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## MARINA EL-ALAMEIN: CONSERVATION WORK IN THE 2009 SEASON

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**Abstract:** In 2009 the Polish–Egyptian Restoration Mission to Marina el-Alamein proceeded with another season of conservation work in heavily constrained circumstances. Architectural studies preceding building conservation work were carried out in House H1, where the Mission has been active over the past few seasons. It was established that the house had an inner peristyle consisting of two tiers corresponding to building floors: pseudo-Corinthian of the Marina type on the ground floor and pseudo-Corinthian or pseudo-Ionic of the Marina type on the upper floor. A similar tiered architectural decoration was noted in the incomplete peristyle (unit 4) of the Southern Baths just off the presumed Main Town Square. Work continued on clearing the chambers of the baths and accomplishing preservation, conservation and subsequently building restoration works. A marble plaque with an inscription, found previously, was subjected to conservation treatment once standard condition monitoring demonstrated progressive deterioration of the state of this object.

**Keywords:** Marina el-Alamein, House H1, Southern Baths, incomplete peristyle, pseudo-Ionic, pseudo-Corinthian, architectural studies, conservation, restoration

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In 2009 the Polish–Egyptian Restoration Mission to Marina el-Alamein proceeded with another season of conservation work, adapting the original extended program to limited circumstances caused by difficulties experienced by the Egyptian partner with timely procurement of building materials and a reduced workforce. In effect the main thrust of the work was concentrated on house H1 in the northern part of the site and the large public baths located off the south

side of the Main Town Square [*Fig. 1*]. The conservation work that was completed was done from limited extra resources that the mission was able to marshal for purchase of essential building materials.

The work in house H1 was a continuation of the mission's regular program (Medeksza 2007: 101–104; Medeksza *et alii* 2008: 71–73, 78–81; Medeksza 2010: 83–88, 94). As for the southern baths, the mission responded to a request from the SCA

to undertake emergency preservation in a complex which had been excavated to some extent by Egyptian archaeologists in 2006 and 2007 on commission for the ARCE–EAP Site Presentation Project. In

the previous season stock was taken of the complex and some restoration was carried out on the hypocaust system, the walls with tubuli and marble revetment (see Medeksza, Czerner 2011).

## STANDARD CONSERVATION AND PRESERVATION PROCEDURES

Standard procedures (reported repeatedly in reports published annually in Polish Archaeology in the Mediterranean since 1995) call for cleaning of a twofold nature to be carried out in selected areas prior to the actual conservation work. On one hand, encroaching vegetation and drifted sand need to be removed from the structures where work is ongoing or it is deemed particularly endangering to the

historical substance (as in the aboveground mausoleum of Tomb T21, which was also cleaned this season). On the other, it is frequently necessary to complete the clearing of individual units under strict archaeological supervision. In the case of the southern baths, units 6 and 7, excavated by an Egyptian team in previous years, were cleaned in 2008; now the mission's archaeologist concentrated on the partly

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### Team

*Dates of work:* 16 April–4 June 2009

*Directors:* Prof. Stanisław Medeksza, architect (Wrocław University of Technology)

*Deputy director:* Dr. Rafał Czerner, architect (Wrocław University of Technology)

*SCA representative:* Boutros Dioskoros (Marina Site Director), Ahmed Musa (Director of Conservation Affairs), Ahmed Mohammed Ahmed Amin (SCA inspector)

*Architects:* Wiesław Grzegorek (freelance), Aleksandra Brzozowska (PhD candidate, Wrocław University of Technology, Faculty of Architecture)

*Archaeologists:* Dr. Grażyna Bąkowska-Czerner (Jagiellonian University), Katarzyna Lach (PhD candidate, Jagiellonian University, Kraków)

*Archaeologist, pottery expert:* Dr. Grzegorz Majcherek (PCMA)

*Restorers (stone and sculpture):* Irma Fuks-Rembisz (Wilanów Palace-Museum, Warsaw), Piotr Zambrzycki (Inter-Academy Institute of Conservation and Restoration of Works of Art)

*Geologists:* Małgorzata Mrozek-Wysocka, Assoc. Prof. Janusz Skoczylas (both Adam Mickiewicz University, Poznań)

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### Acknowledgments

The Egyptian side was represented by the General Director of the Marina el-Alamein site, Boutros Dioskoros, Director for Conservation, Ahmed Musa, and inspector Ahmed Mohammed Ahmed Amin, to whom we are grateful and express our thanks for their assistance throughout the season. The authors would also like to thank Iwona Zych for help in editing this report.

uncovered unit 4, which needed to be studied in detail in order to facilitate an interpretation of the complex as a whole.

Architectural studies are a major part of the mission's annual program, being as they are a prerequisite for proper conservation and restoration. Cleaning under archaeological supervisions and testing in crucial areas complement these studies, helping to clarify the phasing of buildings. This season members of the mission concentrated on the two complexes already mentioned, that is, house H1 and the southern baths. The stone elements found in the baths were

examined and identified by the mission's geologist.

Standard mission procedures require continuous monitoring of the state of the ruins and regular maintenance to counter progressive deterioration. Pointing work, rebuilding and overbuilding of walls, as well as consolidation of wall tops are all measure against penetrating rainfall. For practical and protective reasons white cement is added regularly to the lime mortar in proportions of 6 parts sand to 3 parts lime and no more than 1 part white cement.<sup>1</sup> Occasional excessive use of cement not ordered by the mission results in superficial

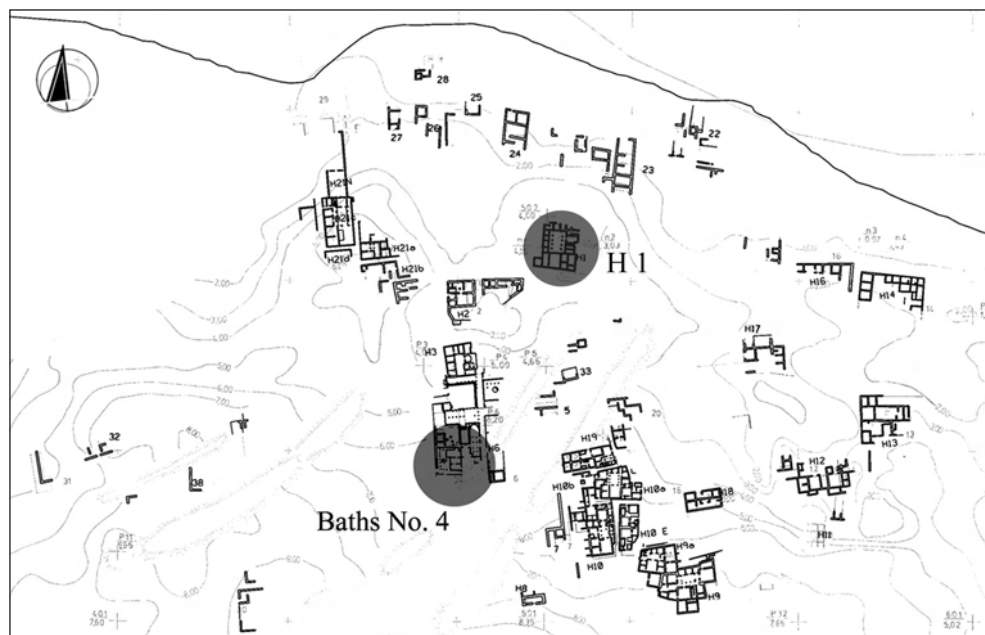


Fig. 1. Plan of Marina el-Alamein showing areas of work in the 2009 season (PCMA Mission Archives)

<sup>1</sup> Reinforcement with white cement is necessary because of the poor quality of locally available lime for building purposes. The issue has been discussed repeatedly in detail in reports published by the author in PAM, starting from 1995 through the present. It is impossible to recreate ancient building methods which involved in the case of Marina perishable materials like clay and clay-gypsum mortars and pure clay render under the lime plaster coating.

cracking. Discoloration of joints and wall tops, as well as spot occurrence of salt efflorescence on wall tops and faces is due to problems with uneven quality and varying proportions of the main components of the mortar, as well as contamination with ground salts, resulting from manual mixing (the Egyptian side has consistently rejected the use of a concrete mixer).

The stone used for restoration and building works is always original, salvaged from the various collapses on site. In specific instances architectural elements, such as column bases, drums, capitals and

their fragments, cornices, niches decorated architecturally etc., are completed in new stone by professional stone restorers.

Preservation of wall plastering has been attempted in the exedra in the Main Town Square and in the northwestern corner of room 4 of the southern baths in order to prepare proper material and technical facilities in the future. The use of clay render, which was a common procedure in antiquity, calls for protective pointing of the joints with by lime and cement-lime mortars. The cost of essential conservation materials in such cases can be prohibitive.

## HOUSE H1: ARCHITECTURAL STUDIES AND BUILDING CONSERVATION

The house poses a considerable challenge for detailed architectural phasing and consequently for building-restoration works that have to take this factor into account. The difficulty lies in having to avoid deforming the extant record of architectural changes, especially as it is impossible to display all phases in architecturally unquestioned form. Consequently, walls can be supplemented either in the vertical or the horizontal. The most important research document in this situation is a very precise architectural inventory of remains of the original architecture.

