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ÉTUDES CHYPRIOTES

XIX

**THE HELLENISTIC HARBOUR OF AMATHUS
UNDERWATER EXCAVATIONS, 1984-1986**

VOLUME 1. ARCHITECTURE AND HISTORY

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with Olivier PICARD and Manuela WURCH-KOŽELJ

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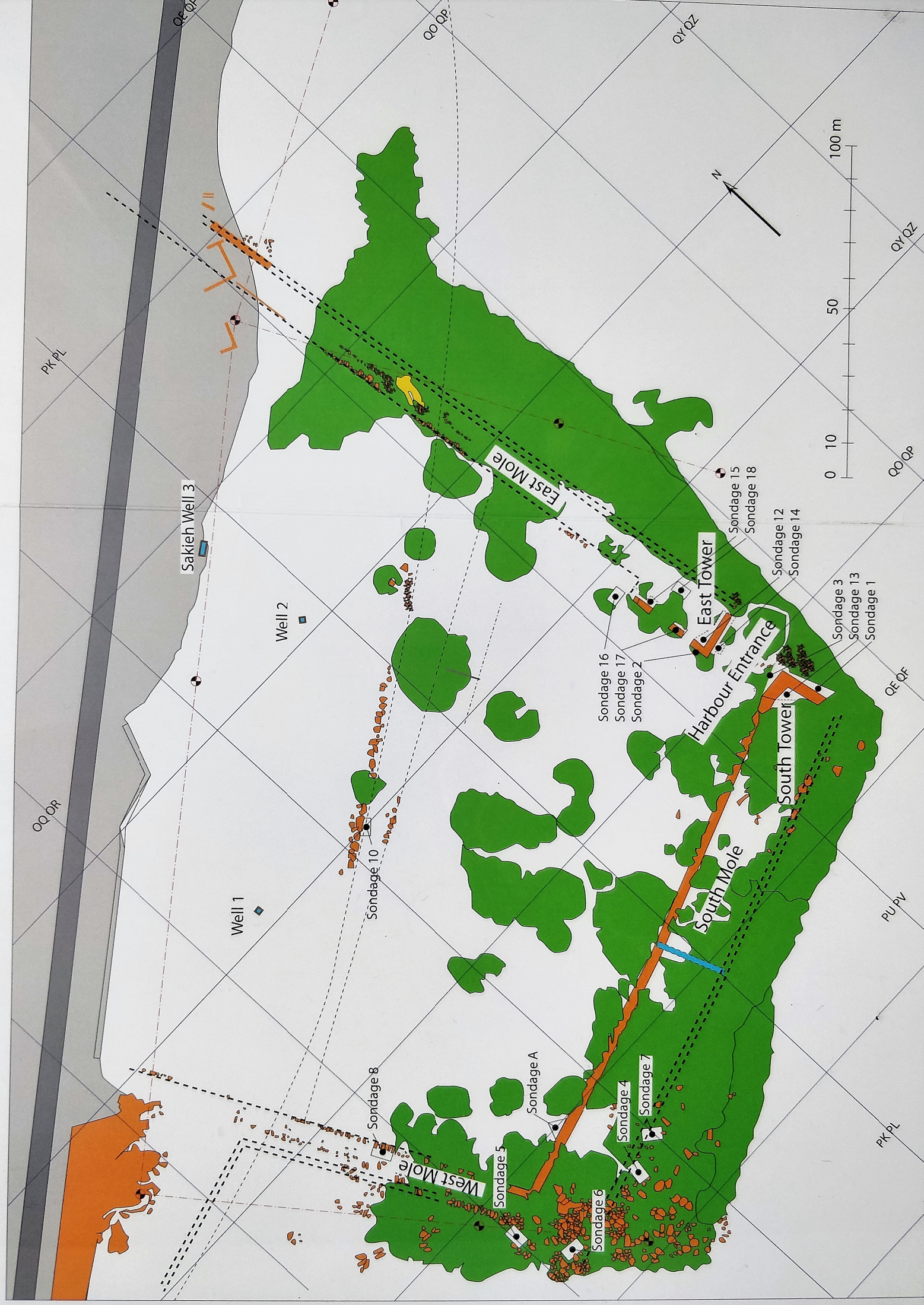
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Fig. 1 — Aerial view of the sunken harbour from an altitude of 500 metres, taken from a helicopter of the British base at Akrotiri (photograph EFA, Ph. Collet)



Introduction

Jean-Yves Empereur

The ancient harbour of Amathus is exceptional for several reasons. First, it is of a remarkable size and dates from the Hellenistic era, going back as we shall see to the end of the 4th century BC. Furthermore, it appears to have never been used: one might even wonder if construction was completed. Lastly, the history of the sea level is quite particular, with a considerable lowering followed by a rise in water level of at least 2 m in both directions.

The majority of explorations of ancient ports have been concentrated on harbours that are now found on dry land as a result of land reclamation or seismic phenomena. Such is the case at Marseilles, Naples, Piraeus, Kition, etc. or, in the second case, at Phalasarna on Crete¹.

Cases of sunken ports that have been the object of underwater excavations are much more rare. One might mention the Archaic port of Thasos, or that of Caesarea Maritima from the Roman period. The excavation of sunken ports is not common due to both the difficulty and the costs of such an undertaking. The lack of depth paradoxically makes the exercise problematic, requiring amphibious operations that make any observation of the stratigraphy complicated, while also requiring a team that is trained in diving, in the safety measures demanded and in the specific techniques of underwater archaeology. A shipwreck covers a limited zone, whereas harbour structures can extend over considerable surface areas. Thus, the harbour basin of Amathus covers more than 5 hectares, with three moles², each one *stadium* long. This size therefore entails choices in excavation procedure and obliges one to engage in spot sondages. Over the three campaigns (1984 to 1986), we opened 20-odd sondages, which we will examine in detail in the following pages (fig. 1 and plan 1).

The appearance of the port has completely changed since the excavation years. Today, nothing shows of the ruins: an attractive promenade on a wooden pontoon with metal reinforcements sits 3 m above the site. The beginning of the moles can no longer be seen, nor the three wells that we excavated on the beach. The infill of sand and rock to retain the road that runs above the site has hidden the landscape as we saw it in 1986, and the view to be seen on a photo from 1963 (fig. 2) when the moles poked through the surface has gone.

1. Cf. F.J. FROST, E. HADJIDAKIS, "Excavations at the Harbor of Phalasarna in Crete", *Hesperia* 59 (1990), p. 513-527.

2. In order to follow Mediterranean usage, we will use the word *mole*, rather than *jetty*, to designate the stone construction built to form and protect the harbour basin.

THE SOUTH MOLE

SONDAGES 4 AND 7

Sondages 4 and 7 to the south of the South Mole also did not reveal an ensemble of parallelepiped blocks as on the north side of the mole, but rather debris from the nearby quarries over a thickness of more than 1 m, all of which was covered by a layer of pebbles and sand, and even the occasional dressed block which had accidentally fallen out of the line of headers (see aerial view, south of Soudage A, **fig. 8b**). The ensemble of these cut stones lie on a layer of pebbles and sand. It lies upon the muddy bottom, as seen above in the description of the row of headers. From north to south, one follows the succession of headers and protecting blocks. This system recalls what can be seen in the modern harbour of Paphos, with a mole that runs from the castle, the interior serving as a mooring quay, while the side open to the sea is a mass of large blocks protecting against the waves (**fig. 6-7**). This particular treatment is distinct from the other moles of the harbour, and is due to the specific exposure of this part of the harbour to the waves from the south and south-east.

THE NORTH SIDE, SONDAGE A

Sondage A was the very first of the excavation. It began on 1 October 1984. The site was chosen after many days of prospecting inside the harbour in order to understand the layout. The selected spot was the northern side of the South Mole. It is the triangular sondage seen on the photos taken from the helicopter on 10 October 1984 (**fig. 8a-c**).

It sits upon the 180 m-long line of header blocks that form the inside cladding of the South Mole.

Using a suction pipe, a thick layer of stones (**fig. 9**) mixed with some pottery shards was lifted to reveal a flat natural formation that resembled the beachrock in the middle of the harbour basin. Quickly, however, it appeared that this was not the case when a second course was revealed, swiftly followed by a third. In a few days, up to six courses of blocks set as headers were discovered in this 5 m-wide sondage oriented east-west (**fig. 10**).

