. 9. Architectural blocks recovered from deposit 2981, they are suggestive of a vaulted or arched roof in this section of the long building. Photos by K. Grant

Pl. 10. Walls 2997 and 2998 in the north-north extension of Trench 14A (view towards the south). Photo by K. Grant



Pl. 11. An orthographically correct photogrammetric image of the ancient theatre and surrounding areas taken during the 2015 pole photography project. The walls of the long building exposed by excavation are visible at the top of the image next to the viewing platform. Photo by G. Hazell




Pl. 12. Plan of the walls of the long building excavated by the Australian mission on the top of the *cavea*. Drawing by C. Richards

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# INTEGRATION OF 2D AND TLS DATA USING GIS TO CREATE A DATABASE FOR THE PAPHOS AGORA PROJECT

**Abstract:** *Excavations in the Nea Paphos Hellenistic-Roman agora have been conducted by the Chair of Classical Archaeology of the Jagiellonian University of Krakow since 2011 under the direction of Professor E. Papuci-Władyka. The main goal of the excavation is to fully uncover the Agora and to reconstruct the ways in which this public space was used. One of the methodological goals set for the research was the creation of a state-of-the-art database (work on which began in 2013) that could import and adapt data obtained from modern equipment. Of equal importance was the implementation of a 3D-format within the database (this had been under discussion for over a decade) and the enabling of GIS software data integration. Faro Focus laser scanner data was chosen to form the graphical core as it fulfilled the most important visual documentation criteria for the Paphos Agora Project database. This article presents the main premises on which the new Nea Paphos Hellenistic-Roman Agora Project database is based (on the integration of 3D and 2D data from 2011–2014) and the different stages of its creation, which made use of the latest methods of developing such tools for the purposes of archaeological excavations.*

**Keywords:** *3D scanning; GIS in archaeology; 3D database; agora Nea Paphos; integrating 2D and 3D data*

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## Introduction

Excavations in the Nea Paphos Hellenistic-Roman agora have been conducted by the Chair of Classical Archaeology of the Jagiellonian University of Krakow since 2011 under the direction of Professor E. Papuci-Władyka. The project is funded by the National Science Center[1] (Papuci-Władyka and Machowski 2015; Papuci-Władyka *et al.* forthcoming).

As one of the most important archaeological sites in Cyprus, Nea Paphos appears on the UNESCO World Heritage List. From the late 3rd century BC onwards, it became both an administrative centre and a seat of government. The Roman Agora was discovered by K. Nicolaou (1980) opposite the odeon at the foot of Fanari hill, which is believed to have been the city's acropolis. The Agora, the square design of which measures approximately 100m on each side, was first dated to the 2nd–4th century AD. However, researchers studying Paphos have long suggested that the square was used as an agora ever since the foundation of the city in the late 4th or early 3rd century BC (Młynarczyk 1990, 67–76; Bekker-Nielsen 2000, 201–202). This hypothesis has been proven correct by the latest findings made by the Krakow expedition, which clearly confirm that the agora existed and was used at least as early as the Late Hellenistic period (Papuci-Władyka *et al.* forthcoming).

Research by the Chair of Classical Archaeology of the Jagiellonian University of Krakow is intended to fully uncover the Agora and to reconstruct the ways in which this public space was used. The work conducted between 2011 and 2014 yielded outstanding results; it has now been established that the site was indeed the Agora and the dating of its foundation has been shifted back to the Late Hellenistic period at the latest. Making use of three different trenches, the excavations unearthed a complex pattern of architectural structures, which were mostly different parts of two large public buildings (probably a temple and a store house) and a *tabernae* by the eastern entrance to the agora. Other finds include numerous walls, floors, wells, cisterns, hydrotechnical equipment, etc. Their stratification is currently undergoing advanced study, including functional analysis, which already at an early stage indicates that the aforementioned structures went through many phases of use and were often rebuilt due to seismic activity in the region. Another factor contributing to the overall complexity of the site is its complicated stratigraphy resulting from varied backfill

[1] Opus grant no. 2011/01/ B/HS 3/01282 in 2011–2014 and Maestro grant no. 2014/14/A/HS 3/00283 in 2015–2019 with contributions by the Department of History of the Jagiellonian University in Krakow and private sponsors. Website: www.paphos-agora.archeo.uj.edu.pl.

formation processes, varied building use and the abundance of archaeological material (Papuci-Władyka *et al.* forthcoming).

One of the methodological goals set for the research was the creation of a state-of-the-art database (begun in 2013) that could import and adapt data obtained from modern equipment. It was equally important to create the database in 3D format (which had been under discussion for over a decade) (Doneus and Neubauer 2005a; Doneus and Neubauer 2005b; Newhard 2015, 14–15), and to enable GIS software data integration. It was E. C. Harris (1989) who laid the foundations for this approach when he highlighted the destructive nature of archaeological research and thus the need to properly register and record explored layers/contexts by graphical means.

The first phase of work, which is presented in this article, involved the documentation of the exposed architecture of Trenches I, II and III, the creation of a 3D model and its integration with data obtained in a 'traditional' way. Due to the fact that three-dimensional documentation at the Paphos Agora site has only been introduced in stages since 2014, all of the previous documentation was based on conservative methodology, such as drawings, photographs and descriptions. With the decision to implement fully three-dimensional documentation from 2015 in the form of a GIS database based on data taken from 3D laser scanning and close range photogrammetry, there arose the need to integrate all previously collected information into digital form. This had to be completed in order to enable simultaneous processing and analysis of data obtained during the years from 2011 and 2014 and after.

## State-of-the-art

The issue of the development of documentation methods and the resulting alteration in the creation of workflow for tasks on various archaeological sites is an area that has received increasing attention of late. Over at least the past dozen years, alongside the development and adaptation of laser scanning, close range photogrammetry and other related methods for creating 3D models, documentary work on archaeological sites has changed dramatically. This (r)evolution has affected not only archaeology, but also the entire area of cultural heritage protection (Campana *et al.* 2012; Núñez *et al*. 2013, 4422; Galeazzi 2015).

Laser scanning is now recognized as a tool to create 3D visualisations in many fields of science. In the humanities, this method was first successfully applied to document work in the relatively broad field of protection of cultural heritage. Creating three-dimensional models of buildings allowed for excellent inventories to be made. Moreover, the method significantly expanded the variety of possible interpretations, mainly through the taking of precise measurements and the capturing of images that registered changes in the development of building structures. Today, a combination of Terrestrial Laser Scanning (TLS) and photogrammetric methods allows a highly realistic mapping of documented architectural assumptions/principles to be constructed, which creates an impression of absolute realism in the building presented. The use of realistic three-dimensional models goes beyond purely scientific and inventory frames (Remondino *et al.* 2011, 283–284; Campana *et al*. 2012, 451–454; Papadakis *et al.* 2014). Their influence on modern museology, their importance in education and their role in the development of virtual reality technology cannot be overstated (Hermon 2008; Hermon and Nikodem 2008; Hermon and Kalisperis 2011).

TLS has only been used in the process of documenting archaeological information for a relatively short period of time (Doneus and Neubauer 2005a; Doneus and Neubauer 2005b). The main reason for this is the high cost of the equipment, the need to have expert knowledge of the operation of both the equipment and software and finally the lack of a clearly defined idea for its use. Since 2005, much work has been carried out in order to demonstrate the possible uses of the scanner over the course of excavations. This has mainly focused on the recording of the tops and bottoms of layers/archaeological contexts and the creation of accurate representations of their surface appearances (Núñez *et al*. 2013; Galeazzi 2015). However, the most success has been achieved in the area of recording and documenting architectural remains, as well as large and complex surfaces. Although the results achieved thus far are very encouraging, certain basic difficulties must still be overcome by excavation directors wishing to use the scanner. The main problems include: the high price of the equipment, the complex workflow, the huge amount of data that needs to be developed, managed and stored, texturing problems, the problem of integrating data with information from other sources and logistical problems associated with the transportation of the device. It is also worth pointing out that despite the huge amount of information collected, the scanning results remain complementary to documentation rather than entirely replacing it (Campana and Remondino 2008, 36; Lerma *et al.* 2010; Dell'Unto 2014b, 61; Galeazzi 2015). The answer to these problems could lie in the development of photogrammetric methods, which are used to create three-dimensional models and to record the process of site exploration. Structure-from-Motion and Multi-View Stereo methods have enabled the creation of models that can now meet the accuracy requirements of archaeological documentation (Dellepiane *et al.* 2013; de Reu *et al.* 2014, 251–252). For those who conduct excavations, these methods (also known as Image-Based Modelling) have several key advantages, which have led to their ever-increasing acclaim (Campana and Remondino 2008; Lieberwirth 2008; Hermon *et al*. 2010, 18–19; Núñez *et al.* 2013; de Reu *et al.* 2013; Dell'Unto 2014a; de Padova 2014; de Reu *et al*. 2014; Galeazzi 2015; Olson and Placchetti 2015; Tsiafaki and Michailidou 2015; Miszk *et al*. 2016). As mentioned above, the models obtained by this method offer a sufficient level of accuracy for archaeological purposes and they also outperform laser scanning in the field of texturing (the difference is mainly due to the fact that 3D scanners are equipped with cameras of much poorer quality than average ones currently available on the market). This method of data acquisition can proceed significantly faster than the same process using a scanner, but it does require that an adequate number of photos be taken. The constantly improving/upgraded software available allows easy data management. With the development of computer hardware, it seems that it will now also be possible to check the documentation being prepared on a regular basis. This will facilitate the organisation of work on site, where the necessary halt in exploration to check whether documentation has been prepared correctly will not take as long (de Reu *et al.* 2014, 261; Miszk *et al.* 2016). However, there are no ideal solutions. Photogrammetric methods require proper exposure, which for many types of archaeological sites is a big problem. In addition, when registering large sites or complex objects, there is the issue of the huge amount of data that requires post processing, which often exceeds the capabilities of field computers (Dell'Unto 2014b, 64; Galeazzi 2015). Another problem is presented by sites which are hard to access (caves, tunnels and narrow deep trenches), where the taking of a photograph with adequate coverage is extremely difficult due to either a lack of space or an excess of it (Núñez *et al.* 2013, 4427; de Reu *et al*. 2013, 1120). For such cases, it is perhaps best to use both methods of creating 3D documentation, which in many situations may be complementary to each other (Lambers and Remondino 2008; Lerma *et al.* 2010, 505; Núñez *et al.* 2013; Koutsoudis *et al.* 2014; Lieberwirth *et al.* 2015, 116–117).

Besides the introduction of three-dimensional documentation methods, another innovation that has been of great importance in the field of data management is the introduction of GIS software that enables the integration of different kinds of spatial information in one place. GIS software has been used in archaeology to good effect since the 1980s, primarily in landscape research (Peterman 1992, 162) and cultural heritage protection (Apollonio *et al.* 2011; Campana *et al.* 2012, 455). Research on urban-type sites does have its own unique characteristics, but in terms of databases they represent a micro-environment that can be tested using similar tools to those used for a cultural landscape (Sharon *et al*. 2004, 161–162; Lambers and Remondino 2008, 31; Tsiafaki 2012, 96; Newhard 2015). Considering that all the information obtained over the course of archaeological research is of a spatial nature, the creation of a database that could collect this information is qualitatively a huge step forward. Recent years have witnessed the development of both commercial and open-source GIS software that allows the integration of 3D and 2D data. This is important not only for research currently being conducted, but it can also be used to integrate data collected previously in a traditional, digital or manual way (naturally post-digitisation). Ongoing archaeological projects at sites such as Catalhöyük and Pompeii use GIS as a basis and operate Archaeological Information Systems that collate all the data collected during excavations. In addition, these systems are able to create realistic three-dimensional models of the sites and the contexts that are explored (Núñez *et al.* 2013, 4421; Dell'Unto 2014b, 58; de Reu *et al.* 2014; Berggren *et al.* 2015; Forte *et al.* 2015, 441; Lieberwirth *et al.* 2015, 107). Stratigraphic data is brought together with other information regarding acquired sights, the exploration process, etc. This is essential for the facilitation of the process of interpretation by finding relationships between different sets of data and the aiding of cooperation not only between those working directly on the site, but also with those who are developing monuments or artefacts. This type of tool may also be ideally suited for the comparison of geophysical survey results with subsequent excavation results (de Reu *et al.* 2014, 261). The sheer volume of data collected during excavations and a growing awareness of the importance of the role that space and landscape plays in research means that the use of GIS software now seems indispensable in the execution of archaeological projects. In addition, complementary platforms for data collection, analysis and management now provide incomparably greater research, inventory and educational capabilities. To summarise, it may now be hoped that the expectations created by contemporary archaeology can finally be met.

In the case of excavations carried out on ancient Cypriot sites, 3D scanning has thus far been used during research on the hill of Agios Georgios in Nicosia (Pilides *et al.* 2010) and in Paphos itself during excavation of the theatre (Ronzino 2010). The possibility of its widespread use in analytical work on archaeological material resulted in the decision to bring all this information together in a single database. The database was created using ESRI ArcGIS software, which offers the best tools for work on three-dimensional models and also enables their use in combination with different types of information. The STARC (Science and Technology in Archaeology Research Centre) programme is currently being implemented on Cyprus. One of its objectives is to develop research methodology using three-dimensional modelling that best suits the particular nature of archaeological sites in Cyprus. The use of both TLS and photogrammetry techniques was tested at the Agios Georgios site and the results confirm the findings from similar research at other sites: the methods of Image-Based Modelling and laser scanning do work well in tandem and offer great opportunities, but their use does pose certain associated difficulties (Hermon *et al.* 2010).

