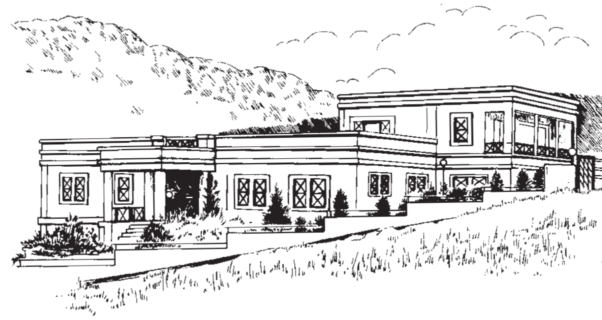
KENTRO

The Newsletter of the INSTAP Study Center for East Crete

Volume 20 (Fall 2017)



The INSTAP Study Center for East Crete Celebrates Its 20th Anniversary

Thomas M. Brogan

In July the INSTAP Study Center for East Crete hosted a lecture and party to celebrate 20 years of operation as a base for archaeological research on Crete (Figs. 1–4). Our mission may be unique in the Aegean, but credit for its success is shared by many, first and foremost by Dr. Malcolm H. Wiener. We are proud of the work conducted by our staff and members and are grateful for the generous support of the Institute for Aegean Prehistory (INSTAP) and our colleagues in the Hellenic Ministry of Culture and the American School of Classical Studies at Athens (ASCSA).

Since 1997 the Study Center has grown to meet both the emerging needs of our projects in East Crete and the broader mission of INSTAP in the Aegean. Our conservators have mended tens of thousands of objects while developing new ways to store artifacts and preserve earth and rubble architecture on site. Our illustrators and architects now collect as much data with drones and cameras as pencils, and our light tables and pens have largely given way to digital Wacom tablets and flash drives. The dark room is now only used to develop X-ray film, while our photographer processes up to 10,000 photos each year with a digital camera and computer. At later points after the foundation of the Center, specialists in ceramic petrography, geophysical prospection, and faunal studies joined our Publication Team to extend our services annually to more than 70 projects in the wider eastern Mediterranean. Supporting all of this are the bedrocks of our team. In Greece Eleanor Huffman keeps a close eye on the physical plant and the payroll; in the United States Elizabeth Shank provides administrative support and works under the direction of Philip Betancourt on our Aegean Outreach Program with the University of Pennsylvania Museum and the History of Art Department at the University of Pennsylvania.

Figure 1. Construction of the Study Center in 1996. Photo T. Brogan.

Over two decades there have been many exciting discoveries by both the projects of the ASCSA and our colleagues in the Lasithi Ephoreia. Among the highlights are the earliest hominid activity on Crete (near Preveli in the southwest of the island), the well-preserved population buried in the Hagios Charalambos cave (in the Lasithi Plateau), the earliest Aegean dye-works facility in Pacheia Ammos (next door to the Center), the jewelry box of a Minoan priestess from Mochlos (on the northeastern coast of Crete), the administrative records in the Minoan palace at Gournia (another neighboring site to the Center), and the public dining halls of a Cretan polis at Azoria (in the mountains east of Kavousi village). With support from the Study Center, our members have published these finds in articles and monographs, including more than 50 volumes by INSTAP Academic Press.

Figure 2. Tom Brogan reminiscing about the past 20 years at the Center. Photo N. Vogeikoff-Brogan.

Figure 3. Angus and Lisa Smith enjoying the pre-lecture gathering. Photo N. Vogeikoff-Brogan.

Figure 4. Sarah Duncan and Floyd McCoy at the anniversary celebration. Photo N. Vogeikoff-Brogan.

Figure 5. Jenifer Neils (at center; new director of the ASCSA) surrounded by the speakers (left to right)—Yiannis Papadatos, Philip Betancourt, Chrysa Sofianou, and Tom Brogan. Photo N. Vogeikoff-Brogan.

Figure 6. Manolis Papadakis leading the band and entertaining the crowd. Photo N. Vogeikoff-Brogan.

Two events were organized on Crete to celebrate this anniversary. The first was a lecture and party for the archaeological community on July 29th (Fig. 2). Philip Betancourt and I started the evening recounting the construction of the building and the various challenges encountered while establishing a United States non-profit organization in East Crete (Fig. 5). Yiannis Papadatos and Chrysa Sofianou then presented a wonderful overview of their excavations of a Minoan villa and two peak sanctuaries in the mountains northwest of Ierapetra. Afterward, roughly 300 guests enjoyed a Cretan barbeque prepared by Romanos Rupp and music by archaeologist (and rocker) Manolis Papadakis and friends (Fig. 6). One week later, the Study Center hosted a second event for the village of Pacheia Ammos and municipality of Ierapetra. I highlighted recent work of the Study Center, and Vance Watrous presented the major discoveries of the recent excavations at Gournia. Both events were very successful, and we enjoyed celebrating this momentous occasion with friends, neighbors, and colleagues.