Access to these courses was obstructed by the accumulation of mud that held many stones and plenty of Hellenistic pottery: mushroom lip amphorae and others with a cylindrical foot with a central hollow, from the end of the 4th century BC. The headers appeared to be set in a quincunx pattern as if from the effect of unequal lateral pressure from the south. One can also notice to the right of the section (**fig. 11**) a sort of gash where one can make out the end of one section of stones and the beginning of another. This phenomenon is most probably due to the process involved in laying the blocks: see *infra* for a reconstruction of the machinery used for placing the blocks, **fig. 51a-e**. This machinery will have finished a section at the end of Series of blocks B5, C6, E7, F7, G7 and begun laying the next towards the west. This means that the machinery, which was moving from east to west, first placed the blocks at the furthest extension of its jib towards the east and then laid the following blocks in reverse as it gradually moved towards the west to join up with the section that had been built previously. This explains the (relatively small) miscalculation that led to Block B5 not being lowered down to the lowest course but becoming stuck at the level of the second course, between blocks A3 and A4 (see **fig. 12**). Series of blocks B5, C6, E7, F7, G7 is composed of only five courses instead of the six of the other series. As a result, one can make out a collapse on the surface at Block G7, below which the headers tilt some 11 to 13° towards the west. The first course of blocks was placed directly on the sandy bottom, as seen in **fig 12**. A deep sondage into this loose sand revealed that it contained no human artefacts (**fig. 13**).



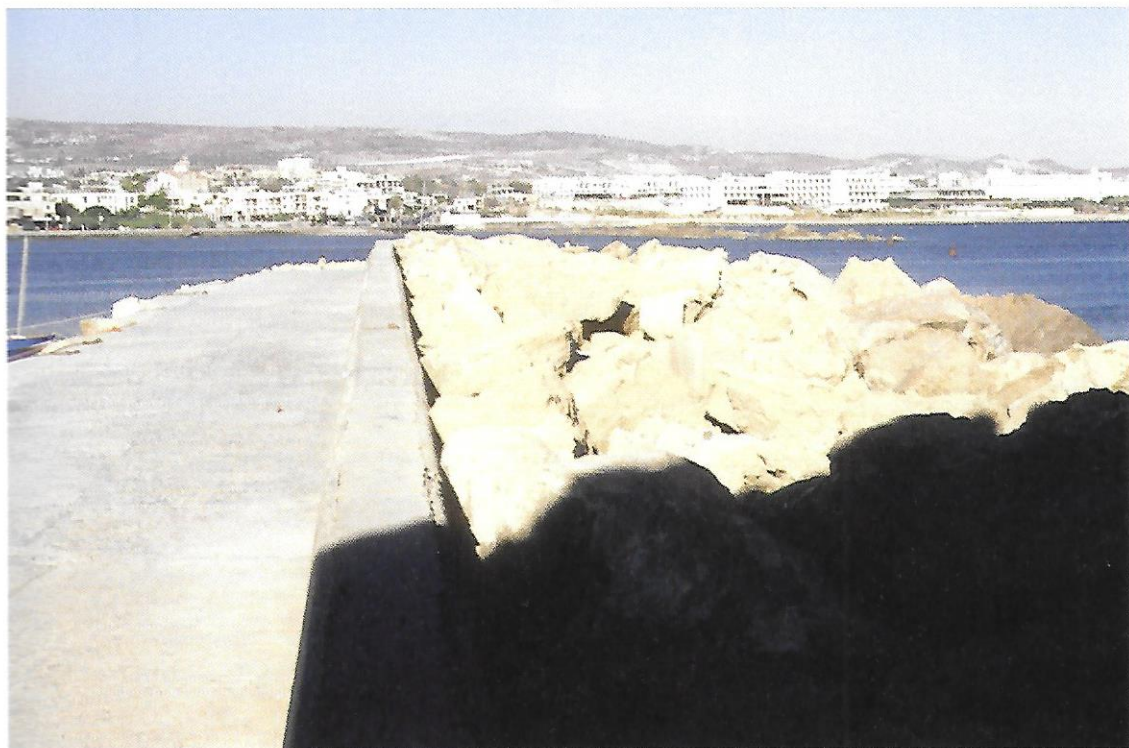


Fig. 6 — The south mole of the modern harbour of Paphos (photograph EFA, J.-Y. Empereur)

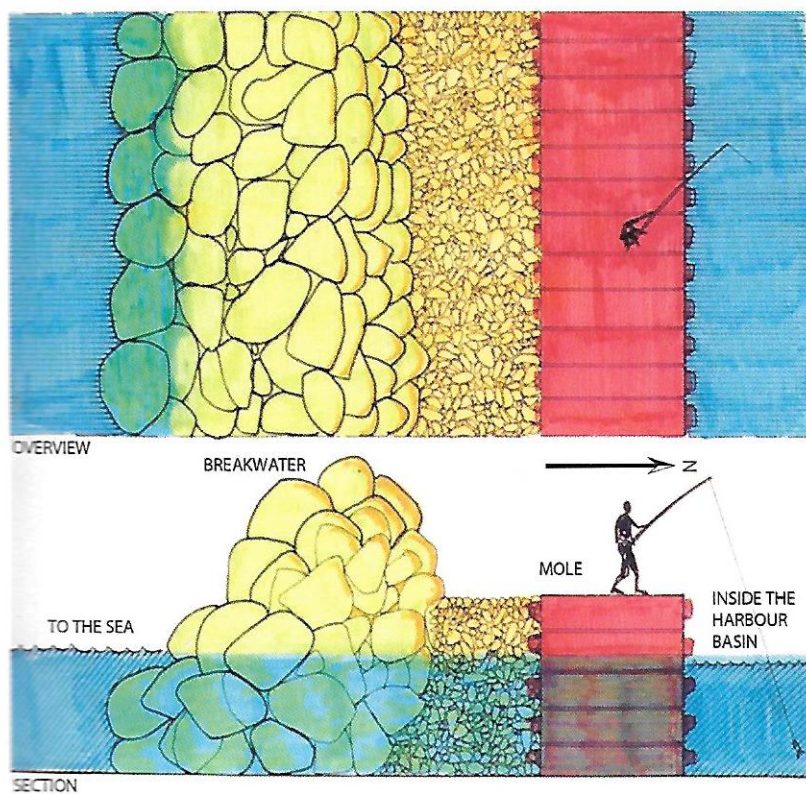


Fig. 7 — Graphic reconstruction of the South Mole (CAD EFA, T. Koželj)



Fig. 10 — South Mole, Sondage A, courses of blocks
(photograph EFA, Ph. Collet)