## Case study – the Paphos Agora. Methodology and the specific nature of the site

The first challenge posed in the creation of a modern database for the Agora site was the integration and digitisation of data obtained during research from 2011 to 2014. Most of the information obtained during these excavations was recorded on paper: inventories (monuments, distinct historic sites, contexts and structures), field logs, architectural layouts and context cards with drawings. Some information was also collected digitally: photographs, geophysical, aviation, and surveying maps. In addition, the decision was taken to create an inventory of all uncovered architectural structures, beginning with work on Trench III. The experience of conducting this work will be described below. The choice of which inventory method to use for the architectural structures (mainly walls) was dictated by the specific nature of the facilities being registered and the logistical capabilities of the expedition. Most of the exposed architectural structures included walls and partitions that were interconnected in a complicated way. In addition, they were frequently very well-preserved. This was demonstrated by the fact that over the course of exploration of the contexts lingering between the walls, the surveyed layers were often extremely thick, often exceeding 2m within Trench III. In contrast, the distance between the intersecting rooms/spaces was often very small (approx. 50cm) and the courses that were preserved may have only measured up to 10mm in length. Therefore, it was very long and narrow trenches that needed to be documented, resembling tunnels rather than classic architecture. Recording the surface of the walls with a camera whilst adhering to the principles of photogrammetry would have been very difficult or even impossible, especially when taking the bad lighting conditions in Cyprus into account (a common feature at Mediterranean sites) (Stal *et al.* 2014, 123). Unfortunately, even when trying to take photos at dawn or early dusk, the desired results could not always be obtained, as the fragments of architecture being recorded were too poorly lit (especially in their lower section). All of these factors combined resulted in the abandonment of photogrammetric methods in favour of laser scanning. In architectural research, the most crucial information includes data on the connection between the walls, their courses and their stages of reconstruction (Campana and Remondino 2008, 36). Thanks to collaboration with the AGH University of Science and Technology, a group of experts in laser scanning (in the mining and construction industries) were brought to the site. In this way, we were able to get around both the problem posed by the cost of purchase of the necessary equipment and that of obtaining expert support. The experts created a 3D model that served as the graphic basis for the three-dimensional database created in ArcGIS. The 3D mapping of the trench served as the graphic platform on which all of the information obtained from 2011 to 2014 was integrated. The model in itself also constitutes one of the most fundamental areas of information on the database for the architecture being documented. The workflow presented above has already been successfully applied at other sites, such as Thessaloniki Toumba (Katsianis *et al.* 2014).

The process of presenting the stratigraphy recorded in 3D proved to be quite complicated on its own. The use of software described below was the result of the expedition's limited capabilities in terms of access to trial versions, open source versions and versions available from the university's (highly limited) resources. In 2015, most of these were replaced with photogrammetric software. The Image-Based Modelling method will, however, be used to its maximum capabilities when creating new documentation on the exploration of archaeological contexts (Miszk *et al.* 2016).

## Terrestrial Laser Scanning as a tool

### *Introduction*

Transposing the tangible world into virtual reality is becoming an increasingly important challenge, as large volumes of data are generated during field measurement, often in a chaotic manner. In order to enhance the clarity and quality of measurement data, it is necessary to select the appropriate data acquisition and analysis method. The main factors that determine the choice of the technology best suited to the task are the area's land relief and the nature of the object of study. Recently, many 3D data acquisition methods have become available, but their applicability varies depending on site conditions (Wong *et al.* 2011, 3). The most important methods include photogrammetry based on image analysis, methods based on cameras that sense depth via triangulation (Hämmerle *et al.* 2014, 4) and classical methods based on angle and distance measurements (tacheometry and laser scanning). Owing to the nature of the site and the land relief of Paphos, laser scanning was chosen as the most appropriate method. In recent years, it has been commonly applied to all kinds of architectural surveying (González-Aguilera *et al.* 2009, 1). The high resolution and accuracy of the data obtained during measurement allows scanned objects to be realistically imaged and thus analysed in a precise manner. Another important advantage is that no lighting needs to be present to take measurements with a laser scanner. Lighting is only required if textures are to be recorded. Relying on personal experience and information available in topic literature regarding the application of laser scanning in the creation of 3D models for an object of study in archaeology and in related databases (Grussenmeyer *et al.* 2010, 2; Torres *et al.* 2014, 5), the project team decided to choose TLS (Terrestrial Laser Scanning).

*Field measurements*

The Faro Focus 3D laser scanner was used to carry out field measurements (Pl. 1: 1). It is a phase scanner with a high measurement rate of 976,000 points per second. This feature allows scanned terrain to be rapidly covered with a dense point cloud, which decreases the time needed to complete measurements. The scanner is equipped with a laser rangefinder that limits the practical measurement range from 0.5m to 80m. The ability to take measurements below the minimum or above the maximum range depends on the reflectiveness of the material covering the object of study. The wavelength of the laser beam emitted by the rangefinder belongs to the 3R spectrum, which poses a hazard to the eye. As a result, people operating the scanner at close range (below 5m) need to wear safety goggles. In addition, the Faro Focus 3D has an integrated 5Mpix digital camera, which can be used to take high-resolution pano--ramic photographs of the site being studied. If necessary, it is also possible to use panoramic pictures to overlay a point cloud with the real colours of the scanned object by adding the RGB colour code. In practice, however, it was necessary to add photogrammetry images to the point cloud from laser scanning. The high quality and accuracy of colour imaging is necessary to be able to document archaeological strata (Doneus and Neubauer 2005a, 4). In order to obtain precise images of the scanned terrain and to optimise measurement time, the mean scanning resolution was set to 7mm/10m. Due to the large number of measurement stations and short sight lines, this configuration allowed the objects (Trenches I–III of the Agora) to be comprehensively measured. Field work was carried out by two people and it took approximately ten hours to complete the measurements for one trench. In order to create an image of the entire terrain, measurements were taken from 108 stations in total. However, an analysis of the results seen on the orthophotomaps below (Pls. 1: 2 and 2, 3) could lead to the conclusion that certain areas were not recorded during measurement. This was caused by the existence of very steep and deep voids (e.g. a well in Trench II) and by the screening of some elements by other elements, a situation hard to eliminate when the object of study has complex geometry. Measurements taken with the laser scanner were then inputted into the excavation's coordinate system. In order to achieve this, a Total Station that was used every day on site was employed. The connection was created with the use of check board targets that were distributed and surveyed by means of the laser scanner and a reflectorless Total Station. The targets also served as characteristic points used to combine scans recorded from different stations. This registration method allowed the scans to be pre-combined. In order to increase the accuracy of the measurement results, a Cloud-to-Cloud registration algorithm was used that was based on a multi-iterative analysis of the shape and location of the point cloud. The overall accuracy of the scans obtained from the abovementioned methods ranged from between 4 to 6mm depending on the trench being scanned. On the basis of the positional errors of the reference targets and the errors associated with determining the position of single scan points, the total error of the model can be estimated at 10mm. This is the level of accuracy recommended for the documentation of archaeological sites (Doneus and Neubauer 2005b, 5). Office work to combine the point clouds into one coordinate system took 4 to 6 hours per trench.

*Data analysis*

A combined point cloud that presents a 3D model of a measured object is a wonderful source of data for a number of analyses, the simplest of which is the measurement of distance between selected elements. Spatial and reduced horizontal and vertical measurements can also be performed. During the Agora excavations, TLS data was used on various occasions to verify the relative position of structural elements of the buildings being unearthed in order to plan work associated with the exploration of further contexts. Basic point cloud operations are enhanced if simple geometric structures can be fitted into them, such as plains or spheres, although more complex shapes can also be modelled with their use. An important deliverable obtained as a derivative of a point cloud is a high-resolution orthophotomap of the scanned space. It must be noted that single object orthophotoplans, such as the representation of a wall or a trench fragment, can also be obtained. An obvious flaw in these images is the poor quality of the photographic material acquired when using the scanner. Many scanned areas are either underexposed or overexposed. Plates 4 and 5: 1 show point clouds with overlaid colours that come from a photo camera integrated into the scanner. Taking extra photographs with an external camera with better optical parameters and shading or lighting a trench is one possible solution. It is worth pointing out that a completed orthophotomap, though slightly inferior in quality, can serve as an excellent base for the sketching and planning of further excavation work. A complete point cloud permits the easy generation of cross-sections, which can be executed at any horizontal or vertical angle and at any height (Pl. 5: 2). Point cloud data can also be used to draw contours of architectural details by simply slicing the point cloud. Slices can be generated automatically, which can significantly speed up work of this kind under certain conditions. Terrestrial scanning can also be used in order to record subsequent stages in the unearthing of contexts. This is presented in Plates 6 and 7: 1 in the form of a triangulated irregular network (TIN) for the three excavation stages and in the form of cross-sections. This functionality permits the graphical extraction of the contexts explored in their true shape and provides insight into the whole exploration process (Doneus and Neubauer 2005b, 3; Lieberwirth *et al.* 2015, 105). Another interesting, albeit rarely applied, feature of laser scanning is its ability to measure the impact of weather and time on the condition of historic buildings. The comparison of models of studied objects from different measurement periods could enable the generation of deviation maps indicating differences in appearance and shape. It would thus be possible to determine the rate of change and to identify the elements which are most at risk of deformation. This type of approach could play an especially important role in regions that are seismically active, such as Cyprus (Ambraseys 2009, x).

## 3D database for the Paphos Agora Project

*Introduction*

In the article *Discourse on the use of a 3D model as a record of excavation*, G. J. Avern (2013, 9) expressed his opinion on the future of excavation records, writing that they will consist of two parts joined together; the first will be a precise 3D model of a site with the second being a database that includes traditional documentation data, such as descriptions, pictures, drawings, etc. This record taking method, which is based on the use of modern technology, has been adopted at the Nea Paphos agora site in Cyprus, where an Archaeological and Archaeometric Information System (AAIS) is currently being created. It is made up of a few crucial components (including traditional documentation) that together form a computer database that works as the fundamental tool for the processing and analysis of archaeological material.

*Creation of the database*

Esri ArcGIS ArcInfo software was chosen as the basic set of computer tools to be used for the GIS environment at the Agora site. This choice was not random. The decisive advantage of using this software was its ability to work in 3D (ArcScene programme with the ArcGIS 3D Analyst extension), which enables both the development of a database and offers a way to create a visualisation and partial reconstruction of the site being explored. The ArcGIS package offers many possibilities, of which the following are particularly worthy of mention: storage of collected information, cataloguing according to pre-defined parameters and the creation and editing of various data types. Another important advantage of this software is its ability to build multiple visualisations by comparing selected data, as well as conducting analyses using an impressive number of built-in applications. The first stage of creating AAIS for the Agora site involved gathering all the data obtained thus far and transferring it into the GIS environment. This data can be divided into two categories (Pl. 7: 2):

Vector data: 1. Numerical Terrain Model (point layer); 2. 3D Model of Trench 3 (multipatch layer); 3. Table of Separated Finds (point layer); 4. Layers drawn in 3D (multipatch layer).

Raster data: 1. photographs; 2. orthophotoplans; 3. architectonic sketches; 4. orthophotomaps.

One of the most basic graphical elements of the project database is a 3D model of Trench III (Pl. 8: 1). This was developed on the basis of a colour point cloud, which was obtained during Terrestrial Laser Scanning in 2014. The use of this technology significantly decreased the time required for documentation and produced much better results than a standard Total Station would have (Doneus and Neubauer 2005b, 226). The raw material obtained was processed through a number of programs in the following order: cleaning up of the point cloud → creating meshes → combining meshes → modelling → texturing. The completed model was saved in the *.3ds (3D Studio Max) format and imported as a multipatch layer into the GIS environment with the use of ArcToolbox. In addition, the Cloud Compare freeware allowed the division of the mesh into smaller elements (structures identified during excavations) and the reloading of the layer with an extended attribute table containing more multipatch items, which enabled more detailed analysis to be conducted. In this case, it was crucial to isolate each piece of information on a separate layer, as it not only contributed to more effective browsing of the database, but also made the database clearer and more readable.

Another element of the GIS database is the 3D presentation of stratigraphy (Pl. 8: 2). Archaeological excavations are a destructive process, as each layer can be explored only once with no reversal possible. Therefore, the importance of precise documentation cannot be overestimated. Thus far, a few stratigraphy presentation solutions based on the usage of contemporary equipment and software have been proposed (e.g. Doneus and Neubauer 2005b; Lieberwirth 2008; Forte 2014). At the agora site, MicroStation V8i software was used. This program is a CAD tool, which in archaeology is mainly applied to digitisation (Neamtu *et al.* 2011, 79; Lieberwirth *et al.* 2015, 105). During fieldwork, points located in the roof corners of each layer were measured with a Total Station. X, y, and z coordinates obtained in this way were imported into the program, where they served as the basis for the drawing of planes, which were then combined to form 3D models of individual contexts on separate layers. Data prepared in this way was divided into separate files in FME Desktop 2015.1., converted into the *.shp format and transferred into the GIS environment as multipatch objects (Pl. 8: 3). A similar method has been adopted at the Thessaloniki Toumba site (Katsianis *et al.* 2014).