A Report on 2017 Work Supported by the Hawes Post-Doctoral Fellowship for Gender Studies

Julie Hruby

My interest in archaeologically preserved fingerprints began while I was working at Mochlos in 1994; it was my first excavation, and in the late afternoons, my job was to assist Ann Nicgorski, who was cataloging the small finds. One day, I noticed that a loomweight had a nearly complete palm print that had been impressed in it before it was fired, and it occurred to me that finger and palm prints might contain useful information. I read everything I could find on fingerprints, but at the time, there was very little that had been written about them in archaeological contexts; the work of Paul Åström and various forensic science practitioners, including Eriksson and Sjöquist, were obvious exceptions (Åström and Eriksson 1980; Sjöquist and Åström 1985, 1991) as was the work of Erik Hallager, who included an appendix on fingerprints in his monograph on Minoan sealings (Hallager 1996).

A few years later, I took a fingerprint classification course offered by a fingerprint examiner who worked with the FBI. One of the exercises was that each of us was fingerprinted, then we traded sets of prints in order to classify those of each other. The police officer who received my prints complained bitterly about how difficult they were to read. The agent in charge asked whose they were, and then he said something along the lines of "well yes, that's because she's female." He elaborated that women's prints were often more difficult to analyze because of the fine ridge detail. This reminded me of a comment in Hallager's book on sealings, that ". . . the papillary lines of the fingerprints on KN Wc 44 (HM 106) were tighter and finer than seen on most other roundels. According to CDI [Chief Detective Inspector] Rasmussen, this is most easily be [sic] explained if the fingerprints had been set by a woman or a child" (Hallager 1996, 242). Other archaeological projects have intervened since the 1990s, but it seems fitting that I have returned to working on Crete as I return to this topic.

The two measurements traditionally used by archaeologists, myself included, to identify the sex of an individual—mean ridge breadth and ridge density—are easy to apply, but there are a few drawbacks to using them. First, both attributes also correlate with the age of the individual producer (David 1981), making it difficult to differentiate adult female producers from juvenile male ones; second, clay shrinkage rates are relatively consistent for Greek clays that have been fired intentionally, but they can fluctuate wildly for clays that were fired in accidental contexts. For example, tablet Ad 667 from the Mycenaean Palace of Nestor at Pylos was broken before it burned; it expanded on one side of the break and contracted on the other, resulting in one part being 27% larger than the other. Fortunately, physical anthropologists working with modern populations have identified a range of other print attributes that correlate with sex, age, or both.

Among these additional attributes is the ridge-to-valley thickness ratio (Badawi et al. 2006); on average, men have narrower fingerprint ridges relative to the widths of their fingerprint valleys than do women. White lines, which are narrow depressions that cross-cut the fingerprint pattern, are more frequently found in women than in men (Wendt 1955), and interpapillary lines, which are narrower and shallower lines between ridges, are more frequent in older individuals than younger ones and more common in men than in women (Stücker et al. 2001).

In order to more accurately identify the sexes of ancient ceramic producers, including people who made tablets, figurines, tools, sculptures, and other objects of pottery, I have joined forces with two senior mathematicians: Yang Wang, Dean of the

School of Science at the Hong Kong University of Science and Technology, and Daniel Rockmore, Associate Dean of the science faculty at Dartmouth College. Using a high-resolution 3D scanner (Keyence VR-3100), I spent six weeks in the summer of 2017 traveling around Greece with an assistant, Despina Karalis, finding fingerprints inadvertently left behind by modern potters on their ceramic products. Wang and Rockmore will use the scans as the basis for building the mathematical model, using principle components analysis to determine which factors have the most predictive value.

I chose to use latent prints from modern Greek potters as my reference sample because they are the closest available analog to the prints from ancient Greek potters. While I initially contemplated obtaining full sets of prints from these modern potters, I quickly realized that those would not actually be useful; the parts of the fingerprints that I see most frequently from ancient sources are actually fairly restricted, primarily the distal parts of the thumb and index finger. Because prints from different parts of the hand can have slightly different qualitative and quantitative characteristics, it is possible that it may be important to have prints that represent similar places of origin. Palm prints do also appear on antiquities, and whenever possible, we obtained those from our modern potters as well.

The INSTAP Study Center for East Crete provided a home base on Crete; after each reconnaissance trip, we brought material back to the Center (Fig. 1). If a piece was too large to carry back to the Wiener Laboratory in Athens, I regretfully cut the fingerprints from it, making use of the Center's trim saw. We made a longer expedition to Chania, and another to Voni (near Thrapsano), which we used as a base to visit Margarites as well as Thrapsano. We were able to obtain material from 37 different Cretan potters, 20 of whom were male and 17 of whom were female. This ratio was an agreeable surprise because I had been told repeatedly how few female potters there were in Greece.