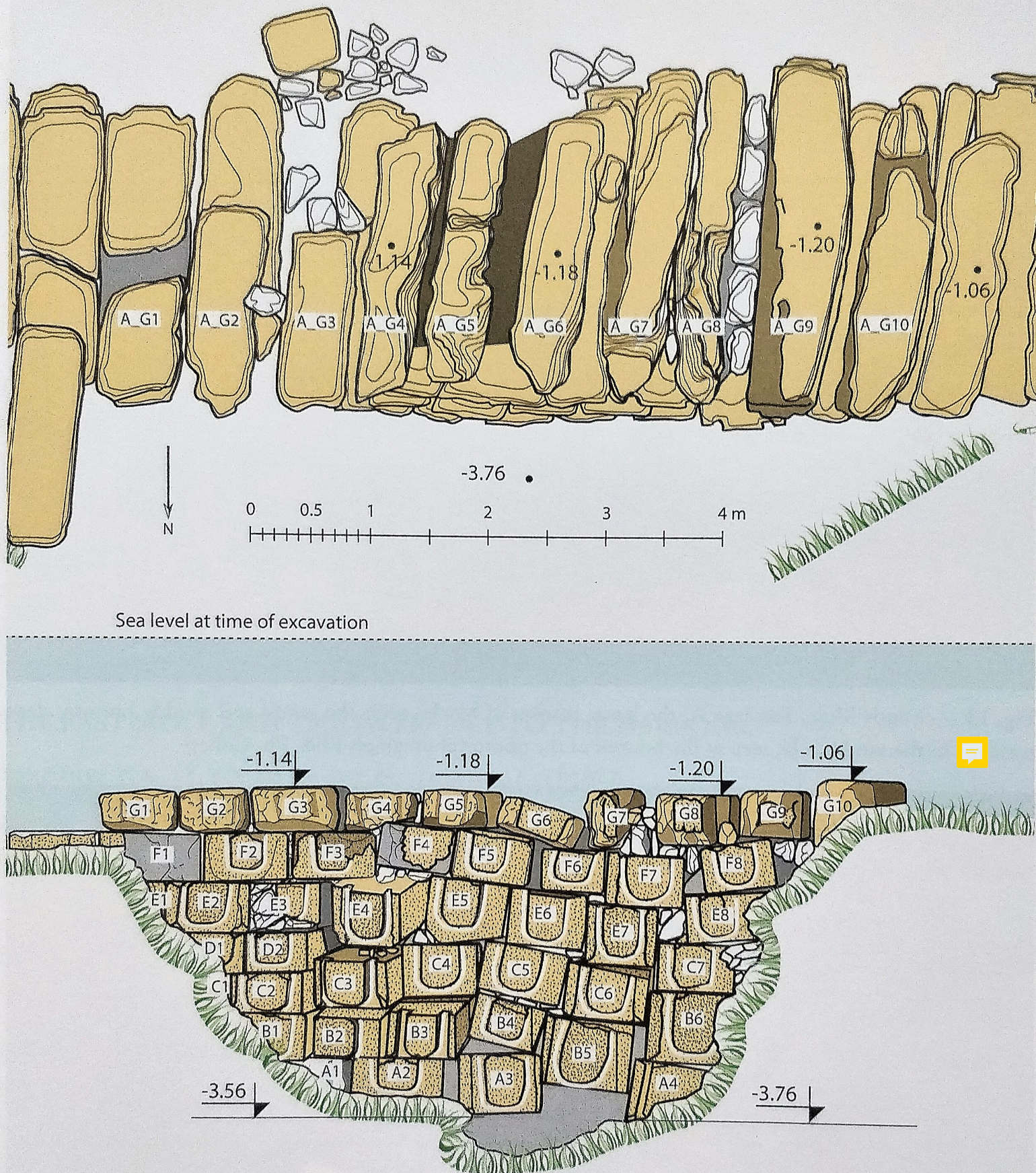


Fig. 12 — South Mole, Sondage A, plan and section with numbered blocks (drawing and CAD EFA, T. Koželj)



Fig. 50 — South Mole, Sondage 1: sketch showing the placing of blocks (drawing and CAD EFA, T. Koželj)

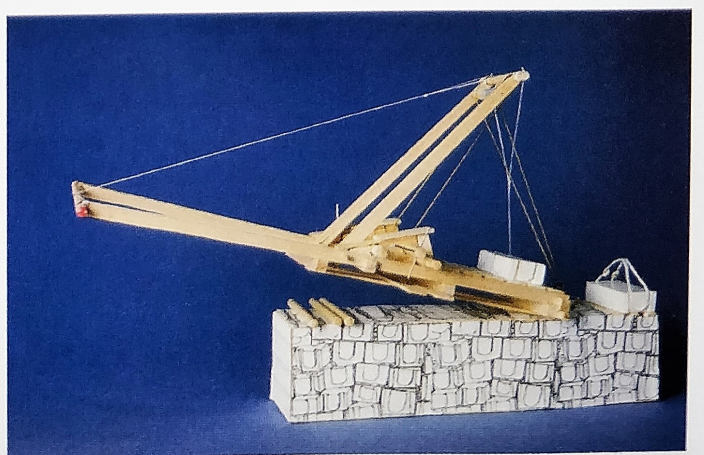
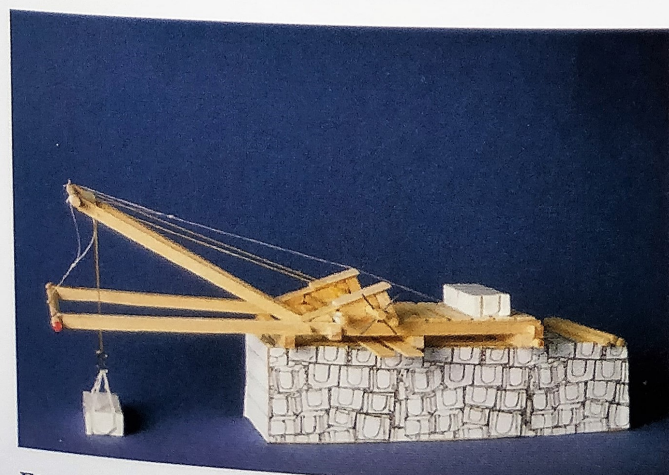
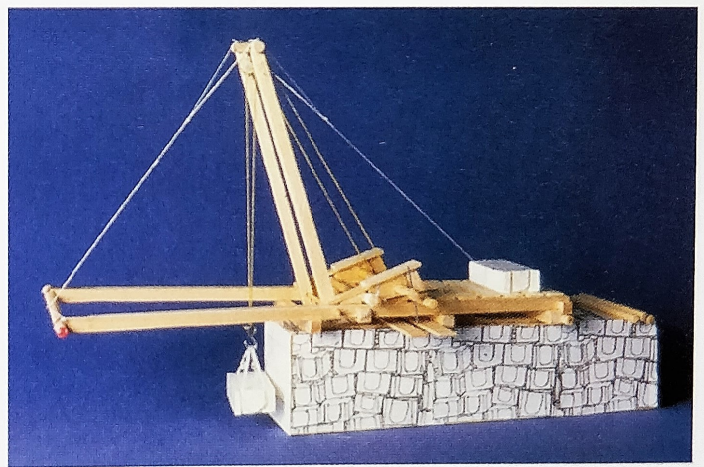
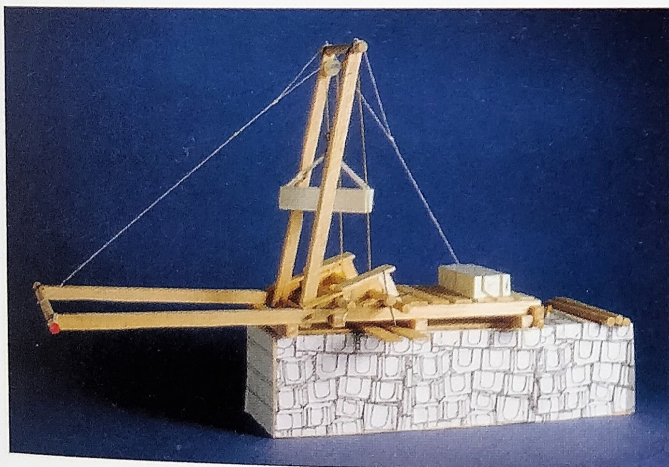
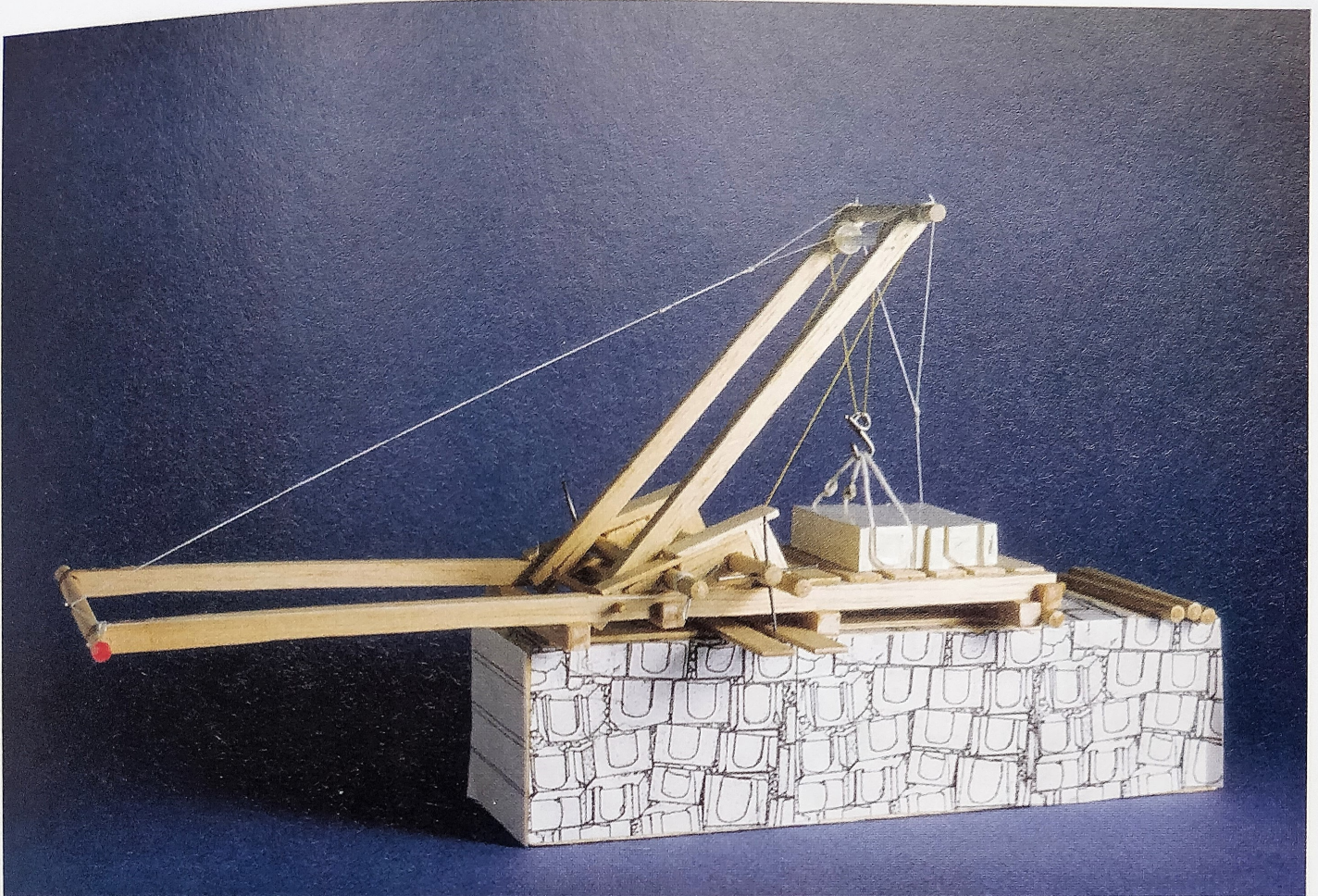
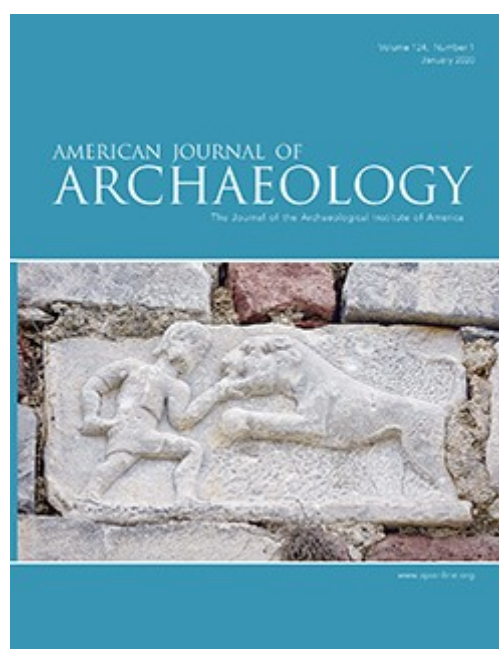