During fieldwork, the team measures each separate find with a Total Station in order to assign its unique x, y and z coordinates. Next, this information and a detailed description of the find are uploaded into the database, which is developed in Microsoft Excel, but can easily be imported into the GIS environment. This is achieved by saving a given Excel sheet as a *.csv or *.xlsx file and opening it in ArcGIS, which displays each record as a separate point element, represented by a pre-defined symbol. The database can be modified with both ArcGIS and Microsoft Excel.

In the Paphos Agora Project, non-destructive archaeological methods are also employed. The resulting abundance of mainly digital data is a rich source of information on the site. In the GIS environment, this data is categorised as raster layers, which present photographs, plans and maps. This sort of information can be directly added to the created database, although without georeference it will not be displayed in the proper location. As a result, each image undergoes a coordinate assignment process (known as calibration, georeference or georectification) before being imported into ArcScene.

All of the aforementioned elements are gathered together and uploaded into a single GIS database in ArcScene. If desired, each layer can be edited, modified in terms of its attributes and geometry or complemented with attachments, depending on specific requirements or software functionalities. It should also be pointed out that all the traditional records are scanned and added to their respective layers as attachments. ArcScene has a range of functionalities, which both speed up and facilitate material analysis. Information gathered in one location can be displayed in many ways as configured by the user. Question-and-answer browsing allows the user to easily access data on all layers and combine and divide them with the available ArcToolbox options. Research results can also be shared as digital or printable maps or even as Internet apps. Another great advantage of the GIS database is that it is an open system, which means that new data can always be uploaded into it and that the software is continuously updated. It is therefore to be expected that once new documentation methods have been developed, we will be able to implement them into the existing database (Pl. 8: 4).

The graphical component of the database will be continuously expanded to encompass the whole of the Agora, as well as other sites that are studied in detail. A 3D model of Trenches I and II is currently being created with the use of laser scanning and tacheometric measurements of the sills and roofs of the recorded contexts. Thanks to the greater possibilities afforded by the new AgiSoft Structure from Motion photo-based 3D modelling software and the greater availability of scanners, the records of all the contexts explored will be imaged much more accurately than before.

The newly-created GIS database for the Agora allows all the information obtained on it to be gathered in one environment, a feat that was made possible by the application of state-of-the-art technology and tools. All of the aforementioned operations have led to the formation of a virtual archaeological site available to all users via a computer screen. This sort of documentation not only allows the emerging image of the past to be accurately preserved, but can also be made accessible to a wider audience in an interesting, appealing and friendly manner.

**Summary**

Laser scanning and GIS are becoming increasingly important tools in archaeological work andthis article has presented the process of creating 3D documentation and implementing it into a GIS environment. In conclusion, it should be emphasised that laser scanning is not only a perfect tool for the recording of unearthed objects and architecture, but also for the accurate registration of every step of exploration. Its main advantages include short data recording and pre-processing time, the objective quality of information that is obtained and the ability to execute precise orthophotoplans or cross-sections in any desired configuration. Texture application remains problematic for the time being, but it will be resolved by combining photogrammetry images with scanning data.

A great improvement in data-processing results can be observed when implementing all of the information obtained into a single database, which in this particular case used GIS software. It allows information to be easily accessed, handled and filtered as desired. One difficulty that is encountered, however, is the implementation of scanned data into a 3D model that keeps it accessible at its highest resolution possible. At present, this appears to be a hardware-related obstacle. It is also hard to overestimate the universal nature of the system discussed in this article. Geographic Information Systems allow users to work in a universal environment, which all interested parties can access (without the need to learn new software) and other archaeological expeditions working at the same site can also contribute to it at a later date (Sharon *et al.* 2004, 161–162).

Furthermore, it should be emphasised that with the development of photogrammetry techniques, laser scanning will increasingly become a purely ancillary method. However, its application will still have a significant impact at sites where the Image-Based Modelling method cannot be used.

Considering the problem of modern documentation when developing a site, it should be noted that laser scanning has allowed significant progress in the fields of accessibility, accuracy and quality. One simply cannot overestimate how useful it is to be able to analyse any given thread/course of a wall, to make accurate measurements, and, last but not least, to

search for relationships between the 3D and 2D data collected in the GIS (Stal *et al.* 2014, 123–125). The experience of numerous case studies shows that Ian Hodder (1999, 180–181) was right when he predicted the huge impact that digitisation would have on archaeology.

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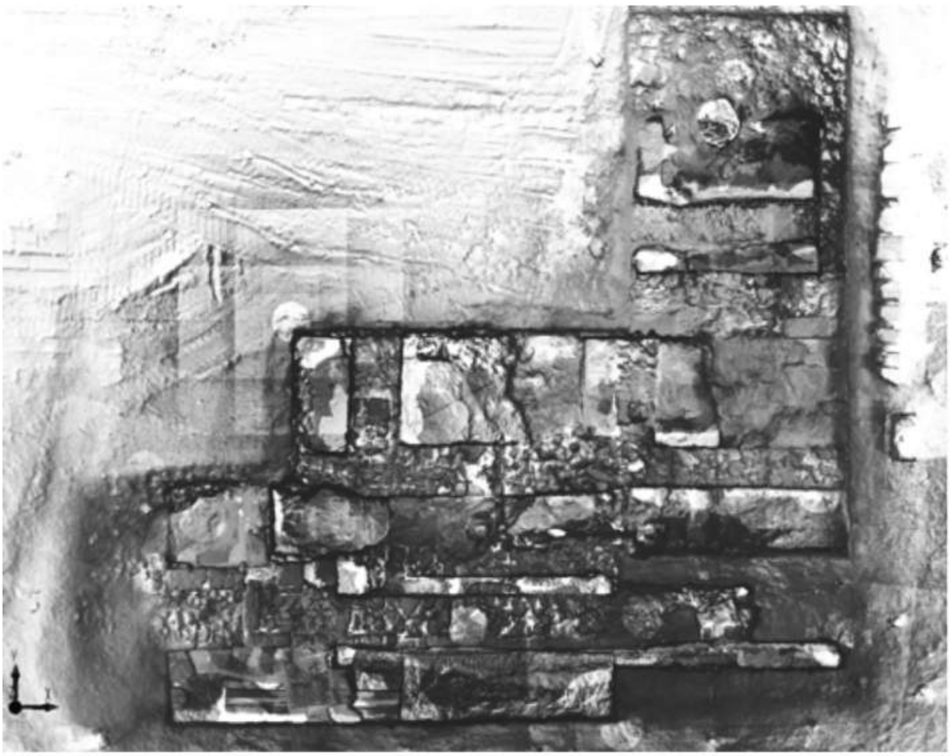

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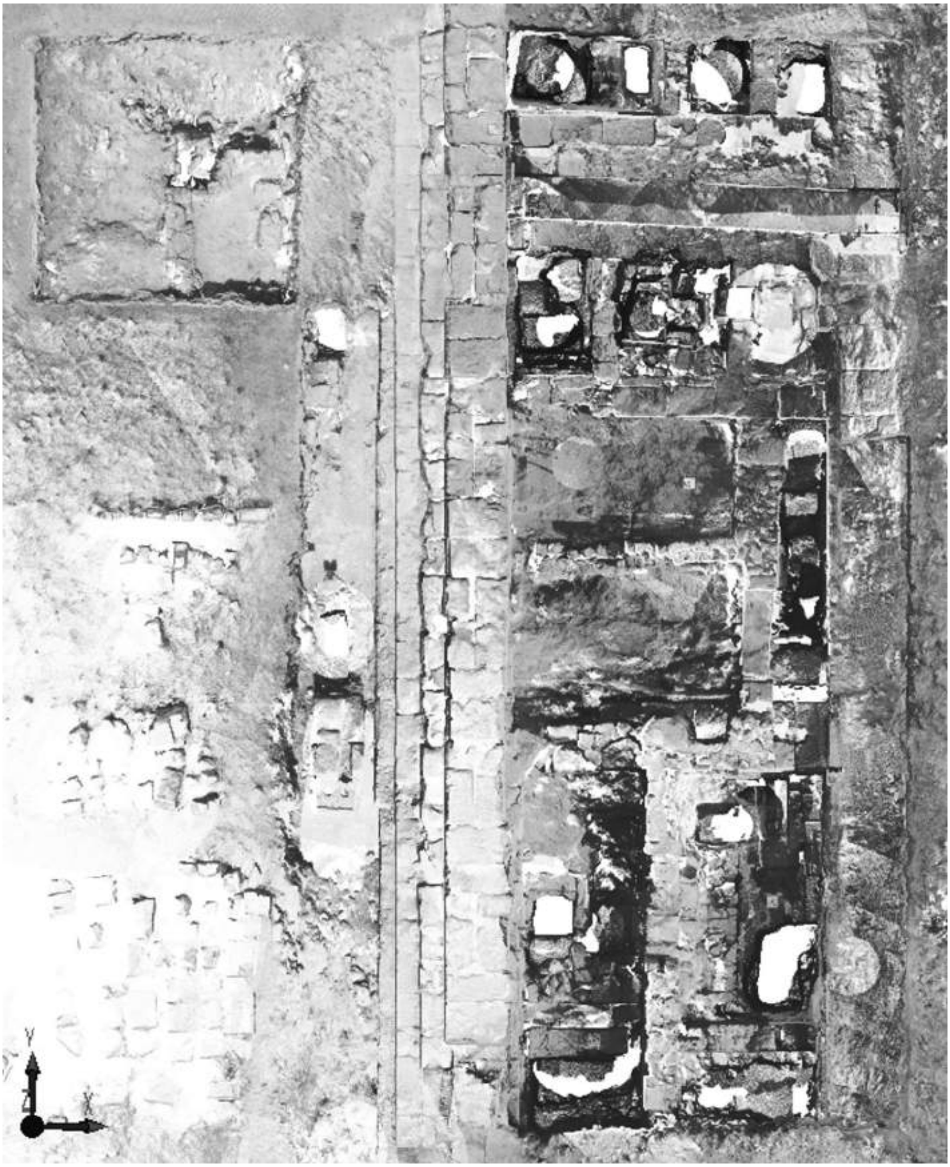
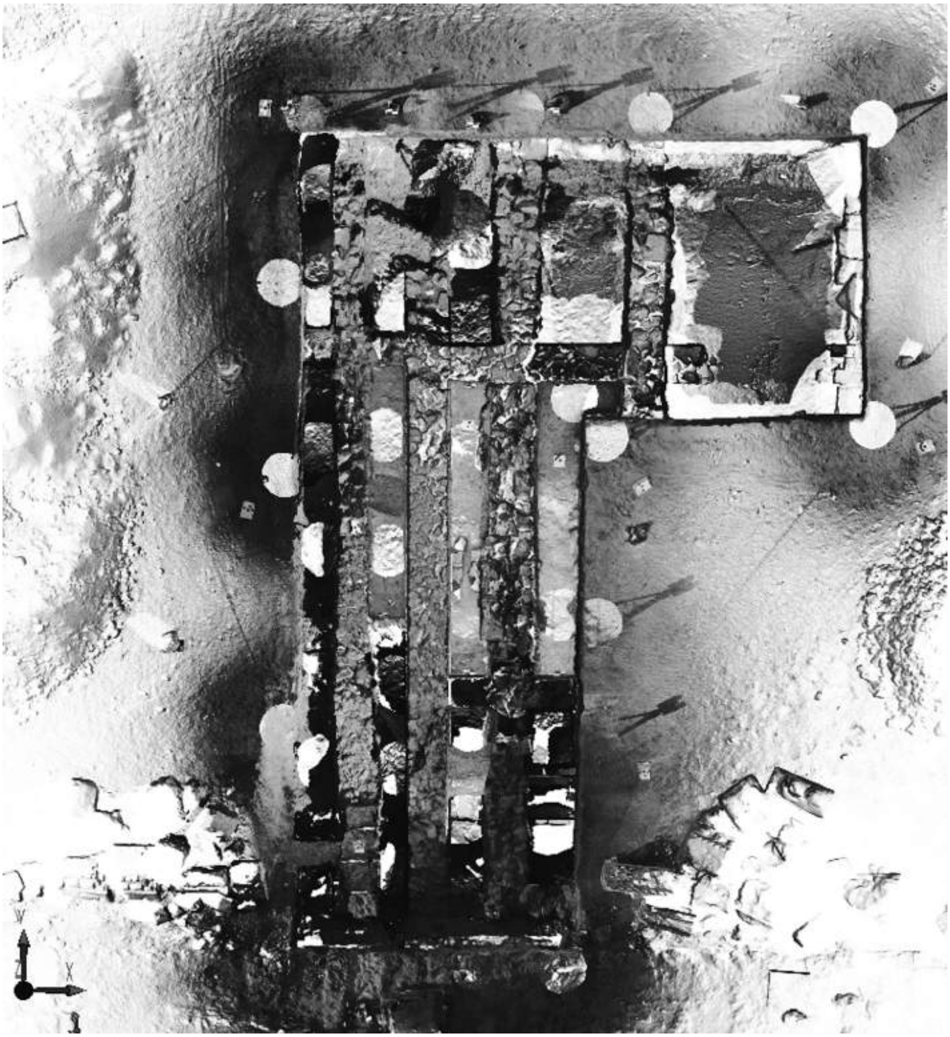
Pl. 1. 1 – 3D Scanner Faro Focus during fieldwork. Photo by R. Słaboński; 2 – Orthophotomap of Trench I from scanning measurements. Drawn by P. Ćwiąkała, K. Matwij, W. Matwij