### STUDIES ON THE

### ARCHITECTURAL DECORATION

An ongoing study aimed at preparing a full anastylosis of the complex has demonstrated that the incomplete peristyle in the central part of the house had consisted of columns in the pseudo-Corinthian order furnished with classic Attic bases. These members were of considerable size

(base diameter 0.45 m). The corners were occupied by “heart-shaped” columns, that is, square pillars with two engaged columns [*Fig. 2*, plan]. Their height could not be reconstructed indisputably for lack of enough preserved elements.

The restorers had been puzzled by the original location of quite a few elements found outside archaeological contexts, occasionally reused secondarily to block doorways. These were all identical in form with Attic bases and “heart-shaped” corner piers, but of very small size (base column diameter 0.305 m). Following extensive study, these elements have been interpreted as a second peristyle and assigned to the upper floor, above the more massive ground-floor counterparts. The rather large entrance from the courtyard to the oikos and certain structural features have provided additional confirmation for this hypothesis (for an extensive discussion of this feature, see Czerner 2011). In consequence, the ground-floor



columns were reconstructed as fairly squat, considering that taken together, the two floors together could not have risen to any great height. It was assumed therefore that the height of the columns equaled eight

base diameters, which gives 3.60 m for the columns in the ground-floor portico and 2.44 m for the ones in the upper part.

It is very likely that the arrangement would have been similar to the colonnaded



Fig. 2. House H1, central peristyle before (top left) and after conservation; top right, amended plan (Photos R. Czerner; plan A. Brzozowska)

porticos of the inner courtyard in the southern baths (see below). Ancient Greek and Roman architecture offers many parallels for such designs, e.g. reconstruction of the “Palazzo delle Colonne” from Ptolemais in Cyrenaica, Libya (see e.g. Pesce 1950: 23–28, 60–62; Étienne 1960: 129–130, Pl. XXXIV; Barberini 2010).

[SM, RC]

### CONSERVATION WORK

The foundations and upper parts of the outer walls were completed this season. Another course was added to the foundation in the northwestern corner of the building. One column was raised to its full height following architectural studies on the proportions of the portico columns [Fig. 2]. The parts done in 2005 and 2006 were now raised with four more drums and topped with a capital, achieving a height of 3.45 m which is close to the theoretically reconstructed one. One of the drums had to be made anew, while more extensive

losses of the ancient substance of the capital were patched up with stone. Lime-cement mortar was used. The walls in the eastern part of the peristyle were pointed again.

[RC, WG]

### BUILDING-RESTORATION WORKS

Last season all the corners of the building had been completed, preparing the entire enceinte of the house for restoration, the walls to be raised at least 1.00–1.50 m above courtyard level. This season the effort concentrated on the northeastern side. The new parts raised over preserved relics have been made to differ from the original walls in thickness and leveling of particular courses. The original parts are uneven, reflecting the various collapses inside the house. Moreover, the foundations were built of blocks crosswise to the line of the wall. Stone blocks 0.30 m thick were lined up lengthwise in the wall structure above the footing.

[SM]

## SOUTHERN BATHS

The complex of the Southern Baths to the south of the Main Town Square was first explored during rescue excavations carried out on the site in the late 1980s. In 2004–2005, the Polish Archaeological Mission directed by Wiktor A. Daszewski embarked on clearing this part of the ruins, starting with the basilica (see Daszewski 2007: 79–83). In 2006, Egyptian archaeologists started clearing the complex again (units 4, 6 and 7) on commission from the ARCE/EAP Site Preservation project, which however was terminated since, leaving the ruins without proper protection.

The emergency preservation project started with the clearing of unit 4,

an apparent inner recreational courtyard, and reconstruction of the porticos [Fig. 3]. Emergency measures were needed in unit 6, where the hypocaust and tubuli heating installation relics were rapidly deteriorating — the ceramic tiles powdering, the tubuli shattered and hypocaust cellar vaults collapsed — and the marble floor slabs and wall revetment were in no better shape.

### UNIT 4

Unit 4 is a long irregular courtyard in the western part of the southern baths [Figs 3, 4]. It is 16.84 m long and 7.45 m wide. A thermal pool later installed in the complex (in neighboring unit 7) reduced

the width to 5.87 m (for an archaeological appraisal, see below). It comprised a roofed portico, 2.10 m wide, running around the north, west and south sides of an inner courtyard, which measures 12 m by 5.25–3.65 m. The porticoes were raised in the pseudo-Ionic order (for a study of the architectural decoration, see below). The courtyard area was paved with limestone slabs, while the floor in the

porticoes, where preserved, was a mosaic of big cubes, some even 1.5 x 1.5 cm big, laid in no apparent order [see *Fig. 9*].

[SM]

#### ARCHITECTURAL DECORATION

The unit is closed off on the east by the outer walls of four rooms, which are not in line. Porticoes lined it on the north, west and south, forming an incomplete peristyle



*Fig. 3. Plan of the units of the Southern Baths inventoried in 2009; inset, plan of the Southern Baths (with marked location of stone conservation work carried out in 2009) and location of the baths in the complex of the Main Town Square (Drawing A. Brzozowska, M. Krawczyk-Szczerbińska)*





*Fig. 4. Unit 4 of the Southern Baths, before (top) and after clearing and conservation, view from the south (Photos G. Bąkowska-Czerner, P. Zambrzycki)*

arrangement. The longest western portico had six intercolumnar spaces, the southern one only three. The northern one with the same number of columns as the southern one was shorter however, the easternmost column standing next to the wall. Altogether there were 11 columns, two of these being corner columns.

The portico colonnades were preserved *in situ* to an insignificant height, no more than 0.50–0.80 m, the remaining elements tumbled together with the plain stone blocks from the walls. The distribution of elements was updated with each uncovered layer. Most of the elements appeared to lie where they had fallen, permitting an analysis of their original

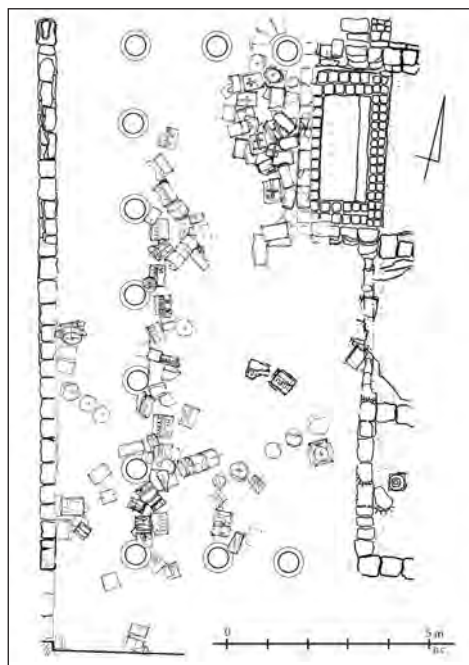


Fig. 5. *Distribution plan of architectural elements belonging to the decoration of the porticos in unit 4 (Drawing R. Czerner)*



Fig. 6. *Architectural elements lying in unit 4 (Photo R. Czerner)*

position in the portico structure and a reconstruction of its height [Figs 5, 6]. The tumble to the west of the west outer wall, next to the southwestern corner, where an entrance was identified, yielded elements of a decorated cornice and frieze from the lintel of the doorway.

The elements of columns and cornices discovered in unit 4 mostly represent the pseudo-Ionic order with a few in the pseudo-Corinthian one (for more on the Marina pseudo-Ionic and pseudo-Corinthian orders, see Czerner 2009: 2–29). The pseudo-Ionic columns have a base diameter of 0.445 m. Complete sets of column drums preserved in a few cases permitted the column height to be reconstructed at equal to seven diameters (14 modular distances), that is, 3.08 m. The shortness of these columns is justified by the considerable width of intercolumnar spaces, equaling 3.5 column diameters in the western portico and 3 such diameters in the other two porticos. Nine pseudo-Ionic capitals were preserved. The one corner capital in this set, identified as coming from the southwestern corner column, presents

a volute arrangement not evidenced so far from the site of Marina el-Alamein. A standard form of cornice decorated with dentils topped this colonnade. Almost a full set has been preserved. The ones from the long western portico preserve the Greek numbering sequence. No evidence of stone architrave blocks has come to light and it should be assumed that here, as in other buildings in Marina, wooden beams were used instead of stone elements. Stone slabs were laid on these beams under the cornice blocks.