In January, I will return to Athens to continue 3D scanning these prints (Fig. 2). The eventual goal of the project is to build an efficient mathematical model that will effectively predict the sex of a ceramic producer at a known level of reliability. This kind of model would make it possible to test hypotheses not only about the sex of producers but also about the ways in which ancient gender functioned. For example, Minoan matriarchy has never before been a testable hypothesis, but evaluating the sex of the people who made clay administrative documents would be a good first step.

Acknowledgments

This project has been made possible by the generosity of the William H. Neukom 1964 Institute for Computational Science, the provost's office at Dartmouth College, the Wheeler Fund, the Navarino Fund, and the ARGO Civil Nonprofit Society for Scientific Research and Training, in addition to the 2017 Hawes Post-Doctoral Fellowship for Gender Studies. I would like to extend my thanks to Dartmouth College's Committee for the Protection of Human Subjects (its Institutional Review Board), who determined that this project did not risk harming human subjects and thus did not fall under its purview. I would also like to thank my assistant, Despina Karalis, whose enthusiasm for the project and practical support were more than I could possibly have foreseen, as well as Tom Brogan and Eleni Nodarou, who provided essential assistance at the Study Center. George Kacandes and Maria Stafylopati were wonderful hosts on our trip to Voni. Finally, I would be remiss if I failed to thank all of the wonderful Cretan potters who shared their work with us and helped us to find far more of their colleagues than we could have hoped.

References

Åström, P., and S. Eriksson. 1980. *Fingerprints and Archaeology* (*SIMA* 28), Göteborg.

Figure 1. The author marking a modern fingerprint on an object made by a Cretan potter. Photo D. Karalis.

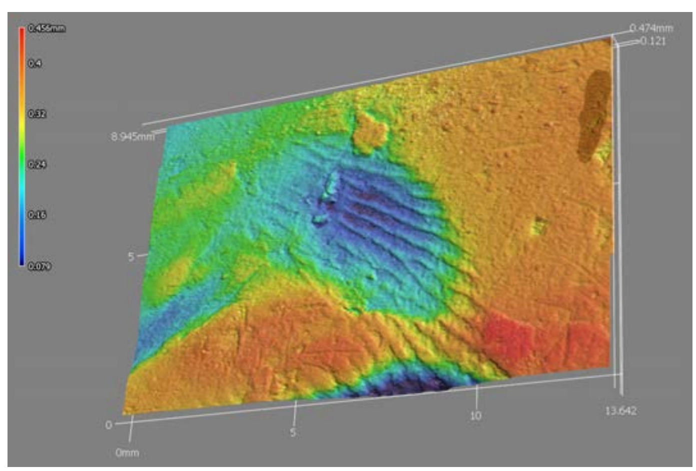


Figure 2. Three-dimensional scan at 120x magnification of a partial, plastic fingerprint impression from an object made by a female Cretan potter. The preserved impression comes from the skin from the intermediate segment of a phalange (which phalange is uncertain). Image J. Hruby.

Badawi, A., M. Mahfouz, R. Tadross, and R. Jantz. 2006. "Fingerprint-Based Gender Classification," in *IPCV'06: Proceedings of the 2006 International Conference on Image Processing, Computer Vision, and Pattern Recognition, Las Vegas, Nevada, USA, June 26–29, 2006*, H.R. Arabnia, ed., Las Vegas, pp. 41–46.

David, T.J. 1981. "Distribution, Age and Sex Variation of the Mean Epidermal Ridge Breadth," *Human Heredity* 31, pp. 279–282.

Hallager, E. 1996. *The Minoan Roundel and Other Sealed Documents in the Neopalatial Linear A Administration* I (*Aegaeum* 14), Liège.

Sjöquist, K.-E., and P. Åström. 1985. *Pylos: Palmprints and Palmleaves* (*SIMA-PB* 31), Göteborg.

———. 1991. *Knossos: Keepers and Kneaders* (*SIMA-PB* 82), Göteborg.

Stücker, M., M. Geil, S. Kyeck, K. Hoffman, A. Röchling, U. Memmel, and P. Altmeyer. 2001. "Interpapillary Lines—The Variable Part of the Human Fingerprint," *Journal of Forensic Sciences* 46, pp. 857–861.

Wendt, G.G. 1955. "Über weiße Linien im Abdruck der menschlichen Fingerbeere," *Homo* 6, pp. 180–188.