Fig. 51a-e — Reconstruction of the machinery used for placing the blocks (CAD EFA, T. Koželj)

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[The Hellenistic Harbour of Amathus: Underwater Excavations, 1984–1986. Vols. 1, 2](#) 

Vol. 1 by Jean-Yves Empereur and Tony Koželj; Vol. 2 edited by Jean-Yves Empereur

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Book Review

The Hellenistic Harbour of Amathus: Underwater Excavations, 1984–1986. Vols. 1, 2

Vol. 1 by Jean-Yves Empereur and Tony Koželj; Vol. 2 edited by Jean-Yves Empereur

Reviewed by [Deborah N. Carlson](#) [Read Article](#) 

These two volumes present the results of five months of underwater fieldwork carried out over three seasons, 30 years ago (1984–1986). The volumes comprise the final publication of the Hellenistic harbor of Amathus, supplanting a dozen earlier articles, most of which are short annual reports published in the *Bulletin de correspondance hellénique* and *Report of the Department of Antiquities, Cyprus*. Exploration of the harbor occurred in conjunction with terrestrial excavations initiated by the French School at Athens in 1975. While the vast majority of books and articles on the archaeology of Amathus have been published in French, Empereur and Koželj are to be applauded for reaching the widest possible audience by publishing these two volumes on the harbor in English. The term *harbor* is used here as it is by the authors to refer broadly to the natural body of water and the associated, man-made port structures.

The structures at the harbor at Amathus was important, above all, because it reflects a major architectural project undertaken ca. 300 BCE and having a curiously short life. Underwater excavation revealed that the limestone blocks were in sufficiently pristine condition to suggest that work on structures at the harbor may have been abandoned before it was ever finished. The first part of volume 1 consists of three chapters that provide an architectural study of the harbor remains. Three moles (east, south, and west), constructed of ashlar blocks, form two parallel walls, ranging from three to eight courses high, with rubble fill between. Underwater recording of the blocks was achieved by opening eight (of 18 total) trenches at various locations inside and outside the mole walls. Within these eight trenches the team recorded the dimensions and features of more than 300 individual blocks. These data are presented in nine tables, although there are inconsistencies in the text regarding the total number of blocks recorded (314, 312, and 309, at 63, 68–77, and 78, respectively).

A major contribution of chapter 1 is the inclusion of a typology of bosses visible on some of the more than 300 blocks. Six different bosses were identified (as well as a seventh blank type), and their frequency is presented in the tabular data. While the mathematical miscalculations in the text are vexing (three of seven tallies do not compute [63]), the inescapable inference is that the bosses reflect the multiplicity of both masons and quarries required to build the harbor structures. The survival of other cuttings and notches on some blocks leads the authors to speculate about the machinery used to place them, resulting in a model of a two-masted crane positioned on rollers that could be advanced along the moles as construction progressed.

Several enigmatic architectural elements found near the harbor entrance invite conjecture about its original appearance. These include a fragmentary curved block that was perhaps part of a cylindrical structure (tower, lighthouse, statue base?), a limestone block with cavities in the shape of human feet, and an enormous bowtie-shaped, lead-covered metal cramp 45 cm long and weighing 54.3 kg. This last implies the existence of a missing uppermost course, which may have been salvaged or never completed. Extrapolating from the number of blocks exposed in the trenches, the authors calculate

that the original harbor construction may have required as many as 3,500 blocks. Their estimate, in turn, suggests that less than 10% of the original has been examined. The only reconstruction drawings provided (131) are outdated and deemed fictitious by the authors, owing to the inclusion on the harbor's landward side of either shipsheds or sandy beach, which contradicts topographical and geomorphological evidence pointing to the existence of an inner harbor or basin (126–30).

In chapter 2, the authors identify five local quarries believed to have supplied the blocks for the harbor; two of these are examined in detail. The first (site 169), which is located very near the ancient harbor at the modern shoreline, produced evidence for metalworking in the form of a hearth, cobblestones for striking, and a reservoir, all understood to be the remains of a smithy where stonecutting tools would have been repaired. Elsewhere at this quarry, the team observed abandoned blocks, and they recorded wedge holes indicative of the extraction process. Careful study of several other wedge holes of rectangular or trapezoidal shape led the authors to theorize the existence of a tripod for hoisting newly quarried blocks onto carts. Farther inland at the second quarry (site 113), the team documented wedge holes, channels, and microfissures and used these subtle visual clues to identify the block negatives (footprints left behind once the blocks were extracted). The chapter culminates in a tabular concordance of block negatives in the quarry and actual blocks recorded in the harbor. Although the catalogue-style format interrupts the flow of the text, chapter 2 is a 15-page jewel that will engage anyone interested in ancient stonecutting.

Part 2 of volume 1 summarizes the evidence for activity at Amathus after the abandonment of the Hellenistic harbor. The geomorphological evidence consists of two parallel lines of “beachrock,” a naturally occurring sandstone conglomerate, inside the Hellenistic harbor, which suggest that the sea level dropped by at least 6 m. Late Roman 1 amphora (LRA 1) fragments cemented into the beachrock provide a date in the fourth century CE. The archaeological evidence consists of three freshwater wells, two of which feature stone-lined shafts set on a footing of wooden beams. The third well is actually a rectangular reservoir for a *sakieh*, an animal-driven waterwheel equipped with ceramic pots for water collection. While the *sakieh* is well documented in Egypt, this example from Amathus is the earliest attested on Cyprus and presumably is connected with the tanning of hides. All three wells appear to have dried up and been filled ca. 600 CE. The 14 pages allocated to the description, depiction, and operation of *sakieh* waterwheels are a valuable resource.

Unlike volume 1, where the content is organized into chapters, the material in volume 2 is presented in a series of articles. The focus of the first part is the “mass of [Hellenistic] pottery and amphorae discovered in every sondage that we opened” (9). Careful study of the predominant shapes (bowls, jugs, and saucers) showed that there was effectively no stratigraphy, and as such the finds represent a massive fill. Petrographic analysis of the six fabrics, coupled with the presence of kiln wasters among the fill, lead to the inescapable conclusion that this “homogeneous assemblage” was a deliberate dump of debris from several local workshops. There follows a short but interesting excursus on the design, function, and distribution of Palmiped bowls (also known as cuvettes, mortaria, and “Persian” bowls).

The numbers are staggering: of an estimated 18,000 ceramic sherds recovered from the Hellenistic harbor, two-thirds are from transport amphorae and one-third from other pottery. Of the other pottery, 1,000 were deemed diagnostic, and 96 of them are catalogued in a 54-page chapter. The presentation of the Hellenistic amphorae seems curiously uneven by comparison, with 23 examples of six amphora types discussed in a five-page chapter. Part 1 of volume 2 concludes with a catalogue of 110 metallic objects (other than coins) discovered in the harbor. These include nails, fishing weights, lead sheets, and votive offerings. Eleven (of 26) nails are categorized as ship fasteners, used to join hull planking to frames (86–91); this interpretation is problematic in that only one (D50) is long enough to function in this way, and none is clenched or bent as such fasteners typically were. Furthermore, the nails are described as being of bronze, copper alloy, or iron, a distinction that warrants elemental analysis since iron fasteners were not common in ship construction until well after the Hellenistic period.