Relics in the pseudo-Corinthian order were of smaller size with a column shaft diameter of 0.31 m under the capital, permitting the base diameter to be reconstructed at 0.34 m. The sole surviving capital is 0.305 m high. The height of these columns, assuming it was also equal to seven base diameters, would have been 2.38 m. The original position of these pseudo-Corinthian columns is not clear, but their small size and presence in the tumble of the porticos of unit 4 point to the possibility of a double-level peristyle, of which the pseudo-Corinthian elements

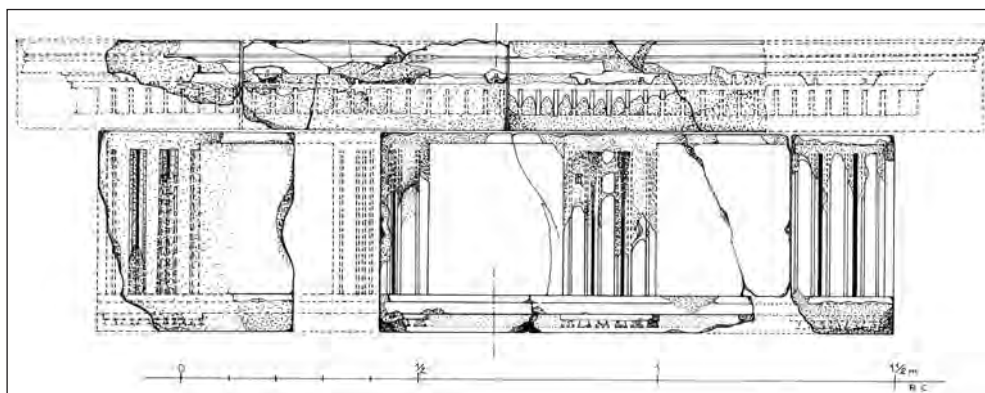


Fig. 7. Triglyph and metope frieze from the portico in unit 4 (Drawing R. Czerner)



would have formed the upper part. Such a design would also explain the relative shortness of the columns. (A similar design has been suggested for the porticos of the central courtyard of House H1, see above and Czerner 2011).

The external portal decoration mentioned above consisted of a triglyph-and-metope frieze comprising four triglyphs and three square metopes, topped by a very ornamental cornice with fine dentils supporting a series of geometrized modillions and wider, square panels [Fig. 7]. This is a form typical of Marina. The square panels were positioned above

the triglyphs and the narrow modillions in line with the center axis of the metopes. An interesting point is the possibility of having a frieze with modillions and a Doric frieze combined in one entablature. The frieze was not much longer than the entrance width, that is, 1.65 m to the doorway's 1.62 m, meaning that it could not have had an elaborate architectural frame on the sides of the doorway.

Seven blocks of a special shape indicating that they had been part of a flat arch were discovered in the courtyard by the west wall of unit 7 [Fig. 8]. Their width was equal to the width of the

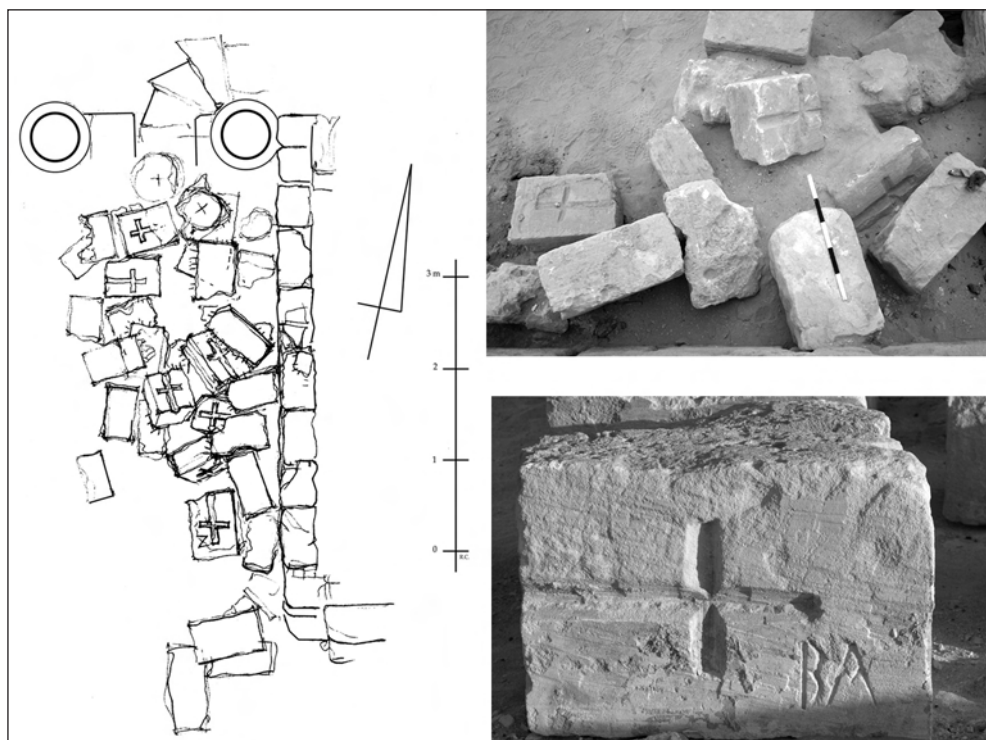


Fig. 8. Blocks from a flat arch found in unit 4: left, distribution plan; top right, the cleared tumble of blocks with cross-shaped incision for mounting; bottom right, close-up of one of the mounting sides of a stone from a flat arch (Drawing R. Czerner; photos S. Medeksza, R. Czerner).

wall; six were shaped like a trapezoid, the seventh as a keystone. The joining surfaces had cross-shaped incisions to facilitate mounting. The end of the longer arm of the cross touched on the upper surface of the blocks, forming an opening that allowed either molten lead or mortar to be poured inside, between adjacent blocks. The flat arch could have crowned a window.

[RC]

#### ARCHAEOLOGICAL EVIDENCE FROM UNIT 4

The clearing of unit 4 was completed this year (for the results of the previous season, see Medeksza, Czerner 2011: 122–125). The locus turned out to be 16.76 m long, 8 m wide in the northern part, 7.75 m in the southern part, having apparently been narrowed down in a later developmental phase (see below). There were four entrances to this locus. The main doorway (1.62 m wide) led from a street along the western side of the bathhouse, piercing the west wall at the southern end. Passing through the southern portico one reached a door in the east wall, which presumably led through a corridor to unit 8. A door in the north wall (0.95 m wide) connected the courtyard with unit 3. The fourth entrance (1.10 m wide) was situated on the opposite side, in the south wall; it was furnished with a marble threshold and opened into another room.

The courtyard was paved with stone slabs, which have not been preserved everywhere. The eastern end appears to have been narrowed down by 1.70 m for a distance of 4.75 m, starting 2.05 m from the north wall. This may have been the result of the installation of a new pool in unit 7, as indicated by a foundation rising 0.06–0.08 m above the floor level

in the courtyard and a channel (0.25 m x 0.25m), which was rebuilt. It starts from the east wall, collecting water from another pool on the opposite side of this wall, then turns behind the first column of the northern portico to continue southward where it reaches a projecting east wall. Here it collected water discharged from the pool in unit 7, running down a lead pipe (3–4 cm in diameter, 0.42 m below the wall foundation) connected with a drain joining the channel. Traces of waterproof mortar were preserved in this drain. The channel continues southward to the stylobate of the southern portico; no covering slabs were found and it is likely that they were replaced in the rebuilding with a hard lime mortar floor. The neck of an amphora from the 2nd century AD (G. Majcherek, personal communication) was found stuck into the ground and surrounded with stone slabs level with the channel by the stylobate of the southern portico; it may belong to this phase of the structure. A large piece of glass windowpane discovered by the east wall of the unit may have come from a window that had once lighted unit 7 (see above, section on architectural studies).

The southern portico featured a mosaic floor made of small irregular cubic stones. The material used was a local oolitic limestone. Most of the floor was made up of cubes made of creamy-colored limestone with brown patina; cubes of a darker color were obtained by burning a high temperature process of burning through blocks of limestone in charcoal. Separate light tesserae were made of milky micritic limestone. The floor was repaired in antiquity with fragmented marble tiles, both unshaped and original elements [Fig. 9].



In the western portico there was no surface preserved, similarly as in the northern portico. A layer of ashes 0.20 m thick was found deposited 0.10 m below the level of the stylobate. Originally, the floor here could have been a lime surface or even a mosaic as suggested by a ceramic bedding (gravel-size balls of baked clay ranging in size from 1 to 1.5 cm) observed in one spot by the west wall.

A well, 0.45 m square, was found by the west entrance to the portico [see *Fig. 9*]. It was angled with regard to the west wall and led presumably to a large cistern situated under the floor of the southern portico. A pseudo-Corinthian capital was found in the mouth of this well.



*Fig. 9. Mosaic floor preserved in the southern portico in unit 4, view from the east (Photo R. Czerner)*

Traces of burning were recorded in both the northern and western porticoes. Two small hearths (each about one meter in diameter) were found in the western portico, adding to the set of hearths already discovered by the west wall in the previous season. They were each surrounded by a ring of stones and fragments of baked bricks. Animal bones, potsherds and pieces of painted plaster were scattered inside the oven in the northeastern corner and around it.

A late phase in the occupation of the unit is represented by a low fence wall consisting of a single course of stone blocks set directly on the pavement in this part (the eastern part?) of the (southern?) portico (similar to a structure discovered by the north wall in 2008). It appears to have fenced off a small household area. A column drum and a severely eroded pseudo-Ionic capital were found next to this feature. In the corner by the east wall of this feature there was the bottom of a big vessel (approximately 0.40 m in diameter) inserted in the ground and plastered down with clay. Further south this low fence wall joined a two-course wall. To the east of this feature the pavement is missing; drifted sand accumulated in this area yielded fragments of different forms of pipes blackened on the inside, about 0.25–0.26 m long, 0.15 m in diameter at one end and 0.18 m at the other [see *Fig. 10*, no. 1]. They could have come from the hypocaust installation in unit 6. Nearby, in the corner by the east wall, yet another bottom of a big jar (0.40 m in diameter), plastered down with clay, was found inserted into the ground.