Pl. 2. Orthophotomap of Trench II from scanning measurements. Drawn by P. Ćwiąkała, K. Matwij, W. Matwij



Pl. 3. Orthophotomap of Trench III from scanning measurements. Drawn by P. Ćwiąkała, K. Matwij, W. Matwij

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Pl. 4. 1 – Part of a wall with an inscription from Trench II. Point clouds with overlaid colours. Drawn by P. Ćwiąkała, K. Matwij, W. Matwij; 2 – Part of a stylobate from Trench II. Point clouds with overlaid colours. Drawn by P. Ćwiąkała, K. Matwij, W. Matwij

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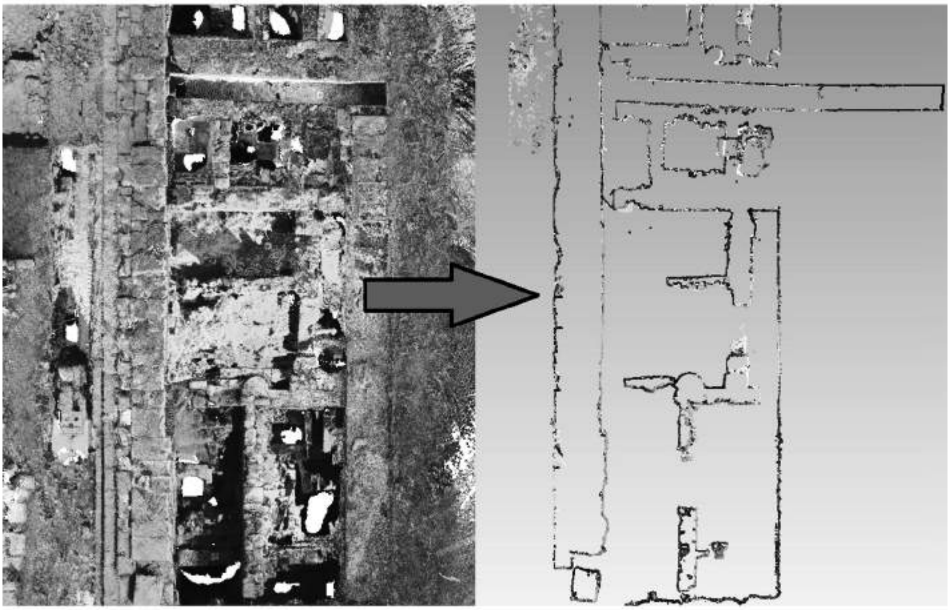

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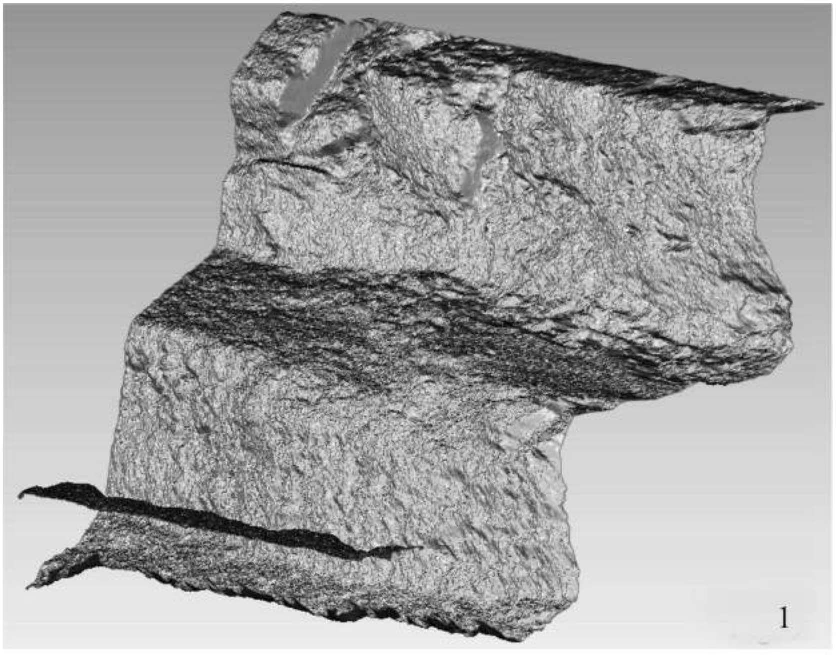
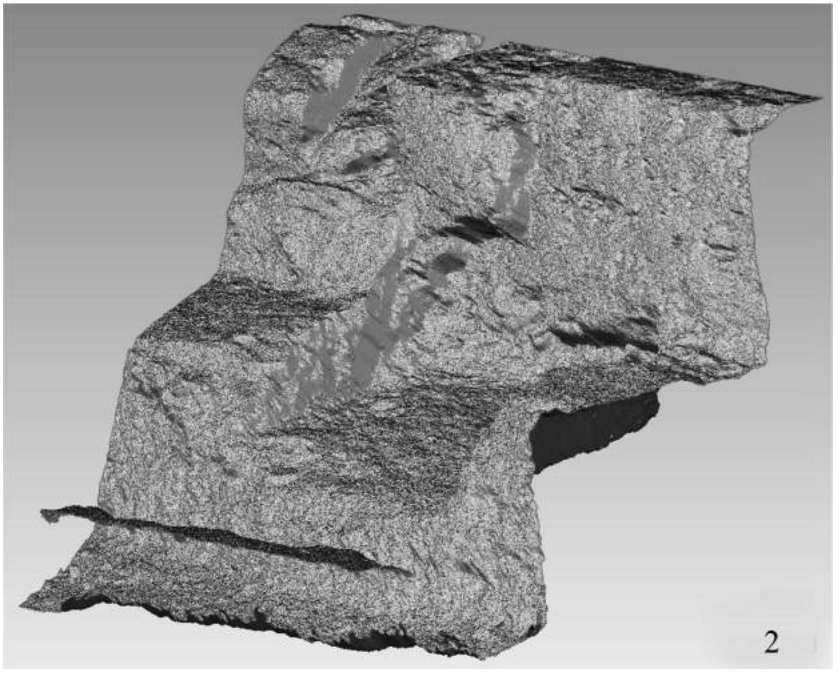
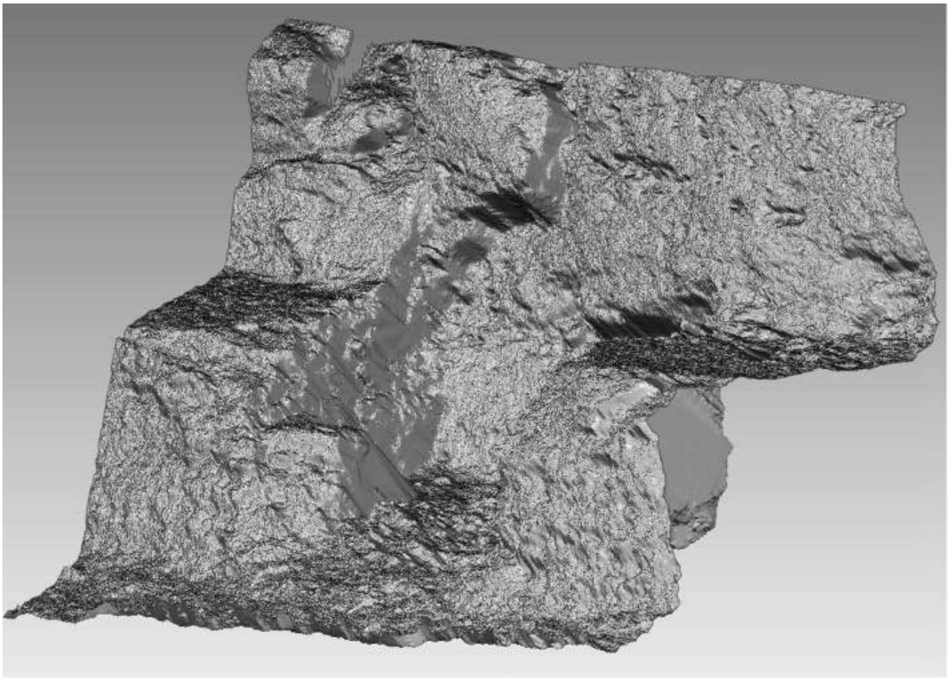
Pl. 5. 1 – Part of a wall from Trench III. Point clouds with overlaid colours. Drawn by P. Ćwiąkała, K. Matwij, W. Matwij; 2 – Example of a cross-section of Trench II. Drawn by P. Ćwiąkała, K. Matwij, W. Matwij




Pl. 6. 1 – TIN for the first stage of exploration in the Trench I section. Drawn by P. Ćwiąkała, K. Matwij, W. Matwij; 2 – TIN for the second stage of exploration in the Trench I section. Drawn by P. Ćwiąkała, K. Matwij, W. Matwij



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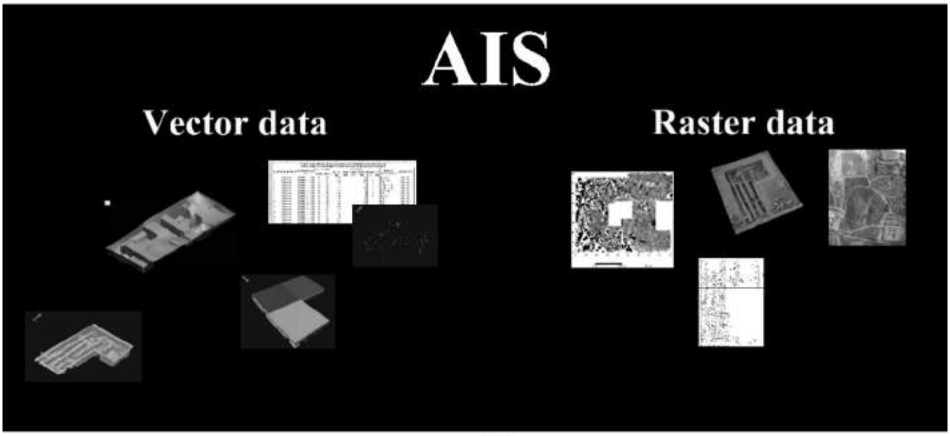


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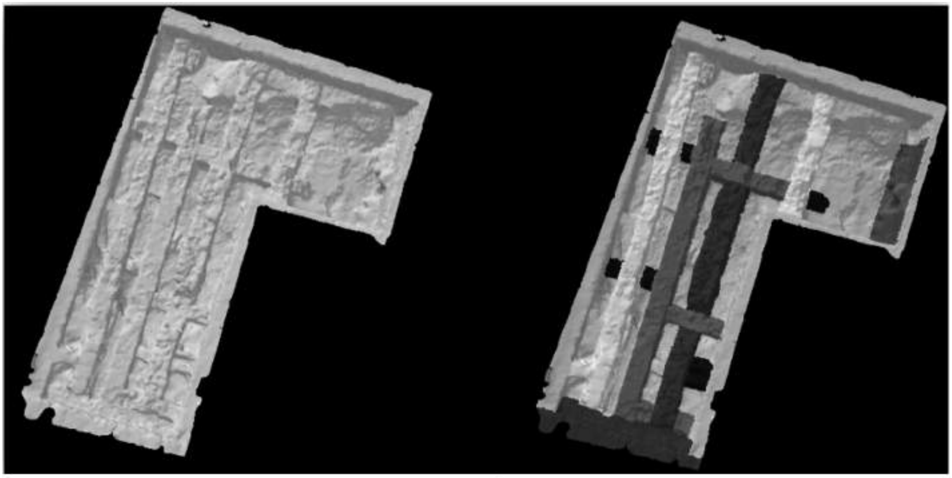
Pl. 7. 1 – TIN for the third stage of exploration in the Trench I section. Drawn by P. Ćwiąkała, K. Matwij, W. Matwij; 2 – Graphical comparison of data collected in the database. Drawn by W. Winiarska



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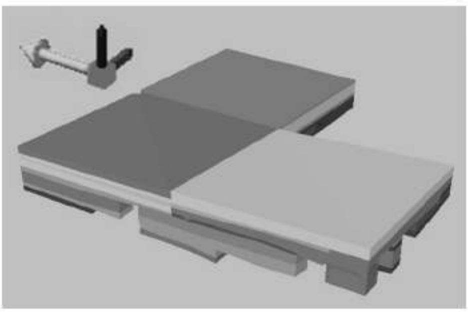