The second part of volume 2 follows the general arrangement of part 1 in being dedicated to the pottery, amphorae, and metallic objects from the three Late Roman wells described in volume 1. Statistical analysis of the pottery is based on 661 sherds, 132 of which appear in the catalogue. The

pottery is organized into three categories according to clay fabric: local (A), Cypriot (B), and imported (C). The vast majority of the sherds are locally produced jugs, jars, lids, basins, dolia, and *sakieh* pots. The same pattern appears among the Late Roman amphoras (mostly LRA 1 and LRA 13), where 90% of the sherds are deemed local on the basis of clay fabric and the presence of misfired pieces. Given the fundamental importance of the fabrics, therefore, the variations in ceramic analysis by the three authors in this volume are frustrating. One author provides Munsell numbers (though only sporadically), another relies on Cailleux's *Code des couleurs des sols*, and the third employs neither. Different researchers approach their respective material differently, but the presentation of these materials in the same volume warrants more uniformity and consistency. Part 2 concludes with two short but comprehensive reports on a faunal assemblage and the radiocarbon dating of wood samples, both from the Late Roman wells.

The authors conclude that the Hellenistic harbor was designed primarily to accommodate warships, owing to the narrowness of the entrance (20 m), although they are hard-pressed to explain the lack of any evidence for shipsheds. The harbor's short life is understood to be a direct result of the vicissitudes of Hellenistic politics. Cyprus was seized by Ptolemy Soter of Egypt in 316 BCE, lost to Antigonos Monophthalmus and his son Demetrios Poliorcetes of Macedonia in 306, and recaptured by Ptolemy again in 294. Given the strategic advantage that Amathus provided to anyone contemplating an attack on Alexandria, it is indeed tempting to read construction at the harbor as an Antigonid project of the late fourth century BCE. It is hyperbole, however, to conclude that the "six coins of Antigonos Monophthalmus and of his son Demetrius Poliorcetes found near the entrance channel enlighten us as to the authority behind the construction of this monument" (2:9). Are we to imagine that the merchant ship that sank at Kyrenia, Cyprus, about this same time was commissioned by Demetrius because two bronze coins minted during his reign were discovered on board?

Readers benefit from the easily accessible, foldout, color site plans inside the front and back covers (which also make convenient bookmarks), though the only map of Cyprus showing the location of Amathus appears toward the end of the second volume (198). The illustrations are generally excellent; photographs are in color and are large. Editing irregularities are present in the formatting of dates, use of asterisks, labeling of illustrations, numbering of footnotes, and occasional typographical errors (1:87 mentions both "Hero of Alexandria [1st century AD]" and "Hero of Alexander [1st century BC]").

The reader cannot help but be reminded that the authors possess a vast amount of accumulated experience excavating other harbors (Thasos, Alexandria), quarries (Thasos, Delos, Byllis), and pottery workshops; this experience underpins much of the scholarship in these two volumes. The organization and presentation of the material, however, is not always intuitive. It is unclear, for example, why the coins are included in volume 1 but all other artifacts appear in volume 2. In volume 1, the site chronology is summarized in chapter 3, based on the evidence of coins (ch. 4) and pottery (vol. 2). Given that the material in both volumes can be rather neatly separated into (a) Hellenistic harbor (and source quarries) and (b) Late Roman wells, it is curious and somewhat regrettable that the editors did not choose to organize the two volumes along these lines.

These volumes establish the Hellenistic harbor at Amathus as a unique monumental maritime project realized at a fast pace, but strangely never completed. The careful recording and now comprehensive publication of this important site advances our understanding of the intensive extraction of ashlar blocks from local quarries and rapid assembly of the harbor moles. As quickly as it was built, a massive fill rendered the harbor inoperable; these events are contextualized within the turbulent political situation of late fourth-century BCE Cyprus. The excavation of several Late Roman wells provides valuable evidence for economic activity (tanning) along the shore of Amathus 1,000 years later. The geological and cultural events that transpired in the intervening millennium remain obscure, and they prompt the authors' call, throughout both volumes, for continued research in the form of archaeometric, petrographic, and geophysical analyses.

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Conclusion

Amathus harbour, a remarkable and enigmatic monument

JEAN-YVES EMPEREUR

In 1877, a German traveller descended from the Troodos Mountains towards the sea and passed by Amathus. He described his arrival at the sunken harbour: "... here at my feet the ancient harbour of Amathus, of which nothing remains but its natural basin, formed by rocks which extend some distance into the sea¹". The harbour basin was clearly visible to his eyes, but he reckoned that it was bounded by natural rock. Indeed, how could one doubt that these dark masses covered with seaweed and just breaking the surface of the Mediterranean were not natural formations, but rather the work of man on a grand scale? In fact, these "rocks" need to be observed underwater in order to see that beneath the posidonia they are cut blocks placed systematically by human hand.

A REMARKABLE STATE OF PRESERVATION

The archaeological excavations led us to this observation: the harbour of Amathus is so remarkably well preserved as to be quite exceptional. It appears at roughly 1 m below the surface of the sea, but as one explores it at depth, courses of almost intact blocks are revealed, protected by the mud that had quite clearly filled the harbour basin rapidly, avoiding any erosion to these stones which, as we can see in the photographs in this book, have never suffered from contact with the marine environment. One of the major features of Amathus harbour is that after having spent more than 24 centuries beneath the Mediterranean it now reveals the freshness of its original state. Below the uppermost course of blocks, eaten away by the fauna and flora, especially the ubiquitous posidonia, the archaeological divers were astonished to find perfectly intact blocks that appeared to have just arrived from the nearby quarries a few dozen metres away².

This very appearance suggests that the port has a strange history, and one might even ask the question: did it truly have a history? The homogeneity of the ensemble of structures demonstrates that it was constructed at one go, without stops and starts and without repairs, at a sustained pace

1. Franz von Löher. *Cyprus: Historical and Descriptive* (1878), p. 344.

2. No signs of lithophaga: the bivalve molluscs that bore into limestone have not touched these blocks, given the rapid protection provided by the silting process.

that led to its completion in a few years, no more. One can only conclude that it was abandoned rapidly and then wonder as to the reasons. Were these political, man-made or perhaps due to one or more natural phenomena?

Natural causes. There could have been several natural causes or even a combination of several factors:

1. Unforeseen silting? The narrowness of the entrance channel due to its naval role might explain a miscalculation by the builders, since the art of harbour engineering, involving the movements of water, currents and the avoidance of silting, is a difficult discipline to master. More than one modern port has suddenly found itself silted up and transformed into a sandy beach. The open channel revealed in the middle of the South Mole seems rather long at 18 m and probably too high to play the efficient flushing role that one might want to ascribe to it.

2. A change in sea level, with a reduction in draught that made the harbour basin inaccessible to shipping? Such a movement is perhaps observable in the appearance of the lines of beachrock and the installation of freshwater wells in the north of the harbour basin. Can geomorphology explain a phenomenon that we can only suggest? Might we be witnessing a drop in sea level and/or the land and seabed rising?

3. Were the moles badly set upon the sea bottom and did they sink under the weight of the blocks? Given that the courses of headers were placed directly on the sand, did the harbour suffer from a sinking phenomenon: can we talk here of subsidence? But if this was the case, then might one not have added extra courses of blocks to counter this effect? Were such repairs made impossible by the abandonment of the harbour? Is the submersion of the moles related to the flooding of the coastal quarries by the tide³?

Man-made causes. Rather than geophysical causes, was the harbour abandoned for political reasons? The discovery of several coins of Antigonus Monophthalmus and of his son Demetrius Poliorcetes have prompted us to attribute construction to these two, which is also confirmed by the abundant pottery from the end of the 4th and beginning of the 3rd centuries BC. As we have noted, these fragments of pottery, found at different depths but connected with each other, point to one single phase: they do not indicate a lengthy chronological use of the harbour but very much the contrary.

When Ptolemy I reconquered Cyprus in 294 BC, did he close and fill in this naval port, which he considered as a direct threat to Alexandria, just as on land he destroyed the palace, ending all signs of Antigonid occupation⁴?

Perhaps the two phenomena, natural causes and political decisions, combined to create an unexpected fate, such that this grand-scale endeavour was destined never to be used. Further development of geomorphological research and a resumption of excavations would most probably provide answers to these questions.