In the eastern end of the southern portico, the floor had been damaged by a falling column drum, which broke through it. Tumbled architectural elements and

blocks from the wall, as well as fragmented stucco cornices and multi-layered painted wall plaster were found throughout the unit. Undisturbed deposits of the drifted sand (0.30–0.40 m thick) trapped under a layer of rubble and debris from the dilapidated structure were investigated by the east and west walls (the center having already penetrated previously by Egyptian archaeologists). Finds included some heavily fragmented potsherds (for general remarks on the pottery from this context, see section below), roof tiles and irregular marble tiles, nails of bronze and iron. There were also two bronze coins, the better preserved one (found in sand just above the occupational level) being a coin of Constantine II as Caesar: obverse legend CONSTANTINVS IVN N[OB C] with a variant of the *Gloria Exercitus* type on the reverse with two standards between soldiers, dated to 333–335, Alexandria mint (B. Lichocka, personal communication).

Considering the evidence of the multi-layered polychromy on wall plaster fragments and the repairs evidenced on the mosaic floor in the southern portico, unit 4 must have remained in extended use for a long time. It appears to have been rebuilt at the end of the 2nd or the beginning of the 3rd century; the eastern end of the paved courtyard was reduced at this time. Destruction came in the 3rd century, the collapsing architectural elements destroying the floor in the eastern part, but also apparently sealing the part of the porticoes where the mosaic floor has been preserved. In the central and northern parts, where stone blocks and elements of architectural decoration had collapsed onto a layer of drifted sand approximately 0.15 to 0.20 m thick, several hearths installed in the porticoes damaged the floors.

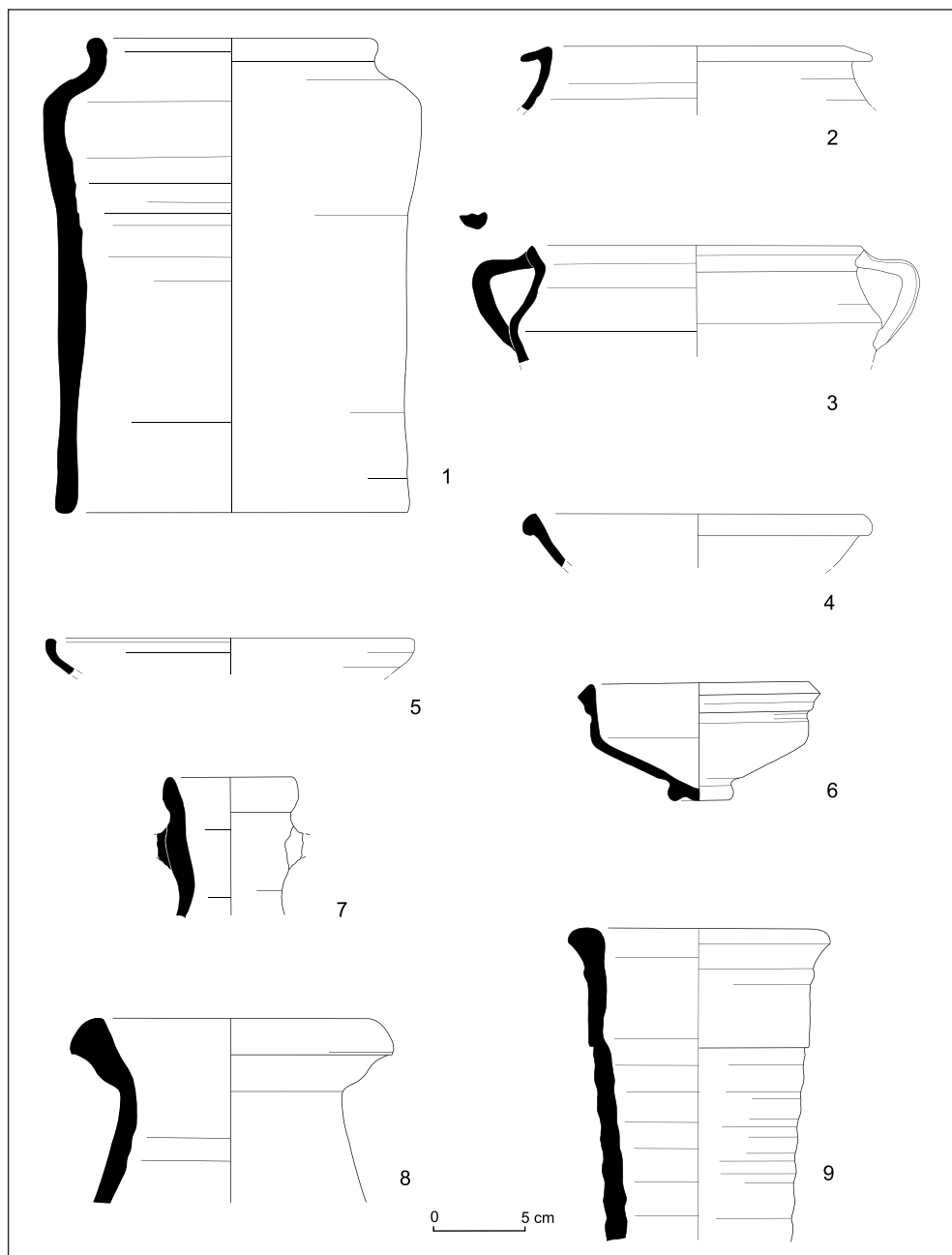
From an analysis of the evidence it seems that the southern part of unit 4 had been destroyed first, before the hearths were installed and the household areas were fenced off in the northern and eastern parts of the unit. These installations appear to have been in use still in the 4th century. By this time the polychromy had already been wasted (some fragments of painted plaster were found under the ash layer). The hearths and furnace were constructed with bricks salvaged from the next-door baths and elements of architectural decoration were used for the domestic installations.

[GB-C with MM-W]

#### REMARKS ON THE POTTERY FROM UNIT 4

Typically of Marina, most of the pottery finds from unit 4 in the Southern Baths represent a 1st through 3rd century AD horizon. Some earlier fragments were recorded, but only in the upper part of the accumulation, and should therefore be considered residual.

Generally the assemblage is rather modest. The area offered no sealed deposits and there is no significant chronological variation between items recovered from the rubble fill (a few examples from the 4th century) and those from the occupational layers, lying immediately on the pavement. The bulk of the material originated from the drifted sand layer approximately 0.30–0.40 m thick, deposited after the building had been abandoned and trapped under wall collapse. Many of the sherds are badly fragmented and abraded, apparently due to heavy transportation. Albeit their presence is typical of such deposits, their chronological value is limited. Most of



*Fig. 10. Selection of pottery finds  
(Drawing G. Bąkowska-Czerner, G. Majcherek)*

the recorded fragments appears to be dated to the 3rd–early 4th centuries AD. Context dating is corroborated by the presence of a *nummus* of Constantine II. Unfortunately, the assemblage of recorded pottery fragments does not date in any way either the end of occupation or a distinct rebuilding phases. A few fragments recovered from the hearths located in the western portico belong to the same 3rd–4th century horizon and most probably postdate the abandonment of the bathhouse, but as always, caution should be exercised with regard to these chronological premises. The unusually high presence of cooking pots, produced in a distinct Nile silt fabric [Fig. 10:2–3], should be connected apparently with these hearths.

Imported ceramics appears to be the most numerous group in the assemblages, repeating an already recognized repertoire for the site. Some body sherds of Eastern Sigillata B and of Pontic Sigillata have been recognized among the tablewares (Hayes 1985: 49–70 and 92–96). Cypriot Sigillata, the most useful chronological marker, was definitely the largest class represented by the most frequent forms P11–P12 and P40 (particularly common in the first half of the 2nd century AD, Hayes 1985: 79–91) [Fig. 10:4–5]. Several Egyptian examples apparently imitating the latter were also recorded [Fig. 10:6]. Similar forms have been already reported from Alexandria and other Egyptian sites. Commercial amphorae, although generally less accurately dated, provide quite a sound ground as far as chronology is concerned. Among the containers, which are mostly of Aegean origin, the dominant form is again the “pinched-handle” amphora (Mau 27/28) product of Cilician and

Cypriot workshops, as well as varied forms of Cretan (AC1–3) amphorae (Majcherek 2007) [Fig. 10:7]. Some examples of single-handled micaceous jars LRA3 were also identified. Likewise, several fragments of the 3rd century AD Tripolitanian oil amphorae were also found (Bonifay 2004: 95–96) [Fig. 10:8]. Quite frequent were Egyptian AE3 [Fig. 10:9] and AE4 class vessels, both forms produced in the Nile Valley, as well as those manufactured in the coastal strip and in the Mareotis region (Dixneuf 2011: 97–134).

[GM]

#### CONSERVATION WORK: COLUMN ANASTYLOSIS:

The tumbled west wall of unit 4 had been reconstructed in the previous season. Following the clearing of the unit this season, the collapsed blocks were examined and classified. Preserved parts of the courtyard walls were pointed again. The key effort, however, was the anastylosis of the pseudo-Ionic columns, begun already during the previous season. Original elements were used to put together and raise to their full height of 3.08 m two columns in the western portico and one in the northern one. A few others were raised to a height made possible by available elements [see Fig. 4]. They could not be reerected fully because of the considerable or complete erosion of drums from the lower parts. In no case were any elements cut from new blocks used at this point. Sporadically bigger losses in original pieces were filled in with stone patches. The binder used for the columns was a lime-cement mortar (6 parts sand to 3 parts lime to 1 part cement).