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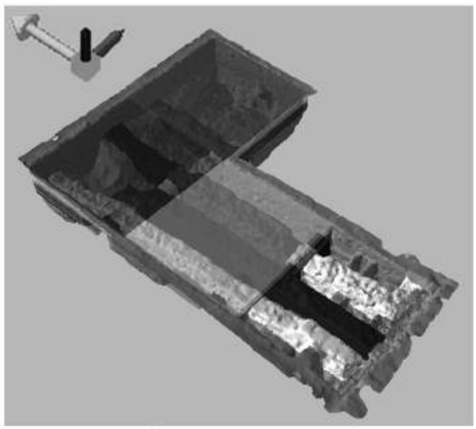

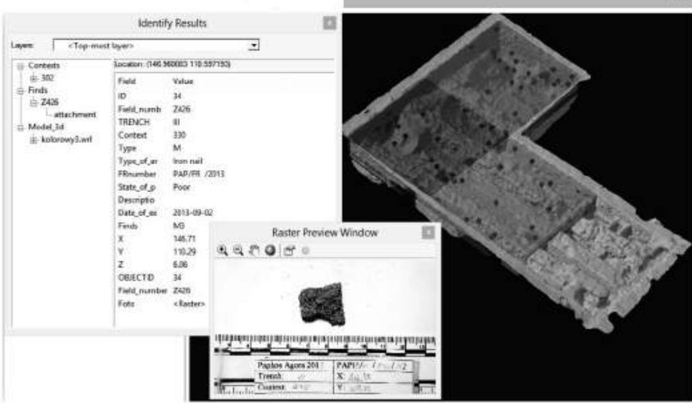


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Pl. 8. 1 – Model of Trench III before and after isolation of individual structures. Drawn by W. Winiarska; 2 – Stratigraphy restored and drawn in CAD. Drawn by W. Winiarska; 3 – Model of stratigraphy coupled with model from 3D scanning. Drawn by W. Winiarska; 4 – Graphical 3D database of Trench III. Drawn by W. Winiarska

Kraków 2015

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# GEOARCHAEOLOGICAL STUDIES IN PAPHOS – FIRST RESULTS

**Abstract:** *The geoarchaeological research conducted consisted of a geomorphological prospecting of the Paphos region and a geophysical examination of the ancient town of Nea Paphos and its agora. In addition, the morphogenetic processes that shaped the coastal plains of the Cypriot area were also determined and a research hypothesis that could explain the shrinking of the bay and the decline of the harbour north of the cape of Paphos was formulated. The Mala GPR (Ground Penetrating Radar) ProEx System, which is compatible with shielded antenna of 500MHz, was used for the geophysical survey of the area. 95 profiles were completed in a northsouth direction (1m apart) and 51 in an eastwest direction (2m apart). One of the main difficulties was to distinguish the stone structures, as the bottoms of their walls were formed at the natural level of the rock and there were pebble layers located above them. Using versatile geophysical techniques, we have attempted to answer a couple of questions: Was the agora area a fully built-up one and what does the continuation of the walls into undiscovered sections of the agora signify?*

**Keywords:** *Geoarchaeology; geomorphology; geophysical survey; georadar; Paphos; Cyprus*

## Introduction: location and present geographical environment

Cyprus is the third largest island (9251km$^2$) of the Mediterranean Sea, located in the eastern part of the basin, about 65–70km south of Asia Minor (Czeppe *et al*. 1966; Dominik *et al*. 1977; Mydel and Groch 2000;

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Makowski 2006; Puskarz 2008). The island's latitudinal extent is 225km and its longitudinal 97km. Cyprus is a mountainous area, with a denivelation reaching as high as 2000m. The coastline (about 700km long) is diverse and abounds in bays and capes.

Cyprus is located in an obduction zone, which is the term used for the rarely encountered situation in which an oceanic plate runs onto a continental one. In the case of Cyprus, this occurs where the Eurasian plate meets the African. This leads to major neotectonic engagement within the area, resulting in earthquakes (panseismic zone). From a geological point of view, the island is a prolongation of the Taurus Mountains' (a mountain ridge bordering the Anatolian Upland from the south) alpine structures. Cyprus was separated from the Asian mainland towards the end of the Pleistocene and initially consisted of two islands. These were formed by two mountain ranges that were uplifted in the Miocene: the Karpason (Karpasia, Pentadaktilos Mts.) Mountains in the north and the Troodos Mountains in the south. The ranges were separated by a tectonic depression known as the Mesaoria. In the Quaternary, this depression was filled with alluvia. Today, it is a flat lowland (denivelations up to 100m), about 130km long and 24–48km wide. Two thirds of the island is covered by mountains. The Karpason Mountains (the highest point of which is Kiparisovounos – 1019m a.s.l.) mainly consist of Jurassic, Cretaceous and Tertiary limestone and flysch, whereas Troodos (where Cyprus' highest point is located – Olympus 1951m a.s.l.) has a geological structure typical of alpine systems. Its centre consists of a crystalline core, built of plutonic and volcanic rock (gabbro, diabase, serpentinite) covered and surrounded by Mesozoic sedimentary rock, from which a high plain located in the southeastern part of the island has been formed. This high plain becomes a coastal plain as it reaches the sea.

Cyprus' climate is semi-tropical Mediterranean. The summer (VI–IX) is hot and dry and the winter (XI–III) can be described as benign. The average annual temperature is about 19$^{o}$C (12$^{o}$C in mountainous areas). The average temperature in January is 10–12$^{o}$C (ground frosts occur in the mountains) and in August 26–28$^{o}$C (max. temp. above 45$^{o}$C). About 90% of precipitation occurs during the winter. Between VI and IX, rainfall is very scarce and the average annual precipitation is about 500mm. The lowest readings (about 350–400mm) were recorded in the central part of Mesaoria, which is cut off by mountains. The highest readings (up to 1000mm) were taken in the Troodos Mountains, where snowfall also occurs.

All of the island's rivers are periodic (Pl. 1: 1), flowing for only a few weeks a year. The most substantial are Kouris, Geryllis and Diarizos, while the longest are Pediaios and Gialias. There are no natural freshwater lakes, but four bodies of salt water do exist. These conditions result in a severe lack of fresh water. Water distribution is based on artificial retentive reservoirs and the wanton exploitation of groundwater, which subsequently lowers its level. Water management difficulties occurred on the island even in ancient times (Kathijotes and Azina 2014).

Brown soil is encountered in the forested parts of the Troodos Mountains, whilst in the Karpason Mountains rendzic leptosoil dominates. In the eastern part of the island, terra rossa soil is the most prevalent and the Mesaoria is dominated by fertile alluvial soils.

The island belongs to the Mediterranean phyto- and zoogeographic zone, although its flora and fauna have been massively anthropogenically altered. Maquis occurs up to 500m a.s.l., although it is replaced by a local variation, 'frigana', on less fertile soil. There is evergreen forest above 500m a.s.l., but it only covers 13% of this area. The dominant species are pine, stone pine and oak. In its highest parts, areas of natural cedar wood have been preserved. Above 1850m a.s.l., high-mountain meadows occur. As far as the animal world is concerned, the most abundant fauna is avifauna (40 species of migrating birds). Mammals and reptiles are scarce.

## Aims and methods of study

Geoarchaeological research was carried out between 29th September and 10th October 2014. It consisted of a geomorphological prospecting of the Paphos region and a geophysical examination of the Agora.

The aim of geophysical research was to investigate the economic infrastructure of the ancient agora, whilst the aim of geomorphological prospection was to determine the natural processes that modelled the area in ancient times.

The initial results of the geomorphological study of the morphology and sediments near Paphos and the geophysical research on the Agora are presented in this article.

## Geomorphological survey

The surveyed area was the archaeological site known as the Archaeological Park in Paphos, as well as its surroundings. Several route sections were completed and diving in several locations around the peninsula allowed the research team to identify underwater structures located in the coastal area. During field examination, the morphology and alluvia of two valleys were surveyed. One of the valleys surrounds the peninsula from the north (Koskinas), whilst the second does likewise from the south (Ezousas). The variations of structure and landform type were also determined in the Xeros and Diarizos basins on the southern slopes of the Troodos Mountains, which is an alimentary area for rivers flowing towards Paphos.

The Paphos region has a very simple geological structure. It is made up of marine terrace sediments uplifted in the Quaternary (MIS – marine isotope stage; age of terraces according to Zomeni 2012), which are dissected by river valleys with terraces and alluvial insertions (Pls. 1: 2, 2: 1). The crystalline core (an ophiolite sequence) of the Troodos Mountains is located about 20km to the northeast. About 5km from the coast, the rocks of various formations belonging to the Mesozoic cover disappear under Quaternary sediments to create a massively karstified carbonate rock basement.

Certain edges of lower marine terraces were exploited as quarries in ancient times (Pl. 2: 2) and their rough, karst surfaces were artificially levelled (Pl. 3: 1).

The karstified carbonate rock bottom also forms a contemporary abrasive platform on significantly long segments of cliff coast (Pl. 3: 2).

The karst depressions, presumably from the Tertiary, are often filled with terra rossa. One of these holes was dug up during 2014 excavation work on the Agora.

The periodic rivers are able to transport coarse material. Ezousa alluvia in the estuary section can be divided into two parts: fine-grained (located in its lower part) and coarse (located in the upper) (Pl. 4: 1). This change of sedimentation type may be connected to anthropogenical environment changes, such as deforestation, change of land use etc. However, this hypothesis has yet to be confirmed and still requires future detailed examination. These contemporary alluvia can be seen as a typical result of anthropogeny, as they consist of a mixture of coarse, clastic sediments and anthropogenic rubbish (Pl. 4: 2).

Similar alluvia occur in the Koskinas periodic river, the estuary of which is located north of the cape of Paphos (Pl. 5). It transports coarse, clastic material to an underwater abrasive platform that can be seen on images from Google Earth. These sediments are transported south along the shore line. When the shore line reaches the cape, at the site of the ancient town of Paphos, the sediment accumulates in the bay to its north (known as Fanari beach nowadays). This process may have led to the disappearance of the bay and transformation of the bay into mainland. In ancient times, the bay may also have been used as a harbour (Pl. 6).

The accumulated algae layers on the beach (Pl. 7), which are meshed with clastic beach sediments, allow us to date this process. Beach sediment typically contains organic interbedding, which can be used in radiocarbon dating. An examination of this material can determine the rate and timeframe of the bay's shrinking and this research (e.g. geological drilling in the beach area) should be conducted as the next stage of the survey.

## Geophysical research

### *GPR research area location*

One of the most popular research methods used in archaeology is the non-invasive identification of a site. This can lead to highly fruitful collaboration between prospecting and excavating archaeologists, if data exchange occurs in both directions (Neubauer 2004, 160).

A ground-penetrating radar survey was carried out on the Agora of the ancient city of Nea Paphos. The area of research covered *c.* 100m$^2$. However, due to the fact that pre-existing obstacles were blocking the profiling route (trenches, shrubs, large stone blocks, ditches), this area was reduced to about 80m$^2$. The survey was conducted along two measuring routes. On the N-S axis, 95 measuring lines were placed, whilst 51 were placed on the W-E axis (Pl. 8).

The purpose of this research was non-invasive reconnaissance in order to determine the location of architectural structures belonging to the ancient agora.

Down to a surveying depth of about 2m, the ground had been formed contemporarily and contained sand and limestone boulders up to 0.5m in diameter (possibly building material). Due to high wave attenuation, both the interpretation of these results and the locating of massive objects remains problematic. A solid, rock roof (highly karstified) appears at approximately 2m (Pl. 9: 1).

### *Method description*

The GPR method is classified as a radiowave method, as it uses electromagnetic radiation. It is based on the variation of a dielectric constant factor in its medium. It is a non-destructive technique used in surveying the continuity and homogeneity of ground. The name is abbreviated to GPR (Ground Penetrating Radar) and signal frequencies range from 10MHz to several GHz.

The surveying appliance consists of a central unit and two antennas – one that transmits and one that receives (Pl. 9: 2). The transmitting antenna sends an electromagnetic signal, which is reflected, refracted or suppressed. The reflected wave is registered by the receiving antenna. The distance from an object is calculated on the basis of the time elapsed between the sending of the signal and the receiving of its echo.

A 400MHz antenna is able to receive usable information from up to 8m below ground level, depending on the geological structure of the ground and the measuring conditions. A 1GHz antenna allows a survey of up to one meter below ground level to be conducted and provides a 1cm resolution. The conditions required to be able to collect data involve an existing contrast of dielectrical constant values between the medium and the surveyed object (Karczewski 2007).

A 250MHz antenna has also been used on similar sites, for example in the Classical Greek cities of Elis and Mantinea in the Peloponnese (Moffat *et al*. 2015) and when seeking structures (Neubauer *et al*. 2014).

The survey was conducted by moving both antennas along the profile. The results of the examination come in the form of an echogram (wave image), which displays the internal structure of the ground (Pl. 9: 2).

*Work range and methodology*

During the survey, a GPR device manufactured by the MALA ProEx company was used. The device was equipped with a 500MHz shielded antenna. The transmitter and the receiver were connected by fibre-optic cables and controlled via a laptop computer (Pl. 9: 2). The software used during the survey was GroundVision 2.0.

In order to achieve a detailed image of the subsurface layer, the following parameters were applied: 1. sampling frequency of the signal received – 14,050MHz; 2. samples – 506; 3. per time – 35.9n; 4. distance between tracks – 1m (N-S) and 2m (E-W).