LOOKING BACKWARDS AND FORWARDS. AN OVERVIEW

The excavation of Amathus harbour took place between 1984 and 1986, more than 30 years ago. We were equipped with the best possible tools of the time: a total station for topography, a photogrammetry plotter, regular helicopter flights for aerial photography, a large well-trained team and all the technical means that we needed (suction hoses, air pipes etc.). Our divers were experienced in difficult underwater conditions and tasks, whether removing the thick carpet of posidonia and tons of rocks and pebbles or manipulating the balloons full of compressed air that were used to shift the

3. B. BOUSQUET and P.-Y. PÉCHOUX, "La géographie du site. Premiers jalons", in P. AUPERT, M.-Chr. HELLMANN 1984, p. 121-146 and especially on the sea level p. 145-146.

4. See AUPERT 1996, p. 53-54.

largest of blocks, an operation that was all the more complicated because of the shallow depth. The photographs, drawings, plans and sections are testimony to the enormous amount of work achieved during the three campaigns, amounting to five months of excavation. Now, 30 years after, we must ask ourselves whether the mission was accomplished.

AERIAL AND UNDERWATER PHOTOGRAMMETRY

Technological developments of recent years have included new underwater survey techniques that are infinitely more precise than hand-drawn work, and this precision is married to remarkable speed. Of course, the procedure is old and was already in practice on the Madrague de Giens shipwreck in the 1970s⁵. However, at the time it required all sorts of installations for underwater photography, with a framework of metal bars along which a conventional film camera in a waterproof housing could slide, while taking care that the photos were taken absolutely parallel to the lens, and then were sent to the plotter, which filled a whole room and was manned by a specialised operator (a full-time job), for several months⁶.

Photogrammetry is now used systematically on underwater excavation sites, and automatic pixel matching of overlapping photos using free access processing software has led to a great gain not just in time but also and especially in the accuracy of measurement and in georeferencing, such that we have even been obliged to recommence all the surveying of a site like the sunken Pharos of Alexandria that began in 1994. Another advantage lies in the acquisition of images in 3D, which, through the massing of data, can provide a global view of a building, whatever its size. We can thus produce an overall image of the ensemble of the underwater site of the Pharos across its surface area of 1.3 hectares.

This method could well be applied to Amathus harbour, at least to obtain a more precise plan than that which we reproduce here. One could envisage an underwater photographic coverage along the 430 m total length of the three moles, despite the shallow depth. This would require an increased number of photos, but the procedure might be simplified and automated using a ROV. Given the clear water, one might also imagine an aerial photographic coverage using a drone in calm weather when the sea is flat.

On the other hand, as regards the elevations, it would be difficult to improve upon the results presented here. If one wished to apply modern survey techniques, it would be necessary to clear once again the tons of rock that we lifted from the sondages conducted along the sides of the moles during our excavations. The sea currents have filled in the cavities: one would have to do it all again.

GEOMORPHOLOGY AND GEOPHYSICS

Outer basin

The application of modern geomorphology would almost certainly lead to decisive developments in our understanding of the outer harbour basin, through an examination of variations in sea level, the amplitude and the chronology of these movements, the speed of formation and the dating of the beachrock, as well as a study of phenomena due to seismic activity and any subsequent subsidence. Hydrological studies would also be appropriate, with an examination of the extent of sedimentation

5. See A. CHÉNÉ, "Techniques spéciales", *La photogrammétrie en archéologie*, *Dossiers de l'archéologie* 13 (1975), p. 104-107; A. TCHERNIA, P. POMEY, A. HESNARD, *L'épave romaine de la Madrague de Giens* (Var), *Gallia Suppl.* 34 (1978), p. 11-12 and pl. XXXVII-XXXVIII.

6. The time required for the reconstruction of a shipwreck like the Madrague de Giens by A. Carrier.

from nearby watercourses that would have contributed either occasionally or continually to the silting up of the harbour basin.

Inner basin

In order to explain the ensemble of the harbour installations at Amathus, it would be essential to apply geophysical survey techniques to discover the limits of the inner basin and determine the nature and date of this basin's use, as well as its relationship with the outer basin and the possible junction point. It would also be important to explore the edge of this basin to see whether this was simply a beach or a constructed layout with an access to the agora of the city.

The harbours of Amathus

One of the big questions to be asked concerns the nature and site of the Archaic and Classical harbour, whose existence is attested by the many terracotta models of ships⁷. Was this the inner basin, as one might reasonably suppose, or should one look elsewhere, which seems less likely? One should also try to locate the Hellenistic and Roman era harbour. Perhaps it was situated east of the ancient port, directly south of the agora.

The Late Roman wells

We excavated three Late Roman era wells on the beach to the north of the sunken harbour. As indicated on the plan (fig. 1, p. 16, Well 4 to Well 6), we located three others outside the harbour, to the east. We did not excavate these latter, having concentrated our efforts inside the harbour. These wells are filled with Late Roman archaeological material and there is potential future interest here. We shall present pottery and amphorae from the first three wells in the second volume and we have touched upon a first ensemble of faunal material, which is a pioneering study for this era on Cyprus. Further examination of the unexplored wells would help to improve knowledge of the fauna and of the activities of the inhabitants of the era, most probably tanners with hydraulic installations connected in some way with the agora of the town.

Should a new excavation be launched, this would be yet another episode in the discovery of what this magnificent construction, unique of its kind, hides beneath the waters of the Mediterranean. We hope that the work of archaeologists to come will increase our knowledge of this harbour, will explain and protect it better and will help draw the attention of future generations.

7. See supra p. 126 and p. 131, fig. 5 and 6.

Chronological table

323	Androcles, the last king of Amathus, sides with Ptolemy, satrap of Egypt.
313	Execution or arrest of the last kings of Kition, Lapithos, Kyrenia and Marion; Androcles dies in this same year or shortly thereafter. Ptolemy names the king of Salamis, Nicocreon, as governor of Cyprus.
311	After having come to terms with Antigonus, Ptolemy forces Nicocreon to commit suicide. Menelaus, brother of Ptolemy, is named as governor of the island. Ptolemy chooses Paphos as the capital and increases the population by forcing the inhabitants of Marion, who had remained faithful to the Macedonians, to leave their city and settle there.
306	Demetrius Poliorcetes enjoys a spectacular naval and land victory over the forces of Ptolemy and his brother Menelaus at Cypriot Salamis. The victorious flagship is dedicated at Delos in the Monument of the Bulls, which was purpose-built for the occasion. Antigonus Monophthalmus and his son Demetrius are masters of the island, and it will remain under Antigonid control for 12 years. They proclaim themselves kings of Asia.
305	Ptolemy I claims the title of king of Egypt.
301	Antigonus dies at the battle of Ipsus.
294	Demetrius Poliorcetes leaves for Greece and Ptolemy I retakes Cyprus; destruction of the palace and abandonment of the naval harbour. The island will remain under Ptolemaic control until 58 BC.
283	Death of Demetrius Poliorcetes (captured in 285 by Seleucus) and of Ptolemy I.

“In every harbor there is a longing”: The enigmatic history of the harbor of Amathus, Cyprus

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EMPEREUR, J.-Y., ed. 2018. *The Hellenistic Harbour of Amathus: Underwater Excavations 1984–1986. Volume 2: Artefacts Found During Excavation*. Études Chypriotes 20. Paris: École Française d’Athènes. Pp. 218, 21 tables, 37 figs., 37 pls. ISBN: 978-2-86958-308-5.

An emblematic aerial photograph of the Amathus harbor has been used in many books and papers on Cypriot archaeology in recent decades before appearing on the cover of the final excavation reports, much anticipated by the local and international archaeological community. This photograph was taken during the underwater excavation of the site by a team from the French School at Athens, between the years 1984 and 1986, under the direction of J.-Y. Empereur and C. Verlinden. After more than three decades, Amathus remains the only harbor site ever excavated on the island and one of the few to be investigated in the eastern Mediterranean. The long-expected publication of the final report came out in two volumes. Volume 1, *Architecture and History*, edited by J.-Y. Empereur and T. Koželj, was published in 2017, and Volume 2, *Artefacts Found During Excavation*, in 2018. Both volumes appear in the series *Études Chypriotes* of the French School at Athens, and the publication was funded by the Honor Frost Foundation. Volume 1 is divided into two parts, in which two distinctive features are discussed: the remains of the harbor and the wells along the coast. Volume 2 follows the same structure, with one part for the archaeological material found in each area: Part 1 comprises four chapters about the Hellenistic harbor of Amathus and Part 2 six chapters about the Late Roman wells. The catalog of the 43 coins found during the excavation is included in Volume 1 instead of Volume 2. Although the coins’ separation from the rest of the finds seems unorthodox, it may have been dictated by the fact that they were used extensively in the first volume’s discussion of the history and date of the site.