[RC, WG]

## UNIT 6

Unit 6 was cleared and emergency conservation was carried out [Fig. 11]. Immediate consolidation with chemical agents (PARALOID B-72) helped to stop the destructive processes at least momentarily.

A study of the heating system in unit 6 showed that the hypocaust cellar was built entirely of ceramic tiles averaging 28 cm square in size. The structure comprised a set of square *pilae* supporting the *suspensura*, reinforced with walls built of ceramic tiles between some of them [Fig. 12]. Some of these spaces were vaulted. It is not clear why this system of reinforcements was put in. Perhaps there was a need to reinforce the foundations for the *tepidarium* pool. Another and perhaps more likely reason is better circulation of heat from the *praefurnium* to other parts of the heated cellar. The heating furnaces themselves have yet to be located.

Smoke and hot air escaped from the hypocaust cellar via a system of *tubuli* inserted into the walls. This allowed for an even heating of floors and walls. The *tubuli*, as well as the marble revetment slabs were mounted with bronze and iron anchor ties, the former found in association with marble slabs and the latter with *tubuli* elements.

The floor above the hypocaust cellar consisted of ceramic tiles averaging 55 x 55 x 5–6 cm spanning the space over the *pilae* and a waterproof lime flooring over the walls and vaulted parts of the cellar. Ceramic tiles do not seem to have been used over this lime flooring, but a waterproof mortar was spread over the ceramic tiles as bedding under a marble-tile paving.

The walls had a structural core to which the *tubuli* elements were attached with iron anchors. A waterproof lime mortar

render was then applied, sometimes up to 5 cm thick, and on top of this the marble revetment kept in place with bronze ties.

Since no pools or tubs have been found in room 6, it should be interpreted as a *sudatorium*, that is, a place for dry hot bathing, like a modern sauna. A *praefurnium* found nearby could stand in support of this hypothesis, but more work is needed to verify this idea. The nearby unit 10 with relics of three pools could be suggested as a *caldarium* or *tepidarium* in this context.

[SM]

## RESULTS OF ARCHAEOLOGICAL CLEARING

Unit 6, which measures 3.64 m by 6.16 m, was cleared of the remaining fill. It was found to have entrances from the north and south (respectively 1.07 m and 1.03 m wide). The fill of the hypocaust cellar (which was 0.72 m high) uncovered many fragments of *tubuli*, pipes, marble tiles and a few bronze anchor ties. The stratigraphy inside the room could still be read in a few places. A layer of yellow clay 0.05 m thick covered the floor, followed by 0.10–0.20 m of black loose soil and 0.20 m of gray ashes. This was followed by 0.30 m of sand mixed with rubble and fragmented mortar.

The facing and floor tiles partly preserved in the eastern part the unit were of marble slabs from 0.9 to 4.0 cm thick, whereas tiles which were originally used on the walls were 1.2–1.8 cm thick. Marble was a common material for facing tiles, but it was of poor quality and often reused.

[GB-C with MM-W]

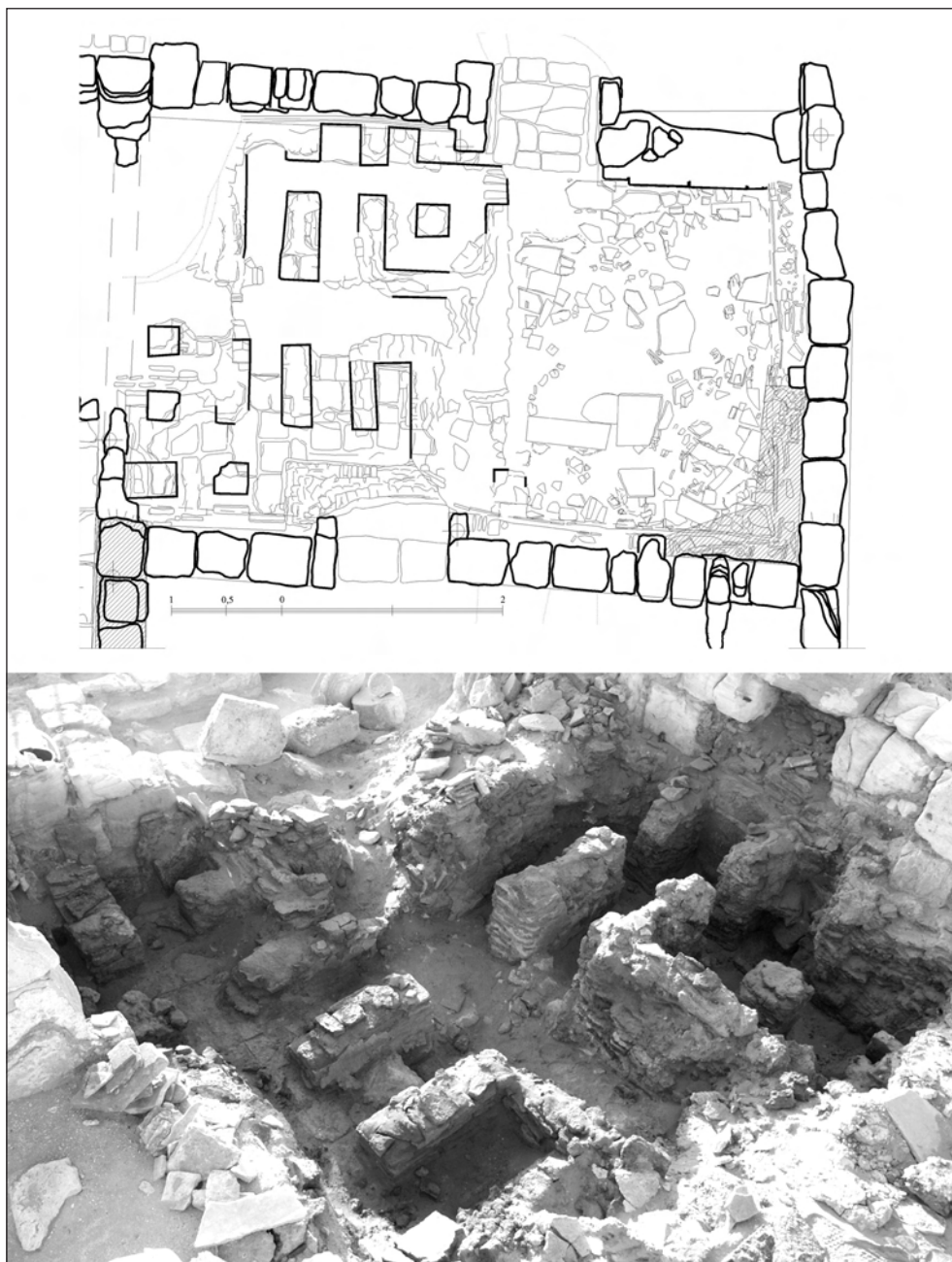
RECONSTRUCTION STUDY OF THE *TUBULI* SYSTEM

Studies on the arrangement and operation of the hypocaust in unit 6 included





*Fig. 11. General view of unit 6 of the Southern Baths at the beginning of the season (2009) and after emergency conservation of the remains (Photos M. Mrozek-Wysocka)*



*Fig. 12. Hypocaust cellar in unit 6 of the Southern baths: inventory plan (top) and general view (Drawing A. Brzozowska; photo S. Medeksza)*