The GPR profile lines were driven parallel, 1m apart from each other in the N-S direction and 2m apart in the W-S.

The GPR data was processed using Reflex software. The data processing sequence was as follows:

Move start time

This is the first procedure, during which a static correction in time direction is achieved. It allows a proper timescale representation.

The beginning of the signal is set by moving the scale to the reading of the first arrival (start time value).

Substract DC-shift

This option allows a 'zero mean' to be established through the subtraction of an existing time constant shift. As a filter parameter, two time values (1.time and 2.time) must be entered. Within this time range, the mean is calculated for each trace, which is subsequently subtracted from all samples of each trace. It must therefore be guaranteed that the mean value in the corresponding time range matches the shift you wish to eliminate.

This procedure was used before the gain function.

Background removal

This function helps to calculate the average trace of the whole echogram in terms of both time and distance. The average value is subtracted from each registered track. The goal of this procedure is to remove the noise of the electronic signals.

Bandpass frequency

This procedure involves the application of a bandpass filter to the readings. It is generally carried out manually when monitoring the frequency spectrum. The process allows frequencies containing random noise to be removed. The signal spectrum is multiplied by the filter value.

Gain function

The application of this feature represents a very important stage of signal processing. The signal amplitude lowers as recording time increases. However, due to the numerous external phenomena that alter the signal, the amplitude is enhanced.

Average xy-filter

This filter calculates the average of a selectable xy-area for each time step. The average is taken using both a number of different traces (parameter no. of traces [x]) and a number of different samples (parameter no. of samples [y]). This filter method suppresses trace and time dependent noise and acts as a lowpass filter for both x- and y-(time).

Div. Compensation

This filter acts on each trace independently and compensates for geometricial divergence losses.

*GPR results survey*

The profiles were taken using a site grid as a basis. The largest number of anomalies occurred in the northern part of the Agora. Clearly visible anomalies can be noted at the site where the *crepidoma* is located (Pl. 10).

The main factor taken into consideration during analysis was whether anomaly depth exceeded the accumulation layer. The depth axis was set for dry lithosol and the echograms' maximum reach was 2–2.5m. The first 0.4m of the accumulation layer consisted of homogeneous ground, whilst the following layer was of a medium density in which thick rubble predominantly appeared). Only the most permanent structures, such as stone construction remains, could be seen distinctly and have their depth calculated.

## Summary

The GPR survey was carried out in the Agora area of the ancient site of Nea Paphos and resulted in the identification of various independent structures lying underground. In the E-W profiles, several anomalies distinct from the rest of the signals can be observed. One of these is an anomaly situated between the first and second to fourth metre, which occurs on practically all of the profiles presented (Pl. 11: 1). Another anomaly is located between the 10th and 18th metre. As with the previous example, it continues (with very infrequent interruptions) throughout the first 60m. A distinct signal is also present at the end of the profile trace. Between the 80th and 86th metre, an anomaly reaching beyond a depth of 1.5m can be distinguished.

The entire Agora area abounds with anomalies derived from structures lying underground. These are probably the basements and lower parts of the walls of the buildings that presumably once existed here. The profile located 31m from the 200/100 line is worthy of special consideration due to a distinct signal that is visible here. The signal is present in the first three metres and reaches below a depth of two metres (Pl. 11: 2).

The N-S profiles indicate similar anomalies in terms of parameter. In the first two metres, an anomaly reaching up to two meters in depth is visible. This continues with infrequent interruptions across the whole Agora. Another anomaly is also visible on the opposite side of the area surveyed. As with the previous example, it runs continuously (albeit with rare interruptions) across the whole Agora. In the middle part of the site, many anomalies can be seen that are undoubtedly indicative of the underground structures present in this area. They can be seen as a continuation of structures uncovered in three ongoing excavations in Trenches I, II and III.

Finally, it should be noted that the kind of device used for this research (the GPR Mala ProEx with a 500MHz shielded antenna) is appropriate for such tasks and can be used successfully on similar sites and in similar climactic conditions.

## Conclusion

The geomorphological prospecting of the Paphos peninsula and its surrounding area has allowed us to determine the set of morphogenetic processes that modelled the coastal plains in this part of Cyprus. A research hypothesis explaining the shrinking of the bay and the decline of the harbour north of the cape of Paphos has also been formulated.

Future research will be focused on two main areas:

1. Drilling in the beach area in order to reveal the stratigraphy of its sediments. These results can serve as the basis for a time model of coastline changes north of Paphos.

2. Geomorphological mapping and dating of the Koskinas river alluvia in order to determine the periods of most intensive material transport into the delta, which led to the transformation of the bay north of Paphos into mainland.

The geophysical survey on the Agora in Paphos has allowed us to come to the following conclusions:

1. Many anomalies are visible underground.
2. The shielded antenna of 500MHz is suitable for this kind of survey.
3. Made ground areas within the Agora are difficult to interpret.

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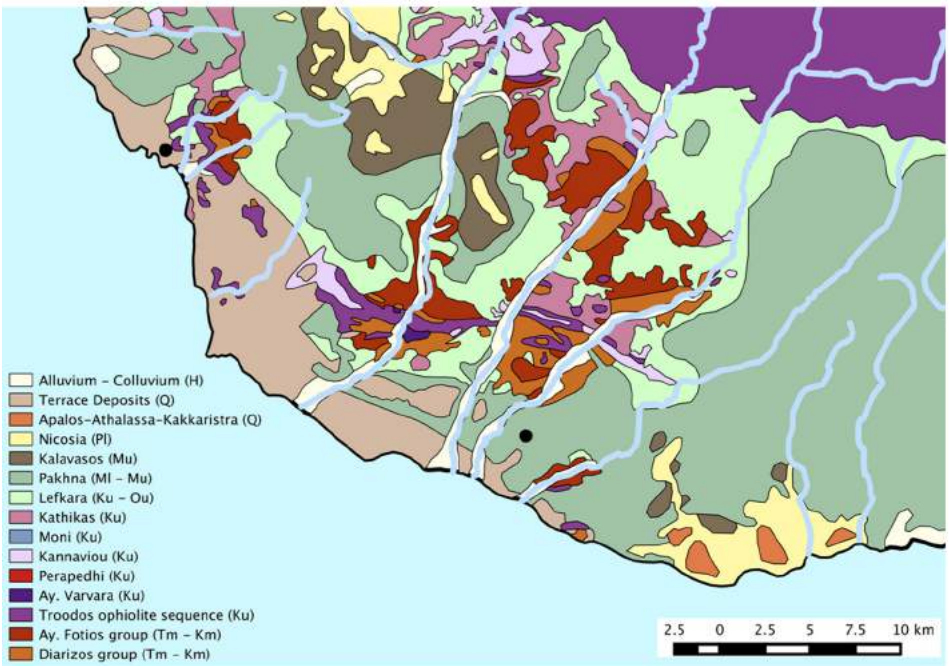


2

Pl. 1. 1 – Braided alluvial plain of a periodic river in the Troodos Mts. Photo by T. Kalicki; 2 – Geological map of SW Cyprus. Reproduced. Courtesy Geological Survey Department in Cyprus

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Pl. 2. 1 – Uplifted Quaternary marine terraces (MIS 5–7 and MIS 9) in Paphos. Photo T. Kalicki; 2 – Edge of marine terrace anthropogenically transformed by an ancient quarry. Photo by T. Kalicki

1

2

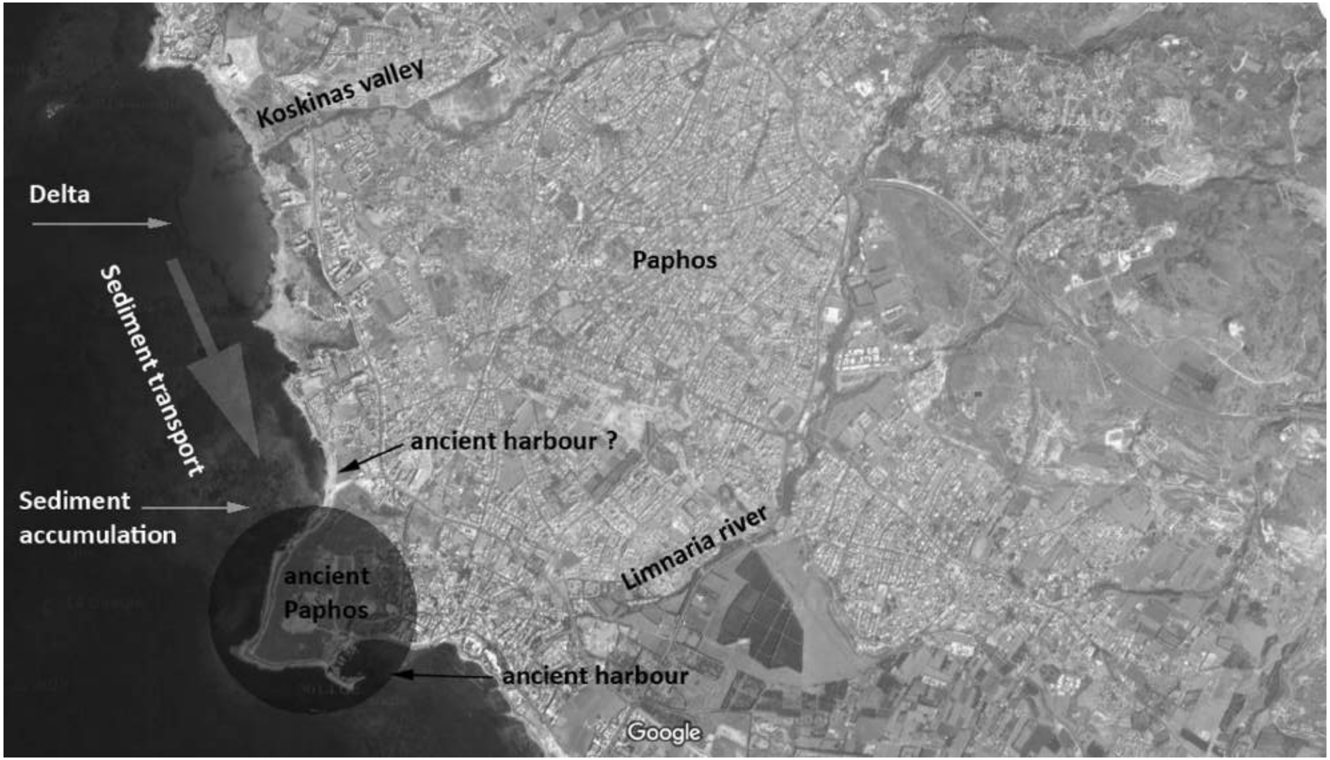
Pl. 3. 1 – Karstic surface of naturally and anthropogenically levelled limestone. Photo by T. Kalicki; 2 – Karstic depresions in limestone on an underwater abrasion platform. Photo by S. Chwałek

1

2

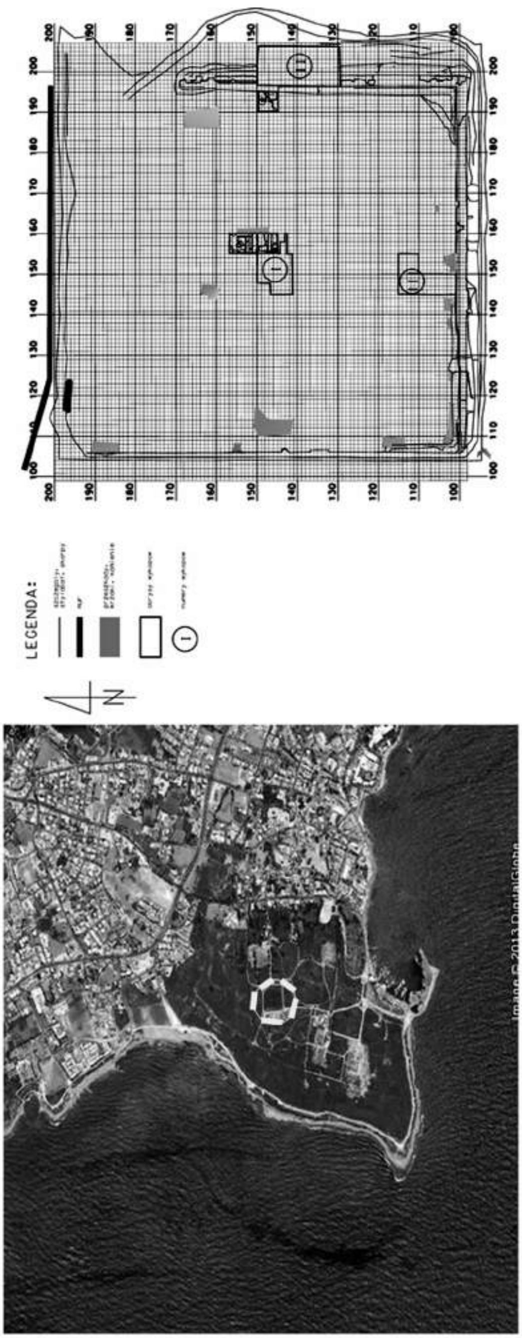
Pl. 4. 1 – Bipartite alluvia in the lowest section of the Ezousa river valley. Photo by T. Kalicki; 2 – Present-day alluvia of the Ezousa river – gravel and boulders mixed with anthropogenic rubbish. Photo by T. Kalicki