Part 1

The book opens with a short introduction, just two pages (9–10), which is enlightening not only about this section but also about the entire volume’s style and objectives: this seems to be a brave and honest effort to disseminate to the archaeological community a full excavation report of a 30-year-old project. To illustrate: “Alabe wrote her study in 1995 and, considering that she arrived at the expected results, she did not wish to rework her text” (9). This straightforward statement about the lengthiest chapter of this section (55 pages), and the one that discusses the main body of dating evidence for the site, aptly prepares the reader for what follows. One can follow the biography of the project itself through old and recent reports which are published together, providing as much information on the excavated material as possible: 139 of 218 numbered pages are filled by catalogs (72 pages), illustrations (52 pages), and tables (15 pages).

F. Alabe's highly informative chapter is written in the form of an elaborate report. It begins with a long and convincing section on the issue of the homogeneity of the pottery. A laborious examination of the material revealed that almost half the sherds found along the south mole could be joined to at least one other sherd, even though some of them were found well apart from each other. The methodology is only explained through examples, however, and the reader has to do the math from reports like the following, about the material from the south mole: "75 joins for 185 objects, of which 36 involved sherds from different bags, and among which 12 joins involved sherds from bags more than 20 numbers apart" (12). With no tables or diagrams to help grasp the nature of the data, we are told that the spatial distribution of the joined sherds, both across the site and down through the strata, was similar in all the areas investigated, which led to the conclusion that the material "is that of a fill that can be considered a single layer" (12). This layer brought to light a rather restricted variety of types, mainly bowls and jugs, the vast majority of which (90%) were made of local fabrics. The author very convincingly bases her argument – that there was a "harbor workshop" on the coast – on the high numbers of local fabrics, as well as on the existence of deformed and misfired pieces among them. Building on the homogeneity of the material, the single stratigraphic unit, and the local production, A. wonders whether the kiln waste found all over the basin and as far from the coast as the south mole was used as a deliberate fill of the harbor or if it was the action of the waves that caused the harbor to silt up.

The rest of the chapter is of great value as far as Cypriot pottery is concerned. Although the compositional identification was done only macroscopically, six variants of Amathusian wares are well described, with text and photographs. The main production of the harbor workshop was a well-known type of open vessel with a flared ring foot; these vessels are known as "Persian bowls" in the literature, but A. suggests the name "Palmiped bowls" after a useful review of other names used in the literature. Dating Amathusian production is no easy task because parallels from Egypt and the Levant are dated from the 7th c. to the end of the 4th c. BCE. The imported pottery does not offer much help with a more precise dating, as it ranges from the 5th to the 3rd c. BCE. Although several vessels are dated to the 4th c., it seems that there is no significant cluster dating to the end of the century. There are many "outliers" and, as A. herself admits, "sandy seabeds and shifting coastlines, as at Amathus, are not ideal environments for a fixed archaeological layer" (22). However, the way that A. chooses to approach the question is perplexing: she considers the harbor's construction at the end of the 4th c./beginning of the 3rd c. to be a fact, and she uses this date as a *terminus ante quem* for the functioning of the harbor workshop (22), whereas Empereur explained in the introduction (9) that the pottery from the harbor is dated to the same period, so it confirms the construction date he suggests.

The reader interested in quantification will find the provided data to be of little help. The numbers of collected sherds are high ("5,000 or so") and "just over 1,000" diagnostic sherds are discussed, but it is not clear how the 96 entries of the catalog relate to them. The catalog contains important new information, however. In particular, the series of tablewares of local production, both fine and coarse, can become a standard reference for local and regional pottery studies. The descriptions could benefit from some introductory text, especially of the three "Palmiped bowl" sub-types that comprise the first 40 catalogued vessels and that are among the highlights of the book. They are named after their characteristic features: "slight ribbing", "ribbing", and "flared ring-feet",

but the reader has to consult the drawings to comprehend the typological division. Moreover, for every catalog entry, an excavation inventory number is provided that includes the year and bag number but not the findspot or the trench, probably because homogeneity was assumed. As a result, however, it is not possible to know whether a vessel was found at the interior, exterior, or entrance of the harbor. This is especially unfortunate for very interesting finds, such as the cooking pot with decomposed lead in its interior (A32, p. 30). But, if the original bag numbers have not been completely lost, the two tables at the end of the section will be very useful as an easy reference for any scholar who wishes to revisit the pottery discussed in the article (or for storeroom curators, for that matter); the finds are sorted by their catalog numbers (table 1) and their excavation inventory numbers (table 2).

The short chapter by C. Harlout that follows (only six pages, including references) contextualizes the “Persian” (or “Palmiped”) bowls within the current state of research. H. explains the importance of publishing the harbor workshop and makes a good point that it has escaped the attention of other scholars who have studied and published on this type of shallow bowl with flaring foot, so widespread in the eastern Mediterranean and beyond. Again, one cannot help noticing that the date of Amathusian production at the end of the 4th c. BCE, and not earlier, is taken for granted, although the evidence itself calls for a more tentative approach. The very insightful remark by H. that the Amathusian bowls exported to Egypt have been found at Herakleion–Thonis but not “in the ceramic material in the oldest levels of Alexandria, which are datable to the last quarter of the 4th century B.C.” (70) points toward an earlier date of the material than the one suggested by Alabe.

A total of 12,000 recovered sherds, two-thirds of the total, belonged to transport amphorae. According to Empereur, who authored the fourth chapter of the book, they were mostly body fragments and were macroscopically separated into local (Amathusian) and possibly Aegean wares; oddly, no Levantine imports are reported. Despite the predominance of amphorae in the harbor material, their presentation is uneven by comparison with that of the tableware: only 23 diagnostic pieces, belonging to six amphora types, are discussed in a five-page chapter (including illustrations). The great majority of them (16 out of 23) belonged to a Cypriot transport container with upraised horizontal handles, known in the literature as a “basket-handle” amphora. According to E., they were all of local (Amathusian) fabric, which adds an important piece to the puzzle of their provenance. Although we still lack an overview, different fabrics have been reported from Cypriot sites such as Panayia Ematousa and Pyla-Koutsopetria.¹ There are at least four or five subtypes dated to the Early Archaic to Hellenistic period, and only two of them could be dated as late as the end of the 4th c. BCE. Even if the illustrated part of a handle is attributed to the Hellenistic subtypes, in the current state of research it is very hard (if not impossible) to date a fragment as precisely as the last quarter of the 4th c. based solely on typology. And, as was the case with the coarse pottery of the previous chapter, the rest of the amphorae, imported or local, cannot all cluster convincingly in the second half of the 4th c. BCE. Be that as it may, a possible combination of tableware and transport containers at the harbor workshop(s) is of particular interest, if

¹ Two fabrics were identified at the site of Panayia Ematousa, Larnaca, Cyprus: a pale brown to pale yellow fabric, and a pale brown to reddish yellow one (Winther Jacobsen 2006, 303–7). At Pyla-Koutsopetria, eight different “categories” of Hellenistic basket-handled variants were distinguished (Caraher et al. 2014, 128–33).

one considers that these two types (the Persian/Palmiped bowls and the basket-handle amphorae) have been found together in different contexts, such as the layers dated to the 5th and early 4th c. BCE at Tell-el-Herr in the north Sinai in Egypt,² and the Archaic shipwreck at Kekova Adası in Turkey.³

Part 1 ends with a catalog of 110 metallic artifacts, by M. Michael. One golden palmette, 1 lead wreath, 2 weapons, 23 pieces of fishing gear, 3 rings, 26 nails, and 3 cylindrical rods are listed, accompanied by no typological or other discussion. The three concordance tables at the end of the chapter are repetitive but useful for anyone who wishes to revisit the material. It is remarkable that every metallic find is described, regardless of its type or state of preservation. For example, an arrow that has not been cleaned is accompanied by a detailed drawing that depicts the size and sections of its encrustations rather than the object itself. There are 17 amorphous pieces named “metallic masses” (96–99), presented in 17 almost identical entries, describing a “small mass of bronze, of unknown function.” In fact, because of the standardized structure of the entries, the “usage” field was filled with too many repetitive comments, such as “function unknown” or “see above”. This material is, of course, hard to interpret because of its nature, and the lack of context in the unstratified trenches excavated at Amathus did not help. Nonetheless, the characterization of 11 out of 26 nails as “fasteners in ship construction” is problematic (86–91). The author repeatedly explains that “nails used to fasten planking to frames normally had shanks 8–12 cm long” but this is not accurate. Nail sizes vary, of course, not only from ship to ship but also among the different parts of the same ship, but the nails belonging to medium-size merchantmen of this period were certainly longer: the clenched nails found at the Ma’agan Mikhael shipwreck were 17–30 cm long (averaging 25 cm) and those at Tektaş Burnu were 12–22 cm.⁴ Most importantly, it is unclear why nails that are not clenched or bent, and that are found in unstratified layers of a harbor, i.e., not a shipwreck, are characterized as fasteners.