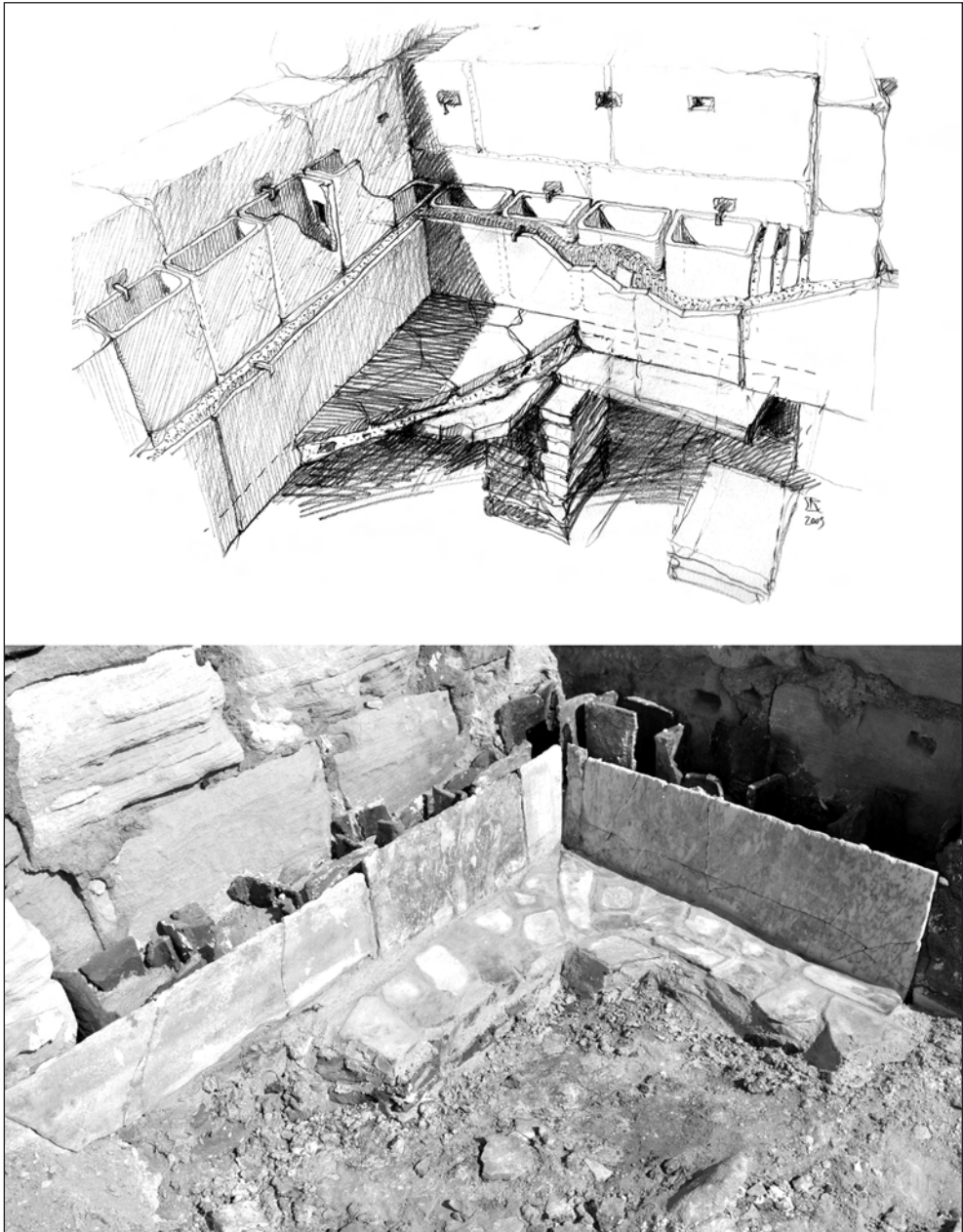


Fig. 13. The tubuli system in the southeastern corner of unit 6 of the Southern Baths: theoretical reconstruction (top) and state after conservation (Reconstruction drawing R. Czerner; photo P. Zambrzycki)



a reconstruction of the *tubuli* system preserved in the southeastern corner of the room. This led to a theoretical reconstruction prior to the actual restoration [Fig. 13].

The condition of the revetment and tubuli was assessed and steps were undertaken toward a partial anastylosis of this installation [see Fig. 10]. Cracked fragments of the revetment were removed for consolidation and reassembly before remounting. Excavated elements of ceramic tubuli were cleaned and partly reinforced

with a silico-organic agent SILEX OH produced by Keim. A floor substructure was made of hypocaust bricks and lime-cement mortar.

Preserved fragments of the wall revetment were reassembled and bound together with a binding mass based on the epoxy resin KEMAPOXY 150 produced by CMB. A mineral mortar was used to mount the revetment back in place. A fragment of the marble floor paving was reconstructed in the corner with the wall revetment.

[RC, PZ]

## STONE CONSERVATION WORK

In the 2009 season the following stone conservation was carried out:

- 1 reinforcement, re-adhesion and puttying of powdering and peeling plasterwork and lime mortar — in the exedra of the South Portico in the Main Town Square, on a pedestal bearing a marble inscription plaque in a passage next to the basilica and on the walls on either side of the pedestal, opposite the pedestal and on the walls adjoining the furnace in the western portico of unit 4 of the Southern Baths;
- 2 reinforcement of powdering surfaces of a hypocaust structure in unit 6 of the Southern Baths;
- 3 conservation of a marble inscription plaque (see below);
- 4 reinforcement of the surface of a masonry furnace (in unit 4 of the Southern Baths), reattachment of parts of the brick-and-stone structure, introduction of putties to fill losses and protect original clay joints;
- 5 readhesion of fragments of original joints of the columns in the Western portico.

### STATE OF PRESERVATION:

The condition of the wall plaster in the exedra of the South Portico in the Main Town Square required emergency intervention. Considerable losses of substance and weakening of mortar surfaces were observed compared to the state recorded during monitoring in the previous season. The plaster had become brittle and very porous, easily brushed away with a paintbrush. Many fragments were lost and big and small pieces were lying on the seats of the benches in the exedra. Large pockets were noted where the plaster had lost cohesion with the underlying stone wall. These were filled with saline sand, which caused further damages, threatening collapse at any time. The extreme salinity of the sand is conducive to unchecked humidity, acting chemically and mechanically to deepen the destruction of the plasterwork. Moreover, the stone next to original joints showed spot losses.

The condition of the plaster on the wall next to the pedestal with inscription plaque and opposite it was similar. Pockets

of peeling and detached plaster were filled with loose accumulations, parts of the plaster sticking as much as 2 cm away from the wall face. The marble inscription plaque, which had been protected after its original discovery, had come away from the pedestal; its deformation created a deep pocket filled with loose saline sand. The preserved fragment of the plaque was cracked heavily, the cracks radiating along the veining of the marble. Conservation *in situ* was no longer possible, hence it was dismantled and transferred to the field lab for further treatment.

Painted wall plaster preserved in patches around the furnace in unit 4 of the Southern Baths was also detached and falling away in pieces. In the lower parts, the painting layer was detaching in small flakes. The furnace itself, situated in the corner of the Western Portico of unit 4, is made of bricks and stone elements set in a clay mortar. The top was covered with loose brick fragments apparently not connected with its structure and loose deposits of sand and fragments of clay mass. Running between the furnace and the wall on the left side was a deep crack filled with contemporary mortar and saline sand.

The preserved parts of columns in the Western Portico of unit 4 had small losses of the substance in the form of old lime joints and fragments of bases and drums. After clearing of the feature parts of the hypocaust structure in unit 6 of the Southern Baths were also found to be detached and powdering.

#### CONSERVATION TREATMENT

All the detached and peeling plaster had to be reinforced and made to re-adhere. The pockets between the plaster and wall

had to be cleaned and filled with mortar. Loose accumulations were removed from the plaster surfaces and the pockets. Falling plaster was saturated with a solution of maximum 5% of PRIMAL AC 33 after having first cleared the pores with a solution of ethyl alcohol (97%) in water (1:1). The pockets were then filled and putties prepared for filling and protection from a lime–cement mortar with quartz sand filler in proportions: 3 parts sand, 2 parts lime, 1 part white cement. The mortar was modified with AIDA MISCHÖL by Remmers, an agent improving elasticity and molding of mortars (0.5% solution). Losses of the stone substance in the neighborhood of the joints were filled with mortar and protected with putties.

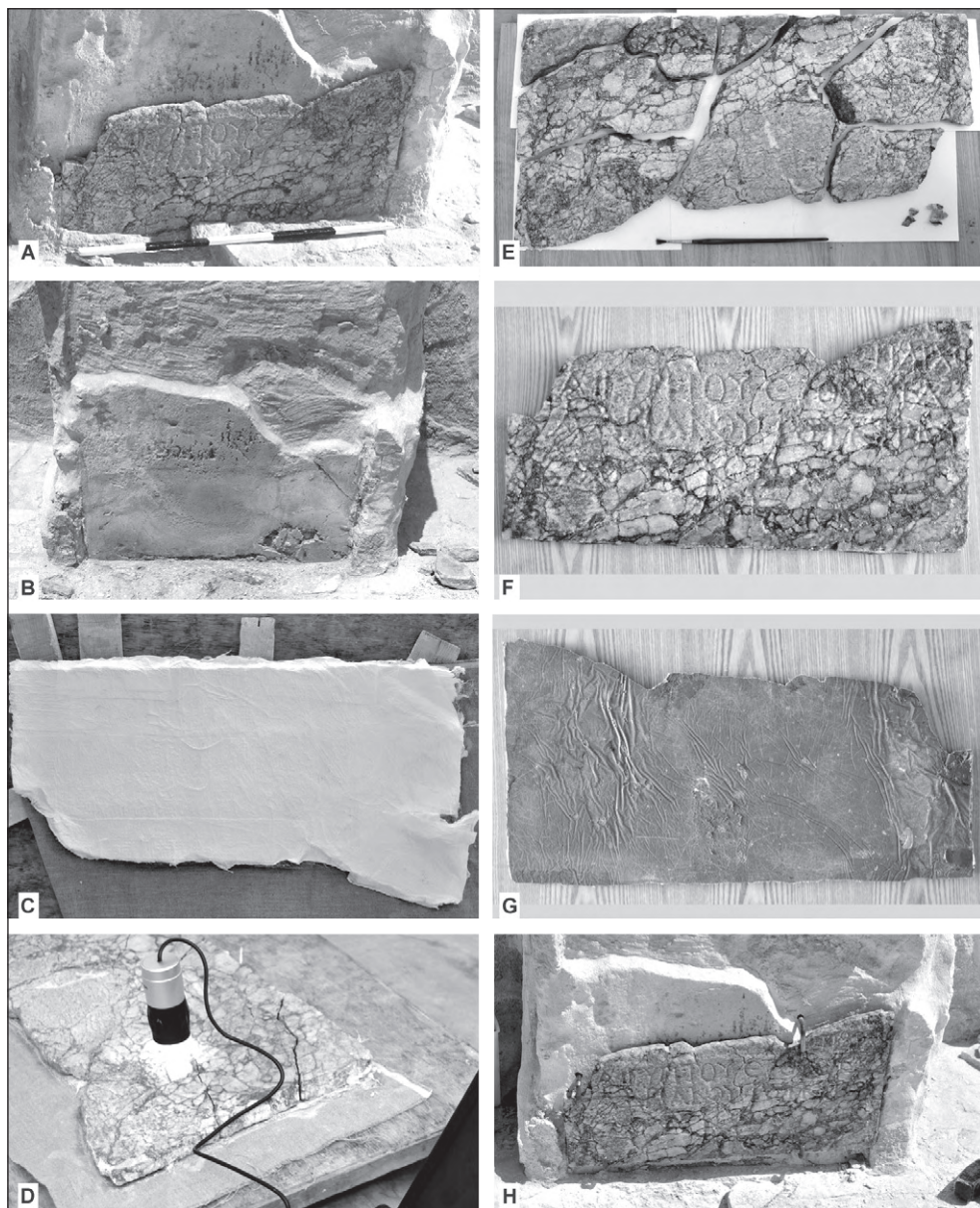
The furnace in unit 4 was cleared of superfluous brick fragments and loose accumulations, as well as contemporary mortar. Protective and filling putties were prepared and the detached brick fragments and remains of a stone hearth inserted back in place, bonded with mortar colored using mineral pigments to match the original clay mortar. The space between the wall and the furnace was cleaned and backfilled with minor stone fraction and lime–cement mortar adequately tinted with mineral pigments.