Architectural Investigations at Gournia: 2001–Present

D. Matthew Buell and John C. McEnroe

Gournia was first excavated in 1901 and 1903–1904 by Harriet Boyd Hawes, resulting in the monograph, *Gournia, Vasiliki and Other Prehistoric Sites on the Isthmus of Hierapetra, Crete* (1908). Over the course of her excavations, Hawes revealed more than 60 houses, a palace straddling the acropolis, a street system linking these features together and creating distinctive residential blocks, and two cemeteries. Hawes was predominantly concerned with describing the town at a time that she considered to be its height, the Late Minoan (LM) IA period. Subsequent publications by Jeffrey Soles (1979, 1992), Vasso Fotou (1993), and L. Vance Watrous (2012; Watrous et al. 2012) offered tantalizing clues that Gournia had a much richer and more complex history than was previously understood. In order to investigate how Gournia developed and changed over time, Watrous established the Gournia Excavation Project (GEP) in 2010.

As team members tasked with drawing architectural remains uncovered by the project (Fig. 1), we originally envisioned adding what we uncovered to Hawes's plan of the town, which was published in her 1908 monograph (Fig. 2). For this plan, Hawes had done much of the drawing herself. Her sketches of the town's various features were fit into a gridded plan created by Theodore Fyfe in 1901. The finalized, iconic version of the town's plan was created by Wassily Sejk and Hawes in 1905. By the end of our first season of fieldwork at Gournia, we had come to the realization that it would not be possible to coordinate the locations of what we had uncovered with Hawes's plan. In retrospect, this should have been something that we anticipated. The problem, however, is that over time Hawes's plan had come to acquire a certain authority of its own, as its level of detail gave it believability, and its frequent reproductions had made it familiar, ultimately providing it with a sense of authority. Given our inability to coordinate what we had excavated with Hawes's site plan, we realized that we would have to draw an entirely new plan of the site.

In 2011 we began our architectural project, which has developed significantly over the past few years, especially with the more recent contributions of Jorge Botero (University of Barcelona) and Rafał Bieńkowski (Polish Academy of Sciences). Our first order of business was to produce a new plan of the entire site. From the outset, we decided that we would not draw stone-by-stone plans because Gournia's extant architecture has undergone at least two comprehensive consolidation projects. As good

Figure 1. The Gournia architecture team in 2016. Front row from left to right: John McEnroe, Marta Lorenzon, Catherine Stram, and Carly Henkel. Back row from left to right: Jorge Botero, Rafał Bieńkowski, and Matt Buell. Photo J. Spiller.

Figure 2. Plan of Gournia published in 1908 (Hawes et al. 1908).

as these efforts have been, it was clear to us that producing stone-by-stone plans would not yield a realistic and accurate portrait of the site's extant walls and other features, as they were revealed by Hawes. We therefore decided to produce line drawings, which accurately captured a feature's location, its dimensions, and its running course. Working on a building-by-building basis, prior to drawing, we classified all of a building's features into one of several categories (e.g., wall, platform, bench, threshold). Each individual feature was then given a unique designation (e.g., W01=Wall 1). Once our basic catalog of features had been created, we began the process of capturing the spatial data for each feature using a TopCon total station provided by the INSTAP Study Center for East Crete. We measured points at 30 cm intervals along the perimeter of each feature. Using GIS software to create shapefiles, we processed data in the afternoons at the Study Center during our excavation seasons. We then checked our renderings against the architecture at the site on the following day. It took four seasons of fieldwork (2011–2014) to draw each of the approximately 2,000 architectural features at the site of Gournia (Fig. 3).

When compared to Hawes's 1908 plan, there are several notable differences between our new plan and hers (cf. Figs. 2, 3). In contrast to the early plan, our walls do not possess a uniform thickness or run in straight lines, and few meet at right angles. In addition, our plan now documents the many walls, rooms, and even entire buildings that previously had not been recorded. Not only does our new plan provide an accurate representation of all of Gournia's built and unbuilt features, but we feel that it also captures the complexity of the Minoan design process in a much more realistic manner when compared to Hawes's plan.

Since completing our new plan of the settlement in 2014, we have returned to Gournia for the past three summers in order to supplement the information reflected in our two-dimensional plan with a view toward interpretation and, ultimately, publication. Our recent work may be subdivided into three broad categories: (1) continued data acquisition and documentation of Gournia's features; (2) terrestrial image-based modeling; and (3) topographic mapping and low-altitude drone-based photography. We have expanded our efforts to complete a comprehensive database of all of the site's features by supplementing each entry with more details, such as spatial location, dimensions, general shape, masonry fabrics (i.e., materials, construction techniques, and stone sources; see below), and associations with other features, as well as providing a general description, which includes both photographs and plans. Consideration of the relationships between features and masonry fabrics has been particularly revealing.