Part 2

Part 2 is a coherent section that concerns the material excavated from three Late Roman wells on the coast, which were discussed in detail in Part 2 of Volume 1. Industrial activities such as pottery production and trade, fishing, water-management activities, and dietary habits all provide valuable material with which to paint a vivid picture of an urban coastal landscape. Another short but informative introduction by Empereur stresses the importance of the pottery, which is local and dated to the Late Roman period, especially the 6th and 7th c. CE. In other words, this excavation has documented a second period of pottery production in Amathus, one previously suggested by E., who discovered remains of kilns on the slopes of the acropolis. In this introduction we also learn about a second lengthy chapter in this book that was written long before this publication. Because of the war in Syria, M. Touma could not revise her study, which “dates back to the 1990s,” but the editor has wisely chosen to include it in this volume.

In more than 50 pages, Touma discusses the 661 best-preserved fragments of the 1,000 recovered in total. Only 50 of them were “non Late Roman” but it is not specified if they were later or earlier, or where they fit into the wells’ stratigraphy. The four tables of

² Marangou and Marchand 2009.

³ Greene et al. 2011.

⁴ Kahanov et al. 1999; van Duivenvoorde 2014.

“statistics” included in the chapter are illuminating and provide a clear picture of the spatial distribution of the pottery types and fabric groups, as well as quantitative analyses per type and per well. Three main fabric groups are distinguished. Category A seems to be the common local coarse ware, identified in jugs, basins, lids, and water-wheel pots;⁵ Category B comprises mainly cooking pots; and Category C is red ware, which only constitutes 5.9% of the assemblage but includes diagnostic and well-dated forms of fine pottery, lamps, and tiles. The analysis is thorough, clearly presented, and very much to the point. The conclusions are meaningful and reflect a deep knowledge of the Late Roman pottery of Cyprus and the eastern Mediterranean. The bibliography is unavoidably outdated and it is a real pity that all the important work of the last 25 years, especially on cooking pots, could not be incorporated into this study.

Late Roman amphorae are discussed in a separate chapter by Empereur. They are handled as one collection, with no indication of the stratigraphy or their distribution per well. There is a very useful table, however, in which the material is quantified by type. This shows clearly that local amphorae comprise 90% of the total amphora material excavated from these three wells. The types (three variants of LR1 and LR13 amphorae) are well contextualized and their apt descriptions are complemented with insightful remarks on aspects of their manufacturing, which are very helpful for their typological identification. The catalog of imported amphorae, mostly from the Levant, is not accompanied by comments or any other discussion.

The faunal remains from the wells are analyzed by A. Hadjikoumis in a well-written chapter which, by the way, includes the book’s only map of Cyprus that depicts Amathus (198). The limitations of the material are clearly explained alongside its potential to provide insights into the dietary habits and the “human–animal” relationships in Late Roman Cyprus. The quantified results of 220 MinAU (Minimum Anatomical Units) confirm the picture painted by earlier assemblages elsewhere on the island, with a predominance of sheep and goat, and the presence of draft animals and dogs. H. argues that the assemblage is indicative of a domestic economy, although he admits that it is not representative of the city, or even of the site itself, since the material was recovered without sifting.

The last chapter of the book is a short contribution by B. Lorenzen and S. Manning on the C-14 analysis of the wood remains recovered from Well 3. The analysis confirms the date of the last use of the well in the 7th c., which agrees with the dates suggested by the pottery. The date range given by the analysis is between 620 and 668 CE. The authors provide an instructive account of how to understand C-14 dates, and they seem to take into account the advice given by Empereur in the introduction of Part 2, namely, that activity at the well cannot be dated after 649 CE, i.e., after the first Arab invasion of the island. But archaeological and textual evidence has demonstrated that life continued on Cyprus during the second half of the 7th c. CE, so there is no reason to consider problematic any use of the wells after 649 CE.⁶

⁵ The use of the Arabic word *sakieh* for the watermill, and *sakieh pots* for the vessels used on it, seems somewhat curious and might be difficult to adopt in Cypriot archaeology – especially after a comprehensive chapter on the function of the waterwheel in Volume 1 (143–49), where Empereur, using his excellent knowledge of Greek, points out that the ancient Greek word *alakatin* (αλακάτιν) has survived in the Cypriot dialect, as did the technology itself on Cyprus until the 20th c.

⁶ Zavagno 2017, 76–78.

General comments

Harbors are sites of idiosyncratic character, challenging to excavate and interpret – this is the reason why I chose the Greek song quoted in the title of this review. Their constructional and functional attributes are directly related to the natural environment, and their stratigraphy is often disturbed owing to coastal dynamics, while the intensity and nature of their periods of use often vary considerably. It was surely challenging for Empereur to interpret the Amathus harbor material, 34 years after a meticulously recorded excavation. The size of the moles, the systematic, single-phase construction, and the narrowness of the entrance (20 m) are the main arguments discussed in Volume 1 to support the interpretation of the site as a naval base. The assumption that it had a short life was based on the unfinished lifting-bosses on the blocks of the moles, but it was up to the pottery to place the construction phase in its proper chronological context. The turbulent period that followed the death of Alexander the Great between 323 and 294 BCE provided a very tempting and convincing historical context, as indicated by the “chronological table” at the end of Volume 1. Volume 2 was published one year later, but it cannot stand as an independent work; it is in absolute accordance with a hypothesis articulated before it appeared. And this is where I found it to be weakest.

A sentence in the first paragraph of this book’s introduction summarizes the discussion of Chapter 3 in Volume 1 (“History of the Hellenistic Harbour”): “the authority behind the construction of this monument was Antigonus Monophthalmus and his son Demetrius Poliorcetes” (9). This rather strong interpretive statement, tempting as it may be, could have been made with a bit more caution, given the fact that the site was only partially excavated and the material was essentially unstratified. In Volume 1, the attribution of the harbor’s construction to Demetrius is based on rather thin evidence: six bronze Cypriot coins that were found at its entrance, three of Demetrius Poliorcetes and three with a Macedonian shield and helmet, possibly associated with his father, Antigonus. The remaining 37 coins provide a much wider context for the site, one that leaves the discussion open for other interpretations. In Volume 2, the date of the harbor is not called into question nor even discussed. And while I find the association of the harbor with military operations and the attribution of its construction to Demetrius Poliorcetes an intriguing and interesting hypothesis, I remain unconvinced that most (if not all) the groups of pottery discussed in Part 1 of this book date more or less to the end of the 4th c. BCE. As I have already indicated, very few of the catalogued fragments can actually be placed within this limited horizon with confidence. The typology of the “Persian/Palmiped bowls” is far from established; many of the “Hellenistic” amphorae seem to be Classical; and the imported pottery, both finewares and transport amphorae, as well as the coins, indicate a much broader chronological scope, one that ranges before and after the end of the 4th c. BCE.

But this does not necessarily contradict E.’s interpretive hypothesis or the different scenarios of the harbor’s abandonment discussed in Volume 1. Local pottery production could have been active well before the harbor’s construction, and it could indeed have been interrupted by it. In either case, it remains uncertain whether pottery waste was dispersed all along the basin, either during or after the abandonment of the harbor, by natural causes or by human intervention. After all, the harbor was built in front of a flourishing city, one that had been exporting its pottery all over the eastern Mediterranean for centuries and one that certainly continued to be active after the harbor ceased serving as a naval base. In this respect, the presence of finds that date to the Classical or Late Hellenistic

and Roman periods should not be considered problematic; even if another site nearby was used as the city's port throughout the Hellenistic and Roman periods, some minor activity must have taken place at this harbor as well.

There is little to criticize about the production of this volume. It is very easy to read and any pottery specialist would recognize that the excellent illustrations, line drawings, and color photographs are among the book's greatest strengths. The foldout site plans inside the front and back covers provide the necessary orientation to the site. The only quibble concerning the pottery is a lack of editorial cohesion, which is understandable, however, given that two of the chapters were written long ago. For instance, Touma's use of A. Cailleux's *Code des couleurs des sols* in her catalog of Late Roman pottery is vexing but could not be changed. Still, a reader can compare those wares neither with the local fabrics described by Alabe, which are not accompanied by color chart references at all, nor with the ones of Empereur, who uses a Munsell color chart. Some errors of English usage should also be noted, e.g., "useful" instead of "diagnostic" sherds, and "isolation" instead of "unique" number.

In conclusion, this is a comprehensive publication that will have a lasting impact. It forms an essential reference for anyone interested in the archaeology of Classical and Hellenistic Cyprus and touches on an array of subjects such as harbor archaeology, the maritime cultural landscape, and pottery studies. Most importantly, it opens the path to further research on this unique material, which may reveal more secrets about a monumental but most enigmatic harbor.

Acknowledgments: The title of this review is the title of a Greek song from 1963, by Giorgos Katsaros and Pythagoras Papastamatiou (original title: Κάθε λιμάνι και καπημός).

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