Powdering surfaces of the hypocaust structure in unit 6 were reinforced superficially with a maximum 5% solution of an acryl agent, PRIMAL AC 33. In order to enhance the action of the agent the object was first penetrated with 50% solution of ethyl alcohol in water.

Lime mortar in proportions as above mentioned was used at a minimum in filling in the joints of columns in the Western Portico.

[IF-R]





*Fig. 14. Conservation of a marble inscription plaque: a – current state before conservation; b – the pedestal during conservation after the plaque had been dismantled; c – desalination of the plaque with compresses; d – recording of damages; e – after removing of the “facing”; f – gluing of pieces; g – consolidation of the back side of the plaque; h – after reassembly (Photos G. Bąkowska-Czerner, M. Mrozek-Wysocka, P. Zambrzycki)*

## CONSERVATION OF A MARBLE INSCRIPTION PLAQUE

Annual monitoring of the condition of a marble inscription plaque discovered in 2005 in the passage by the basilica (for the archaeological context of this object, see Daszewski 2007: 83) [location marked with a dot on the inset plan of the Southern Baths in *Fig. 3*], preserved out in the open on the site, recorded extensive damages to the structure of the stone of this plaque, caused by unfavorable exposition and natural erosion processes.

Standard procedures in such cases call for conservation of the historical substance and preparation of a copy for outside display in place of the original, which should be kept in museum conditions. The Egyptian supervising body requested a stage-by-stage program for the preservation of this plaque. The first stage consists of conservation of the plaque and its remounting in the original position at the site; a copy will be made eventually as the second stage of the process.

First the plaque was cleaned of loose deposits and delicately washed with water. The pocket behind the plaque was cleaned. Joints around the plaque were also cleaned, uncovering the bronze anchors used to mount the plaque. The piece was documented and then dismantled by the transfer method. Two layers of cotton gauze were fastened to the surface of the plaque with polyvinyl alcohol (water solution). The same adhesive was used to attach linen cloth to the gauze. Once this was done, the plaque was detached mechanically with trowels onto a convenient support in the

form of a drawing board. The plaque was then moved to a field lab located on site.

Conservation procedures started with a desalination of the plaque using cellulose compresses [*Fig. 14*]. The protective “facing” on the face of the plaque was removed temporarily for this purpose. The state of the stone was examined and assessed, and a program of conservation treatment was developed. The complete deterioration of the stone around the cracks called for these areas to be cleaned and reinforced. Particular fragments were first separated, cleaned and protected with a 5% solution of PARALOID B-72 in toluene. The pieces were reassembled using an epoxy mass with marble filler.

The back was reinforced with a fiberglass laminate with binder KEMAPOXY 150 produced by CMB. The stone was subsequently reinforced with a silico-organic agent SILEX OH produced by Keim. The last stage was mounting the plaque back in its original position using stainless steel anchoring. Air isolation 20 mm above the floor will reduce the negative effects of ground humidity. In preparing the remounting of the plaque an effort was made to minimize the detrimental effect of climatic conditions in its surroundings, hence the anchors which do not transfer pressure and which maintain horizontal and vertical air isolation.

Should erosion processes continue, the plaque will have to be replaced with a copy and the original prepared for museum display.

[PZ, IF-R]

## CONCLUSION

The previous seasons have already demonstrated the need for combining current conservation with archaeological excavations. Walls when first uncovered are usually in fairly good technical condition and the plaster coating often bears still clear painted decoration. By the end of a season, this plaster is ready to collapse. Plaster fragments should be protected immediately, so that rainwater cannot penetrate the cracked structure and attack the clay mortar render used as ground for the stucco plastering, as well as wash away the painting layer. Disadvantageous climatic conditions out in the open also contribute to a rapid erosion of stone architectural decoration fragments, which require immediate preservation when there is no chance to place them under protected conditions (shielded from sun, sand, wind and rain). Immediate treatment consists of chemical protection which could be effective against erosion caused by aggressive atmospheric conditions. This treatment is costly but essential for preserving such elements in good condition. We feel it is necessary to discuss among Polish and Egyptian professionals how to address problems of a comprehensive conservation of the uncovered parts of the town. Architectural-conservation procedures must be initiated in full coordination

with archaeological excavations so that the archaeological record is not obliterated and elements of architectural decoration are not left lying unprotected. It is equally essential to carry out regular and systematic architectural inventorying and undertake immediate protective action to preserve the stone against quickly proceeding erosion. A recent problematic issue is the approach to conservation and restoration activities using new building material. Our position on this matter is that wherever architecture is preserved substantially, replacing old material with new one is acceptable only in a very limited extent. On the other hand, any reconstruction, especially when faced with a lack of original fragments, should use by principle new material and modern technologies. It is inadmissible for stone blocks to be taken from relics of architecture which have not yet been excavated or treated by restorers, to be used in currently restored monuments. Conservation principles demand that all modern intervention be visible to the naked eye at first glance. This can be achieved by different means: differentiated joints, color and building material. Complete likening obliterates and distorts the picture, making it impossible to tell the original from the modern additions.

[SM]

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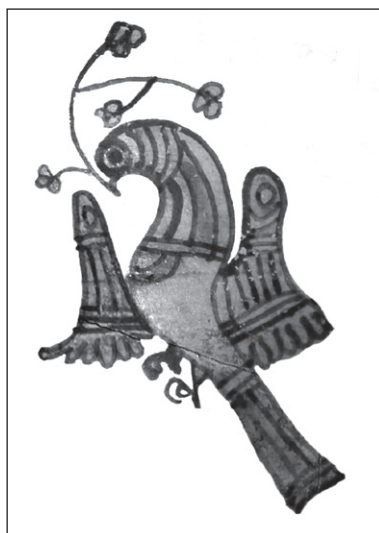


POLISH CENTRE OF MEDITERRANEAN ARCHAEOLOGY  
UNIVERSITY OF WARSAW

# POLISH ARCHAEOLOGY IN THE MEDITERRANEAN

## XXI

RESEARCH 2009



---

## CONTENTS

---

## CONTENTS

ACKNOWLEDGMENTS .....	11
OBITUARIES	
<i>Aleksandra Krzyżanowska</i> .....	13
ABBREVIATIONS AND STANDARD REFERENCES .....	15

## PAM REPORTS

PCMA FIELD MISSIONS AND PROJECTS IN 2009 (WITH MAP) .....	19
-----------------------------------------------------------	----

## EGYPT

### ALEXANDRIA

ALEXANDRIA KOM EL-DIKKA: EXCAVATIONS AND PRESERVATION WORK.	
PRELIMINARY REPORT 2008/2009	
<i>Grzegorz Majcherek</i> .....	27
APPENDIX: AUDITORIUM E: EXPLORATION IN SEASON 2009	
<i>Karol Juchniewicz, Katarzyna Lach</i> ...	43
KOM EL-DIKKA 2005–2009: SELECTED ANTHROPOLOGICAL RESEARCH	
<i>Robert Mahler</i> .....	49

### MAREA

MAREA. REPORT 2009	
<i>Hanna Szymańska, Krzysztof Babraj</i> .....	59
MAREA 2009: POTTERY FROM THE EXCAVATIONS	
<i>Anna Drzymuchowska</i> .....	72

### MARINA EL-ALAMEIN

MARINA EL-ALAMEIN. CONSERVATION WORK IN THE 2009 SEASON	
<i>Stanisław Medeksza, Rafał Czerner, Grażyna Bąkowska with contributions by I. Fuks-Rembisz, W. Grzegorek, G. Majcherek, M. Mrozek-Wysocka, P. Zambrzycki</i> .....	79