One simple type of relationship that we have documented is the joints of walls. We have recorded whether one wall was added to another (abutting) or whether they appeared to have been bonded together as integrated parts of a single construction. While some abutting joints were no doubt made during the building's initial construction or shortly thereafter, others were added over time as a structure changed. Although such a method may not provide as accurate a reflection of building sequences as we would like, when combined with consideration of other associations between features and masonry fabrics, we can develop a sequence of construction for each house. Individual house sequences may then be compared to others within a block, ultimately providing a fairly detailed understanding of how the blocks themselves developed and transformed over time.

We considered the materials, techniques, and sources used in wall construction as a masonry fabric. Much in the same way as we tend to think about ceramic fabrics, each of the interdependent components in a masonry fabric involves decision-making on the part of the builder. We have come to realize, in accordance with our own stratigraphic excavations, that several of the masonry fabrics employed at Gournia were chronologically specific. For example, one fabric we have identified consists of massive boulders (>0.75 m in one dim.) of white crystalline meta-limestone, which were laid irregularly within a wall (Fig. 3). The boulders used in this fabric come from the bedrock spine that runs north–south through the town. Stratigraphic soundings and recent excavations of buildings possessing walls constructed in this fabric

Figure 3. New 2017 plan of Gournia showing distribution of monumental Protopalatial masonry fabric. Image D.M. Buell and J.C. McEnroe.

indicate that it was used exclusively in the Middle Minoan (MM) IB–II period.

When masonry fabrics are plotted across the site, they yield interesting and often unexpected results. By combining our identification of masonry fabrics with our observations concerning the relationships between features, and with the project's stratigraphic soundings, we have determined that the earliest palace on the Gournia acropolis dates to the MM II period, not LM IA as Hawes previously thought. What remains today consists of the monumental northern facade, which was incorporated into the Neopalatial palace. This facade, which makes use of monumental white meta-limestone boulders, would have been visible for quite some distance. The impressive facade would have advertised the wealth and authority of those who commissioned its construction. Shorter sections of the original facades of the Protopalatial palace are also still standing, incorporated into the walls of the later palace (Fig. 3). The construction of the Protopalatial palace seems to have been one part of a much broader transformation of the town at that time because our masonry fabric distribution map has revealed the presence of a number of monumental houses and because the GEP has uncovered evidence for an extensive system of paved streets and town-wide water management. Not only have we discovered a virtually new palace, but our architectural studies also demonstrate that construction of the later Neopalatial palace was ongoing. We have revealed at least six distinct building sequences, spanning the entirety of the Neopalatial period from the MM IIIA period to its final destruction in LM IB. It has become obvious to us that every single building on the site has a similar story to tell. Buildings are constructed, they are transformed, they go out of use, and they are sometimes replaced by others in a completely different style of building. Our studies have provided the opportunity to disentangle the complex histories of Gournia's buildings.

As we were creating our new plan, it became clear to us that we wanted to provide a sense of the buildings as three-dimensional structures, built around, within, and often incorporating elements of the diverse topography. Gournia, in other words, is an emphatically three-dimensional site, a fact that often gets lost in two-dimensional plans. In order to address this situation, Botero began a program of terrestrially based high-resolution photography and photogrammetric recording in 2015. Botero's general methodology involved meticulously cleaning target areas and then photographing them when lighting conditions were optimal. Spatial data was captured with the total station to georeference his image-based modeling into the overall site plan. Over the course of three seasons of fieldwork, Botero took more than 30,000 photos to document every built and unbuilt feature at the site. This information was uploaded daily into PhotoScan software for post-processing.

Apart from creating high-resolution orthophotos of every building at Gournia, we can now extract three-dimensional point clouds and render meshes from which we can compute other models, including three-dimensional photogrammetric models at the level of the house, block, or entire site, as well as architectural sections and digital elevation models (DEMs; Figs. 4, 5). These three-dimensional models are more detailed than our conventional drawings, and they permit us to look at the buildings from every point of view and within their proper topographic contexts. Moreover, they preserve sufficient data for other scholars to check our interpretations, which provides greater accountability. Lastly, they will serve as important tools for public interpretation, conservation, and historic preservation. Unfortunately, there are also disadvantages to such a robust program of high-resolution photogrammetric recording on a large site. For example, a massive amount of computing power is required for model generation and manipulation. In addition, the sheer size of data means that we have experienced issues with storage and accessibility. To account for these disadvantages, we are currently in the process of designing a database that allows the user to visualize only the information required and resolution necessary

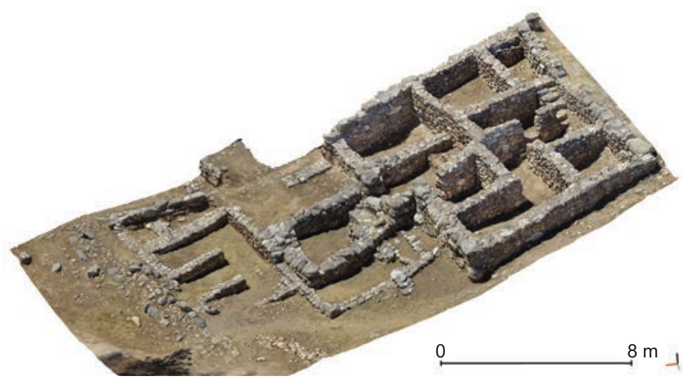


Figure 4. Photogrammetric model of House Ab, view looking south. Image J. Botero.