Pl. 5. Coarse alluvia of the Koskinas river in its lowest section. Photo by T. Kalicki




Pl. 6. Model of processes which led to the disappearance of the bay north of Paphos. By T. Kalicki on Google Earth image

Pl. 7. Accumulated algae layer on the sandy beach. Photo by T. Kalicki




Pl. 8. GPR research area location. By S. Chwałek and Ł. Bąk on Google Earth image

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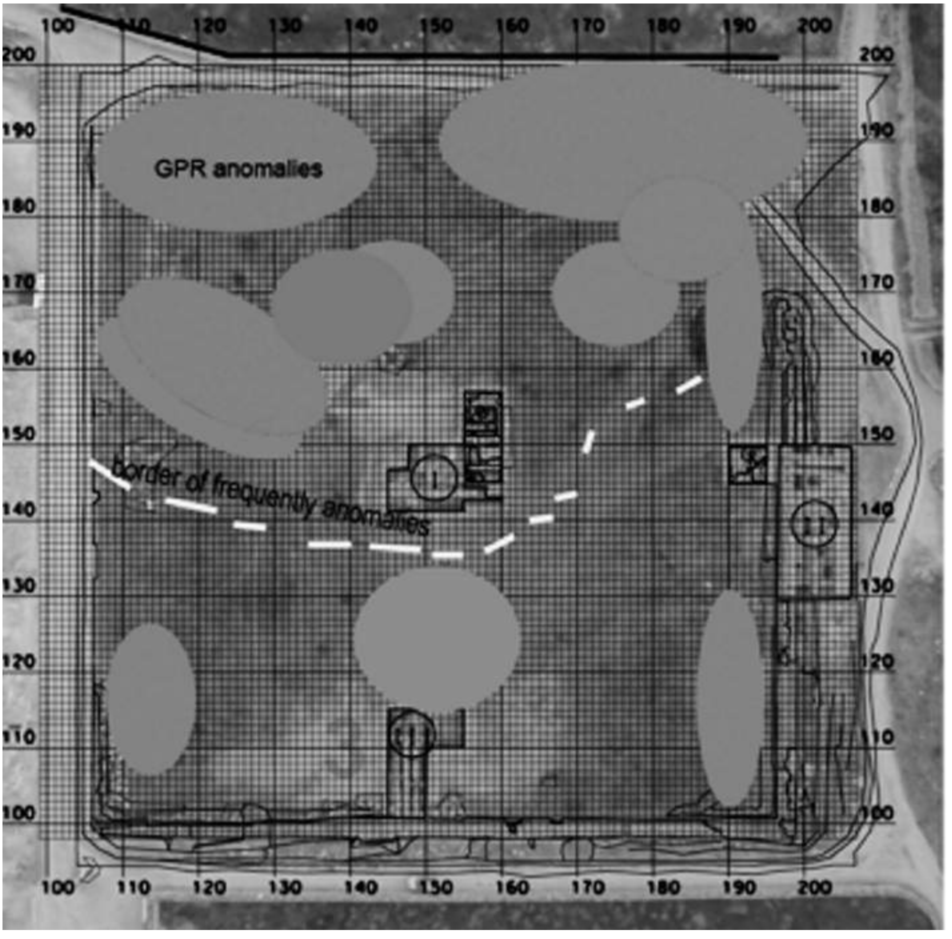
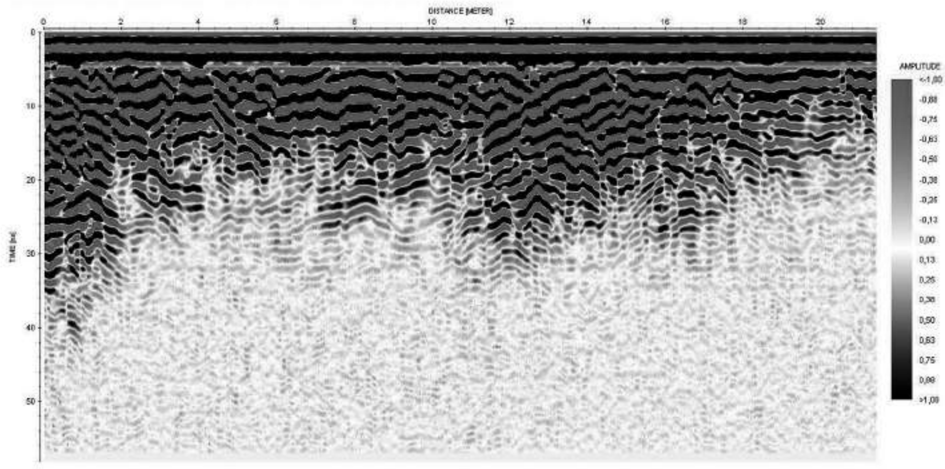
Pl. 9. 1 – Made ground on the site. Photo by T. Kalicki; 2 – GPR surveying of the site and the surveying appliance. Photo by R. Słaboński




Pl. 10. Map of the Agora with anomalies. By S. Chwałek and J. Krupa

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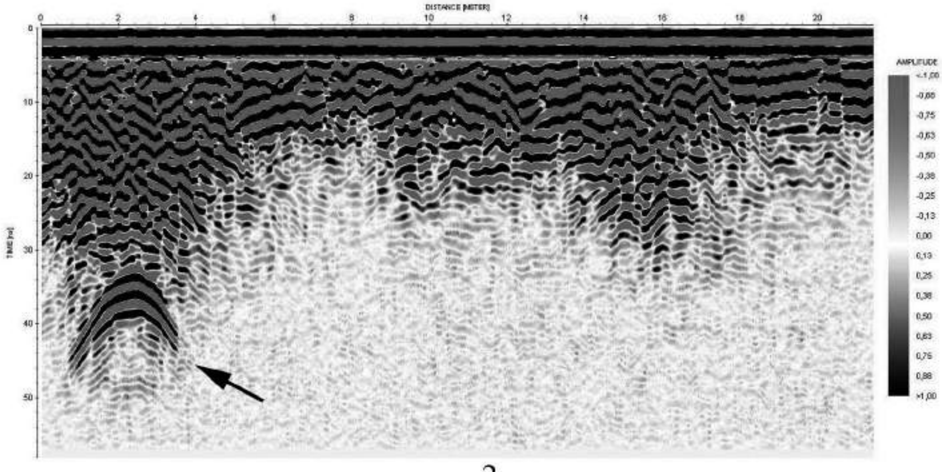


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Pl. 11. 1 – Radar profile of anomalies, E-W direction. By S. Chwałek and J. Krupa
2 – Radar profile with very clear anomalies, E-W direction. By S. Chwałek and J. Krupa

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# THE SYMBOLIC MEANING OF THE ACORN – A POSSIBLE INTERPRETATION

**Abstract:** *The acorn is a very popular literary and decorative motif in Greek and Roman culture that was used by many ancient authors to symbolise fertility and the possibility of creating new life. It was used as a decoration with this significance on many everyday objects, such as vessels and jewellery. The acorn was also very popular as a shape for the counterweights of Roman balances. On this group of objects, it is possible that the acorn symbolised the gods, who ensured the fairness of transactions between sellers and their customers. The gods used may have been Zeus, Hermes or Athena, with the latter being the most likely to appear.*

**Keywords:** *Counterweights; acorn; symbols of fairness; Athena*

## Introduction

The question of the symbolic meaning of the acorn in antiquity was raised when Professor E. Papuci-Władyka[1] and me were working in preparation for the publication of a small bronze steelyard found during season 2011 of the Paphos Agora Project,[2] run by the Jagiellonian University of Krakow archaeological expedition in Paphos, Cyprus (Papuci-Władyka and Wacławik forthcoming). A small, acorn-shaped counterweight (illustration

[1] I am deeply indebted to Professor E. Papuci-Władyka, the project Director, for her help and all of her suggestions during the preparation of this paper.

[2] The project grant is from the Narodowe Centrum Nauki (National Science Centre, Poland), grant OPUS NCN 2011/01/B/HS3/01282 (years 2011–2014) and MAESTRO NCN 2014/14/A/HS 3/00283 (years 2015–2019). See Papuci-Władyka *et al.* forthcoming.

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on the cover) was found with this steelyard. The device and the counterweight can be dated to the 1st century AD through analogies to other examples from the period. During the study of these objects, an anomaly concerning the use of the Roman pound as a weighing unit was discovered; the calculated weight of one operating unit from the Paphos balance was different to that of the Roman pound (*libra*) generally used across the Roman Empire. A few possible explanations have been put forward (Wacławik forthcoming), but that of a new weighing unit, known as the 'Cypriot pound', is by far the most probable. Another possibility is that the owner of the steelyard was cheating his customers by using an invalid device. This idea raises the question as to how the fairness of transactions could have been guaranteed, as well as questions concerning the symbolic meaning of the acorn itself.

## Steelyard – the rule of use

Ancient Romans called scales *trutina*, a term that was used both for pan scales (*libra*) and the steelyard (*statera*). The functioning of a steelyard, also known as a 'Roman balance', is based on the very simple principle of bilateral leverage (counterweight), which was described in antiquity by Aristotle (*Mech*. 853b) and Vitruvius (*De arch*. 10.3.4) among others. The beam of the steelyard is divided into two arms of unequal length which flank the suspension point, called the *fulcrum* (Pl. 1). The point itself is determined by one of the hooks used for mounting the device. On the shorter arm, which ends in an opening, the items being weighed were attached to a chain. The second, longer arm was marked with one or more scales and a weight was attached to it that acted as a counterweight to the load being weighed. The mounting of the counterweight was movable, allowing it to slide along the arm. This solution made it possible to find a point where the balance was in equilibrium. Any scale etched on the beam was related to the hook suspending the device. By shifting the centre of gravity, objects with a mass greater than that of the first scale could be measured without additional complications, such as changing the mass of the counterweight (weight) or other modifications (Hill 1952, 52). In some cases, an additional weight was suspended on an unused hook, which allowed the other scale of the balance to be used. The steelyards may have been used to weigh not only solid objects, but also powders and liquids. Weighing these final two was made possible through the use of vessels that were suspended on the appropriate side and then filled with a non-solid substance (Tarbell 1909, 139; *BM Guide* 1920, 165).

## Shapes of the counterweights

As mentioned above, the counterweight is crucial to the functioning of the steelyard. Many such artefacts are stored in museums and most (as is the case with steelyards) have never been studied or published. Sometimes their discovery appears in archaeological reports, purchase lists, documents made by museums (e.g. Bates 1917, 100; Deane 1924, 349; Mellink 1964, 161; Cook and Blackman 1964–1965, 60) and in museum catalogues (Walters 1899, 359–360), but most have not even been published in this way. In many cases, information concerning their discovery context is not available or the artefacts come from private collections of which the context is unknown. A very preliminary typology of steelyards has been proposed by N. Franken (1993), who has also studied Roman and Early Byzantine figural counterweights (Franken 1994).

Counterweights already known to the community of researchers may be grouped into a few types distinguished by shape. The first group could include simple, geometric solids, such as spheres, oblate spheroids and tetrahedrons (Michon 1918, 1229; Papuci-Władyka and Wacławik forthcoming). The second might consist of the shapes of everyday objects such as amphoriskoi and medallions with the head of Medusa (Michon 1918, 1229). The third type could contain busts of gods (Michon 1918, 1229), mythical creatures and humans (Michon 1918, 1229). In terms of humans, it was very popular to portray common people, such as boxers (inv. no. P&EE 1856.7-1.5091; British Museum 2014a), philosophers (inv. no. P&EE 1934 12-10 1; British Museum 2014b), women, youths and rulers, including emperors and empresses (Zahn 1913, 10; Megaw 1956, 13; Franken 1994). The final type may be made up of 'natural shapes', such as animal and floral presentations, for example the head of a ram or wolf (Michon 1918, 1229). Interestingly, most specimens of the fourth type are counterweights in the shape of an acorn (Papuci-Władyka and Wacławik forthcoming), which was sometimes also used with a pan scale (Tarbell 1909, 140; Michon 1918, 1226). It seems that this shape was quite popular from the 1st century BC to the 2nd century AD (Papuci-Władyka and Wacławik forthcoming) before it was later replaced by bust-shaped counterweights, with the most common being those of Athena/Minerva, emperors and empresses (Vermule 1960, 14; Franken 1994, 116).

## The acorn in ancient culture

Why did the ancients use the acorn as a shape for a counterweight? The acorn itself is no nicer than any other tree fruit, but other tree fruits were not registered. If its aesthetic value was not the key factor, why did the ancients decide to choose this nut?