## CONTENTS

---

### TELL EL-RETABA

#### TELL EL-RETABA: SEASON 2009

*Stawomir Rzepka, Jozef Hudec* ..... 107

#### APPENDIX: TELL EL-RETABA: ARCHAEOBOTANICAL STUDIES

*Claire Malleson* ..... 118

#### TELL EL-RETABA 2009: THE POTTERY

*Anna Wodzińska* ..... 124

### TELL EL-FARKHA

#### TELL EL-FARKHA (GHAZALA). SEASON 2009

*Marek Chłodnicki, Krzysztof M. Ciałowicz* ..... 135

### SAQQARA

#### SAQQARA 2008–2009

*Karol Mysliwiec* ..... 157

#### APPENDIX: CONSERVATION WORK IN SAQQARA (2008–2009)

*Zbigniew Godziejewski* ..... 167

#### SAQQARA 2008–2009: THE POTTERY

*Teodozja I. Rzeuska* ..... 175

### NAQLUN

#### NAQLUN (NEKLONI) EXCAVATIONS IN 2008–2009

*Włodzimierz Godlewski* ..... 193

#### APPENDIX: NAQLUN 2008: ARCHAEOBOTANICAL STUDIES

*Jarosław Zieliński* ..... 210

#### REFUSE DUMP IN SECTOR B IN NAQLUN: EXCAVATION REPORT 2008–2009

*Tomasz Derda, Dorota Dzierzbicka* ..... 212

#### POTTERY FROM THE REFUSE DUMP UNDER UNIT B.26 IN NAQLUN

*Katarzyna Danys-Lasek* ..... 222

#### TWO BURIALS FROM CEMETERY A IN NAQLUN: ARCHAEOLOGICAL AND ANTHROPOLOGICAL REMARKS

*Dorota Dzierzbicka, Marzena Ożarek* ..... 233

#### ON THE COLLECTION OF WOODEN FINDS FROM NAQLUN AGAIN

*Jarosław Zieliński, Iwona Zych* ..... 244

### DEIR EL-BAHARI

#### CONSERVATION WORK IN THE HATSHEPSUT TEMPLE IN DEIR EL-BAHARI (2009)

*Rajmund Gazda* ..... 251

#### SANDSTONE SPHINXES OF QUEEN HATSHEPSUT FROM DEIR EL-BAHARI: PRELIMINARY REMARKS

*Agata Smilgin* ..... 255

## CONTENTS

---

### TEMPLE OF TUTHMOSIS III IN DEIR EL-BAHARI IN 2008 AND 2009: WORK IN THE STORES AND FIELD

*Monika Dolńska* ..... 261

### THE TEMPLE OF TUTHMOSIS I REDISCOVERED

*Jadwiga Iwaszczuk* ..... 269

## DAKHLEH OASIS

### DAKHLEH OASIS PROJECT. PETROGLYPH UNIT: ROCK ART RESEARCH, 2009

*Ewa Kuciewicz, Michał Kobusiewicz* ..... 279

## SUDAN

### OLD DONGOLA

#### DONGOLA 2008–2009

*Włodzimierz Godlewski* ..... 289

#### APPENDIX: CONSERVATION OF WALL PAINTINGS INSIDE THE FORMER THRONE HALL OF THE MAKURIAN KINGS IN DONGOLA (2009 SEASON)

*Cristobal Calaforra-Rzepka* ..... 312

#### DONGOLA 2009: POTTERY FROM BUILDING I (KOM A)

*Katarzyna Danyś-Lasek* ..... 315

#### WALL INSCRIPTIONS IN A BURIAL VAULT UNDER THE NORTHWEST ANNEX OF THE MONASTERY ON KOM H (DONGOLA 2009)

*Adam Łajtar, Jacques van der Vliet* ..... 330

#### CRYPTS 1 AND 2 IN THE NORTHWEST ANNEX OF THE MONASTERY ON KOM H IN DONGOLA: REPORT ON THE EXPLORATION IN 2009

*Włodzimierz Godlewski, Robert Mahler, Barbara Czaja-Szewczak* ..... 338

## EL-ZUMA

#### THE POTTERY FROM FOUR TUMULI GRAVES IN EL-ZUMA (2009)

*Edyta Klimaszewska-Drabot, Ewa Czyżewska* ..... 361

## FOURTH CATARACT

#### RESEARCH IN THE PCMA UW CONCESSION ON THE FOURTH CATARACT (HAMDAB DAM RESCUE PROJECT). INTERIM REPORT 2009

*Marek Chłodziński* ..... 377

#### ROCK ART RESEARCH IN THE FOURTH CATARACT REGION, SEASON 2009

*Ewa Kuciewicz, Andrzej Rozwadowski* ..... 387

#### EXCAVATIONS IN 2009 IN THE ENVIRONS OF EL-AR VILLAGE (FOURTH CATARACT REGION, SUDAN)

*Anna Longa* ..... 393

#### EL-AR 31: EXCAVATIONS OF LATE/POST-MEROITIC TUMULI. PRELIMINARY REPORT

*Artur Buszek, Michał Kurzyk* ..... 399



## CYPRUS

### NEA PAPHOS

NEA PAPHOS. SEASON 2009

*Henryk Meyza in cooperation with Wiktor Andrzej Daszewski, Aleksandra Brzozowska, Joanna Michalska, Joanna K. Rądkowska, and Monika Więch*..... 407

## LEBANON

### JIYEH

PRELIMINARY REPORT ON THE 2008 AND 2009 EXCAVATION SEASONS AT JIYEH (PORPHYREON)

*Tomasz Waliszewski, Karol Juchniewicz, Mariusz Gwiazda* ..... 423

APPENDIX 1. SUNKEN VESSELS IN LATE ROMAN AND BYZANTINE HOUSES IN AREA D

*Mariusz Gwiazda* ..... 439

APPENDIX 2. PRELIMINARY REMARKS ON THRESHOLDS FROM PRIVATE HOUSES IN JIYEH (PORPHYREON)

*Mariusz Gwiazda* ..... 441

LOCAL HELLENISTIC 'PHOENICIAN'-TYPE AMPHORA AND OTHER POTTERY VESSELS FROM EXCAVATIONS IN JIYEH (PORPHYREON) (SEASONS 2008–2009)

*Urszula Wicenciak* ..... 446

GROUND AND AERIAL PHOTOGRAMMETRIC DOCUMENTATION IN JIYEH (PORPHYREON)

*Miron Bogacki* ..... 454

## SYRIA

### PALMYRA

POLISH ARCHAEOLOGICAL MISSION TO PALMYRA. SEASONS 2008 AND 2009

*Grzegorz Majcherek* ..... 459

### HAWARTE

EXCAVATIONS IN HAWARTE 2008–2009

*Michał Gawlikowski* ..... 481

GLASS FINDS FROM THE MITHRAEUM IN HAWARTE

*Krystyna Gawlikowska* ..... 496

### TELL ARBID

TELL ARBID 2008–2009. PRELIMINARY REPORT ON THE RESULTS OF THE THIRTEENTH AND FOURTEENTH SEASONS OF POLISH-SYRIAN EXCAVATIONS

*Piotr Bieliński* ..... 511

---

## CONTENTS

---

ADAM MICKIEWICZ UNIVERSITY EXCAVATIONS IN SECTOR P AT TELL ARBID  
(SPRING 2009)

*Rafał Koliński* ..... 537

### TELL QARAMEL

TELL QARAMEL: EXCAVATIONS 2009

*Ryszard F. Mazurowski* ..... 559

## PAM STUDIES

ADULT BURIALS OF NINEVITE 5 DATE ON TELL ARBID (2007–2008)

*Dariusz Szela* ..... 585

CHARIOT TERRACOTTA MODELS FROM TELL ARBID

*Mattia Raccidi* ..... 605

NEW PROTODYNASTIC *SEREKHS* FROM THE NILE DELTA: THE CASE OF FINDS  
FROM TELL EL-FARKHA

*Mariusz A. Jucha* ..... 625

*PITHOS*-TYPE VESSELS FROM CHHÎM: PRELIMINARY ASSESSMENT OF FINDS  
FROM 1996–2009

*Zofia Kowarska, Szymon Lenarczyk* ..... 643

BUILDINGS ON SITE B AT NAQLUN (NEKLONI)

*Szymon Maślak* ..... 653

ZOOARCHAEOLOGICAL ANALYSIS OF MATERIAL FROM CISTERNS STR 1/96–97  
AND HA/NEH 2.16.3 IN NEA PAPHOS

*Ewelina Tepe* ..... 677

ANIMAL BONE REMAINS FROM SHEIKH ABD EL-GURNA:  
ISSUES AND OPPORTUNITIES

*Urszula Iwaszczuk* ..... 691

ANIMALS IN ROCK ART. RESULTS OF ARCHAEOZOOLOGICAL RESEARCH  
AT THE SITE OF EL-GAMAMIYA 67 (FOURTH CATARACT, SUDAN)

*Marta Osypińska* ..... 703

INDEX OF SITES ..... 715

GUIDELINES FOR AUTHORS ..... 716