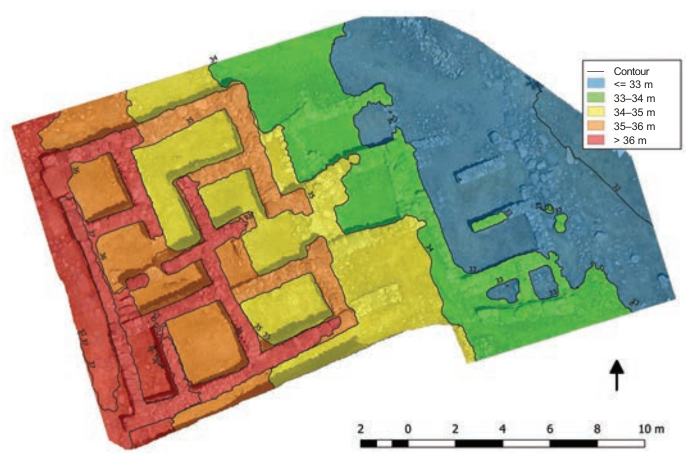


Figure 5. Digital elevation model of House Ab showing increase in elevation from east to west. Image J. Botero.

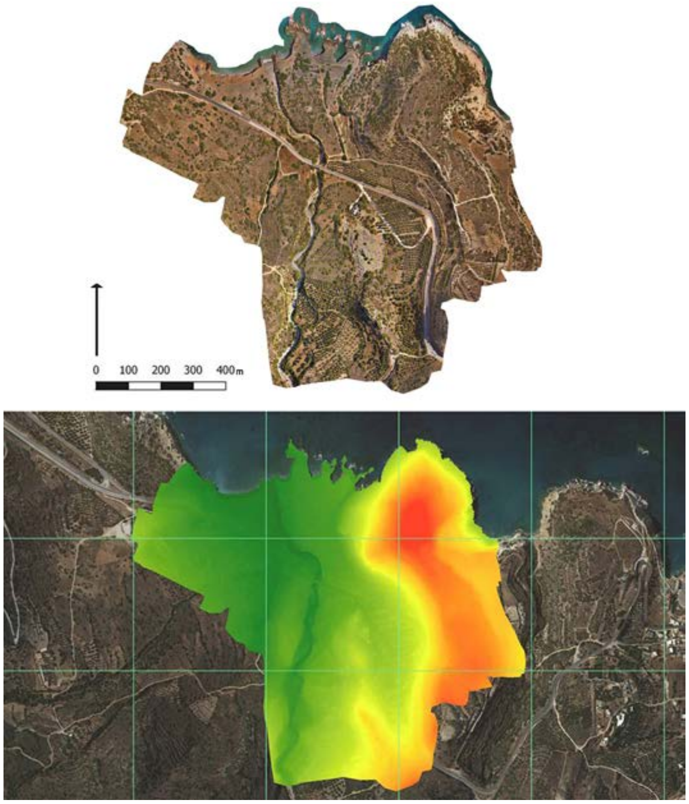


Figure 6. Orthophotograph (top) and DEM (bottom) of Gournia and its immediate catchment. Image R. Bieńkowski.

Figure 7. Orthophotograph of Gournia. Image R. Bieńkowski.

for a specific task. It is our hope to eventually make this database available to users through our project website.

Not only are we concerned with the recursive relationship(s) between humans and their buildings, but also with those between community members and their natural environment. Because we believe that the landscape was structured and that it also helped to structure human experience, memory, and interaction, we have extended our research into the immediate environs surrounding the settlement of Gournia. Bieńkowski implemented a program of topographical mapping and low-altitude drone-based photography, video, and photogrammetric modeling to record and investigate these issues. Our topographical map is an update of the 1:5,000 map created by the Hellenic Military Geographical Service (HMGS). Due to the variable topography of the environs, which includes the entirety of the Gournia valley and surrounding hilltops, we did not follow a strict pattern for data collecting. Instead, we captured spatial data using a total station to measure approximately every 10 m in accordance with prominent topographical features, including bottomland and the base, breaking slope, and summit of rises in the landscape. When the topography was irregular, we collected our data at closer intervals (ca. 1–2 m). All data was uploaded to the Gournia spatial database and processed with global information system (GIS) software to produce a DEM, from which we generated a contour map with extrapolated 1 m contours (Fig. 6). When complete, not only will this up-to-date map serve as the starting point for more detailed analyses of the town and its local environs, but the DEM can also be used as a source of valuable information from which computed models concern such issues as inter-visibility, slope, watershed, and least-cost path analysis, among other topics.