In ancient sources, the acorn is mentioned only a few times, usually in relation to the oak and the possibility of creating life, as is the case in the poem of Ovidius (*Met*. 12.316), Lucretius (5.925) or Vergilius (*G*. 1.1). Very interesting information pertaining to it can be found in *Description of Greece* by Pausanias (8.42.6), in which he mentions the prophecy of Pythia to the Azanian Arcadians who dwelt in Phigaleia, named by the oracle as *βαλανηφάγοι* – the acorn-eaters – to emphasise their wildness, primitivity and poverty. It is quite possible that Pausanias simply adopted the *Motivgeschichte* created by Diodorus Sicilus in *Library* (9.36.2) and Plutarch in *Caius Marcius Coriolanus* (3.3), both of whom used the term in relation to the inhabitants of Arcadia. Plutarch also mentioned the prophecy of Apollo to the Arcadians, as well as the fact that garlands of oak leaves were used as an offering to Jupiter, the guardian of the city. In the following sentence, Plutarch describes the sturdiest of oaks and the beauty of its fruits, as well as its ability to feed people and other properties (Plut. *Cor.* 3.4). This same usage also appears in a few of his philosophical texts, such as *De esu carnium* (1.2), *De communibus notitiis adversus Stoicos* (35) and *Quomodo adolescens poetas audire debeat* (6). A similar point was made by Atheneus in *The Deipnosophistai* (2.35), in which he described the acorn as the fruit of oak trees. Additional information of great interest can be found in the *Athenian Constitution* (Aristot. *Const. Ath*. 64.4), in which we read that acorns were used to choose the jurymen called *δικαστηρίου*.

Ancient Greek authors used three separate terms to refer to the acorn: *ἄκυλος*, *βάλανος*, and *δρύκαρπον*. The first two have already been identified and are undoubtedly related to oak species. Ruxer (1938, 115), following Kuruniotis' suggestions, assigned *βάλανος* to *quercus robur* and *ἄκυλος* to *quercus ilex* and the *quercus robustissima. Quercus ilex* was quite popular, especially on Cyprus, as a model for ancient jewellery and metalwork (Ruxer 1938, 115). Horizontal grooves on the cupule and an oval-shaped pericarp are both very common in representations of this species (Ruxer 1938, 115). It seems that the counterweight of the Paphian steelyard is an example of the *ἄκυλος* type. A further reason to make this assumption is that *quercus* *ilex* is a species native to the Mediterranean region (Weber and Kendzior 2006, 184).

As mentioned above, acorns were used as a decorative motif in jewellery. Gold, acorn-shaped pendants and beads were very popular in the Orientalising period and from the Archaic to the Classical period (Myres 1899, 35; Monaco 1907, 108; Ciupis 2014, 35, 39–41, 44). It is interesting to note that they do not appear on jewellery from Hellenistic and Roman times (Higgins 1980; Ciupis 2014). An oak wreath dating to approximately the mid-3rd century BC is known from a cist grave at Potidaea in ancient Kassandreia (Ignatiadou 2011). It is made of golden oak leaves and flowers, but acorns are not present. The latest items of jewellery presenting acorns are oak wreaths from the royal tombs at Vergina: the first comes from Tomb II (probably of Phlip II) and the second from Tomb III (known as the 'Prince' Tomb) (Hammond 1991, 76; Tsigarida 1994, 93, 97).

A collar of cereal fringed with acorns decorates the neck of a statue of the Ephesus Diana in the National Museum of Naples (inv. no. 6278; Monaco 1907, 27; MANdN 2014). It is a Roman copy of an Ephesian polymastic *xoanon* made of alabaster and bronze. On this statue, acorns are once again used to symbolise fertility alongside other symbols, such as breasts and cereal. A similar significance is indicated on an Etruscan tripod-stand that bears an acorn from the British Museum (Walters 1899, 85). On this Archaic period artefact, squatting frogs, lotus flowers, and shells may also be seen, all of which relate to fertility (Cirlot 1971, 114, 193, 293).

As a decorative motif, the acorn has also appeared on vases made from both glass and clay. A cinerary amphora from the National Museum of Naples, discovered in one of the buildings near the Street of Tombs in Pompeii may be included in this category (Monaco 1907, 108). It is made of blue glass covered with a white bas-relief presenting a winery scene with Cupids at play and many natural ornaments. Acorns may be seen in the detailed decoration alongside birds, flowers and fruit. As for ceramic vases decorated with the acorn, the Attic black-figure Panathenaic amphora from the Detroit Institute of Arts must be mentioned (Robinson 1951–1952, 65). It dates from the second quarter of the 4th century BC and is surmounted by an acorn-shaped knob above a raised fillet.

The acorn also appeared on other artefacts, sometimes in connection with oak-leaves or wreaths. One example is the wooden sheath of an iron sword covered with bronze reliefs from the British Museum. Below a scene of Tiberius sitting on his throne welcoming Germanicus is a medallion with the head of the emperor surrounded by three bands of oak leaves and acorns (Walters 1899, 157). Another medallion, also from the British Museum and plated with silver (probably part of a cuirass), bears the bust of a beardless Germanicus (Walters 1899, 351). Below the medallion is a hinge, which has a flat piece ending in two acorns attached to it, with an oak leaf in between. Acorns were often present in combination with oak wreaths on oil lamps. It seems that this motif first appeared in the 1st century BC in the western part of the Roman Empire (probably Gallia) (Bailey 1988, Q1491, Q1533) and later, in the 1st century AD, spread to the southern provinces of Africa Proconsularis/Byzacena (Bailey 1988, Q1688) and the eastern provinces of Cyprus (Bailey 1988, Q2375, Q2485–Q2492) and Cilicia (Bailey 1988, Q2623), where this motive was used from the mid-3rd century AD onwards (Bailey 1988, 309, 320).

Acorns did not appear in isolation on coins and gems (Imhoof-Blumer and Keller 1899, Taf. IX: 1–X: 43, XXV: 1–27), but they can be seen with oak wreaths on the reverse of coins[3] from Kyzikos minted from the 3rd to the 1st century BC (Wroth 1892, cat. nos. 148–158), on Macedonian coins from the time of Philip V to the years following the Roman conquest (Moushmov 1912, cat. nos. 5855, 5958, 7334) and on the autonomous coins of Tomis (Moushmov 1912, cat. nos. 1710, 1733).

The Roman oak wreath, known as the *corona civica*, was also a very important military symbol (Plin. *HN* 16.3). It was presented to any soldier who saved the life of a citizen in battle and was therefore accompanied by the inscription *Ob civem servatum* (Senec. *Clem.* 1.26). It was originally made using the *ilex*, before it was replaced by the *aesculus* and finally the *quercus* was adopted (Plin. *HN* 16.5). Plutarch (*Quaest. Rom.* 93), when considering why the Romans chose this particular chaplet to give to soldiers, referred to Jupiter and Juno, the protectors of Rome, as well as to the Arcadians and their customs. Emperors such as Augustus, Claudius, Nero, Galba, Vitellius and Trajan are all depicted wearing the *corona civica* in marble busts, as well as on coins and gems (Rich 1875, 360).

## Hypothetical interpretation

All of the examples presented above show that the acorn was very popular in the 1st century AD as a literary and decorative motif on almost all types of artefacts, most commonly symbolising fertility and the creation

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[3] I am deeply indebted to Barbara Zając for her bibliographical suggestions related to coins.

of life. Other sources indicate a relation to Zeus, who was sometimes called *Βαγαίος*, or the Oaken-Zeus (Fehrle 1937, 607), symbolised in iconography by oak wreaths (Waser 1937, 732; Andrew 1966, 271). It is worth mentioning that there was a sanctuary of Zeus in Dodona, which contained a holy oak devoted to the king of the gods (Homer *Iliad*, 16.233–16.235; Fehrle 1937, 617–618; Kristensen 1960, 114). This could be an indication of why rulers (e.g. Roman emperors) chose to use a crown of oak leaves like the one discovered in the tombs at Vergina and are thus depicted wearing it (Rich 1875, 360; Waser 1937, 757). It could also be the reason why the oak wreath was struck on Macedonian coins. Finally, it is also possible that the acorn (as the offspring of the oak) may have symbolised one of the offspring of Zeus, especially on items related to trade.

Other common counterweights include those in the shape of busts of Athena/Minerva, Hermes/Mercury, Ares/Mars, Dionysus, Apollo and Artemis/Diana (Franken 1992, 218; Franken 1994, 34–44, 71, 99–101; Corti 2001, 198–203), so the acorn could also be representative of one of these deities. The most probable are Hermes (god of trade and merchants) and Athena (goddess of knowledge), who would have ensured and confirmed the legitimacy of the transaction. However, when later tradition is taken into consideration, it appears that Athena is the more likely answer. In the Byzantine period, when Christianity became the official religion, Athena symbolized Holy Wisdom (Vermule 1960, 14; Franken 1994, 105). At this time, counterweights in the shape of a bust of an emperor or empress were also very popular (Vermule 1960, 14; Franken 1992, 218; Franken 1994, 44, 96–99, 101–104; Karydas 1998, 45; Corti 2001, 204–205; Corti *et al*. 2001, 300 and *passim*). In the ideological makeup of a ruler, Holy Wisdom was conferred upon the emperor to help protect him and to allow him to reign wisely. In this way, he himself began to symbolise Holy Wisdom. Divine justice, as well as the authority of the ruler, therefore confirmed the fairness of deals (Franken 1994, 104–105). It is also worth mentioning that in the 1st century AD, when the acorn-shaped counterweight was the most popular, the beam of the steelyard was sometimes inscribed with information that the device was calibrated by a governing official (eg. Tarbell 1909, 139; Michon 1918, 1228). However, it seems that an inscription on a steelyard never appeared in combination with an acorn-shaped counterweight. This implies that such an inscription was unnecessary when this kind of weight was in use, because the acorn may have already symbolised the legitimacy of the transaction (through Athena) and no additional confirmation was therefore required. This hypothesis could explain why the ancients used the acorn as a shape for their counterweights, but further study is required to more definitively confirm this notion.

## Conclusions

The acorn had a very interesting and rich meaning in ancient culture. It was a highly popular decorative motif used on almost all types of everyday objects, as well as in prose and poems, to express both primeval wilderness, as well as fertility and the creation of life. In the iconography of rulers, it was a reference to their special relationship with powerful gods, who protected them and allowed them to rule using their divine justice. Both divine and imperial images were commonly chosen as shapes for counterweights used with steelyards in everyday trade. The relationship between the concept of a ruler and Athena, between Athena and Zeus, and finally between Zeus and the oak could be proof that the acorn symbolised Athena in iconography. For this very reason, the ancients may have chosen it to be the shape of the counterweight, as it was a guarantor (through divine power) of the fairness of transactions on the agorae and fora.

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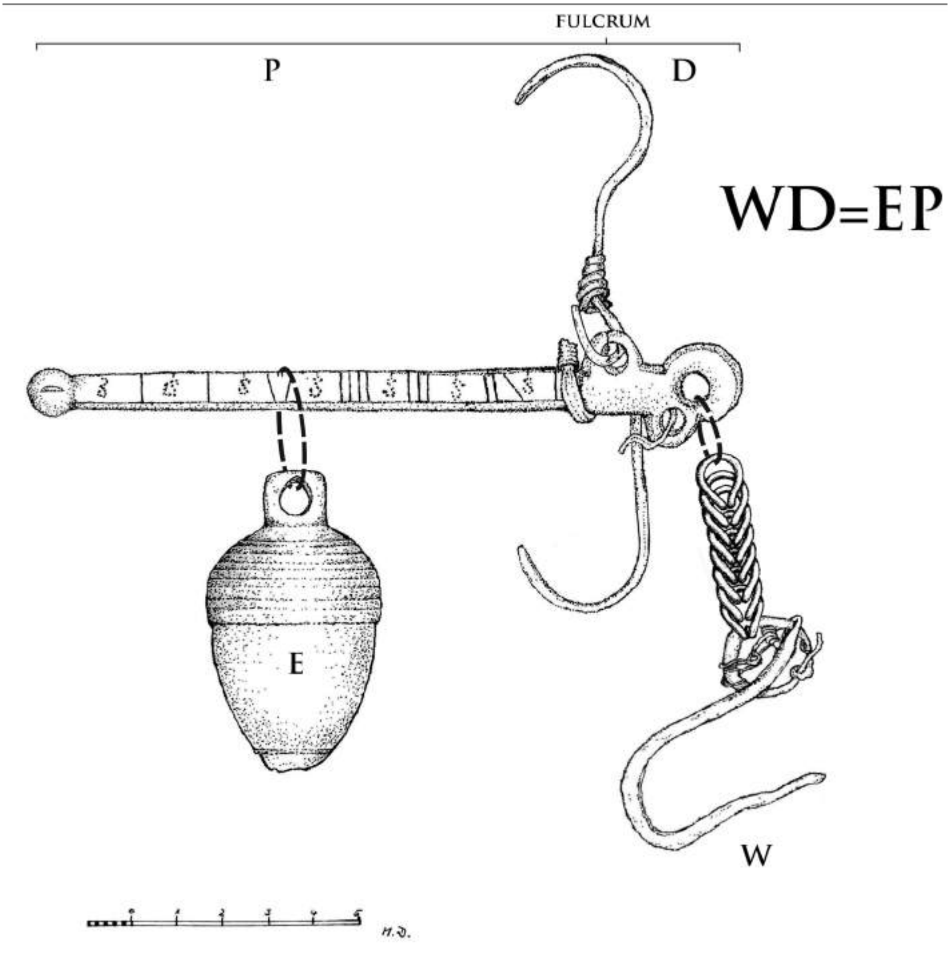


Pl. 1. Steelyard – the method of use. Diagram based on a drawing by M. Droste with a reconstruction by U. Bąk and alterations by the author