As part of this study of Gournia's immediate environs, we have taken more than 5,000 aerial photos, expanding our program of photogrammetric recording to cover some 54 ha (Fig. 7). Working within the confines of the settlement, we captured photos at 10 m above ground level, while within the surrounding environs we took photos at 20 m above ground level. These photos have been aligned in PhotoScan and orthorectified using spatial data from ground control points captured by the total station. Apart from documenting Gournia and its environs from a bird's-eye perspective, the lower resolution data from the drone allows for experimentation with three-dimensional modeling. A low-resolution model is smaller and thus more manageable for users. Also, we can generate models for the whole site at once, and it is easier to create three-dimensional models of the terrain, which is more convenient for topographical studies. Ultimately, we believe that the new topographic map and models of Gournia's immediate environs will allow us to explore the relationships between settlement and natural environs with a higher degree of precision and in more nuanced ways than was previously possible.

Over the course of our six years of study of the architecture and natural environment of the Minoan town of Gournia, we have learned a great deal of new information. It is clear to us that the settlement was an urban entity in the Protopalatial period, governed by a central authority ensconced on its acropolis. We have learned that house forms were not fixed from initial construction. The buildings changed in infinitely complex ways, just as the community of people who lived there did. Over a century after its initial excavation, Gournia is a new site once again, one that is more complex and more dynamic than was ever previously thought.

References

Fotou, V. 1993. *New Light on Gournia: Unknown Documents of the Excavation at Gournia and Other Sites on the Isthmus of Ierapetra by Harriet Ann Boyd* (*Aegaeum* 9), Liège.

Hawes, H.B., B.E. Williams, R.B. Seager, and E.H. Hall. 1908. *Gournia, Vasiliki and Other Prehistoric Sites on the Isthmus of Hierapetra, Crete: Excavations of the Wells-Houston-Cramp Expeditions, 1901, 1903, 1904*, Philadelphia.

Soles, J.S. 1979. "The Early Gournia Town," *AJA* 83, pp. 149–167.

———. 1992. *The Prepalatial Cemeteries at Mochlos and Gournia and the House Tombs of Bronze Age Crete* (*Hesperia Suppl.* 24), Princeton.

Watrous, L.V. 2012. "The Harbor Complex of the Minoan Town at Gournia," *AJA* 116, pp. 521–541.

Watrous, L.V., D. Haggis, K. Nowicki, N. Vogeikoff-Brogan, and M. Schultz. 2012. *An Archaeological Survey of the Gournia Landscape: A Regional History of the Mirabello Bay, Crete, in Antiquity* (*Prehistory Monographs* 37), Philadelphia.

Experiments with Orthophotography during the Erasmus+ Training Programme at the Kentro

Rafał Bieńkowski and Agnieszka Kaliszewska

During the summer months in 2016, we had the great pleasure to participate in the Erasmus+ Training Programme at the INSTAP Study Center in Pacheia Ammos. Erasmus+ is a student exchange program established by the European Commission that allows for the mobility of students and academic staff within the European Union. Recently the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, where we are in the doctoral program, became one among the many institutions cooperating within the Erasmus framework. This allowed us to participate in the training program and hence spend a wonderful summer developing our skills as archaeologists and also exploring the wonders of Crete, becoming acquainted with the local people and their ways.

Among other topics, Rafał is interested in orthophotographic documentation of archaeological finds, while Agnieszka's work consists mostly of documenting and analyzing pottery. Because documenting pottery fragments was also part of our training program, we decided to join forces and experiment. As a result, we created a low-cost portable photo studio that is suitable for taking photographs for orthophotography.

The requirements for our particular photo studio are:

(1) Low-cost in order to work this year and also in future seasons

(2) No shadows underneath the photographed fragment to make the computer processing much faster and easier

(3) Good lighting to assure the best quality photos and ability to adjust the lighting because each pottery fragment requires slightly different conditions

(4) Portability of the whole setup so we could work in different places without any loss of quality of the photos; very often, especially when natural light is used, the lighting conditions cannot be recreated at a later time, and it results in the photos having variable saturation; the portable studio can be disassembled and stored for the next season

Through trial and error we found a solution that was both inexpensive and simple, but could also provide very satisfactory results. We used a large cardboard box from a local supermarket (60 x 40 x 50 cm), which was the main component of the studio. We purchased two desk lamps with powerful LED lightbulbs (equivalent to 60W), a piece of plexiglass, and some adhesive putty. We also used one professional photography lamp.

The construction of the photo studio is illustrated in Figure 1. The box was set on its longer side. Three holes were cut in the box: one on the top (a), in order fix the camera, and two holes on the sides to admit extra light (b). Light was softened by covering the holes with simple white paper (or tissue paper). The plexiglass plate (c, blue) for photographed objects was mounted inside. We decided to use plexiglass because there is no risk of breaking it, and it is easier to transport. On that plate we marked four points as the border of the area for photography. It is important to know the real distances among those points to allow for later adjustment of photos. In order to avoid "catching" the shadows that occur underneath the sherd in photos, the plate needs to be slightly raised—to this aim we used small food containers (d). To provide a proper background we attached a piece of white paper on the back wall of the box in such a way that it lay underneath the plate (e). The last step was the proper placement of the two desk lamps (f), one to light the background and one to light the side of the object. The light within the photo studio can be adjusted using a third handheld lamp. This third light source allows for the lighting of the surface of the object properly. If one chooses to focus on the surface or decoration of the pottery, then the lamp should be held higher to evenly light the whole object. If one wants to show more of the texture and shape of the object, then the lamp should be held lower. At this point the photo studio was ready! The adhesive putty was used to place the sherd in the desired position—that is, in the same way a sherd is placed when it is drawn. This ensures that the information about the shape is not distorted. A photo taken in our little studio is shown in Figure 2. The background is gray because, while the fragment was heavily lit, less light was directed onto the paper. This is done on purpose so as not to overexpose the photo, resulting in a dark fragment.

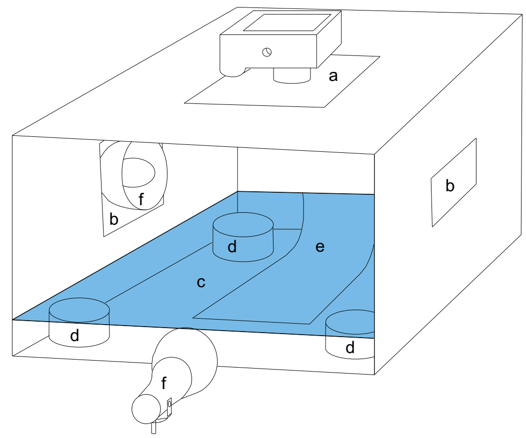


Figure 1. Schematic drawing of the photo studio by R. Bieńkowski.

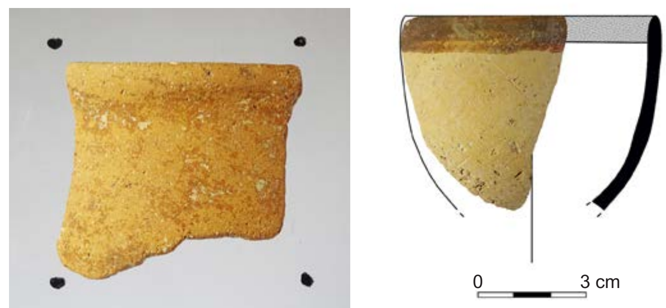


Figure 2. Left: pottery fragment in the photo studio. Right: orthophotograph combined with drawing. Photos R. Bieńkowski; drawing A. Kaliszewska.

Once the photos are taken, the computer processing stage consists of deleting the background from the photo, leaving only the pottery fragment and the four (or more if needed) points marked on the glass. Because the raised plexiglass plate prevents shadows underneath the sherd, the process is quick and easy. Next, files are uploaded to a software program that allows rectification of the photos and removal of the distortion caused by the curvature of the lens of the camera. For the purpose of our experiments, we used the WiseImage for Windows software by CSoft. Once this stage is complete, the orthophotographs are ready. If we have the drawings of profiles, the orthophotograph and the corresponding profile of an object can be combined. An example of such a combination is shown in Figure 2.

We do not think that such orthophotographs can fully replace professional photography or drawings, but we do believe that they efficiently document pottery, and they might find application, especially during work seasons when time is scarce.

Memories and Realities in Neopalatial Mochlos

Jeffrey S. Soles, Georgios Doudalis, Luke Kaiser, and Jerolyn Morrison

The Neopalatial settlement at Mochlos grew rich as a result of its location on an international trading route that brought copper, tin, and other precious raw materials into the Aegean, but it also had the misfortune to be located on one of the major tectonic lineaments in the eastern Mediterranean Sea—the Ierapetra Fault Zone (Fig. 1)—which appears to have been especially active during the years 1700–1430 B.C. This activity and the havoc it wrought on the Neopalatial town was the subject of a paper presented at a workshop in Leuven in November of 2012, which has now been published by Leuven University Press in its *Studies in Archaeological Sciences* series (Soles, McCoy, and Suka 2017). At the time, we presented only evidence from the underwater mapping of the Mochlos straits and a few selected buildings in the town, notably House C.3 (the House of the Metal Merchant) and the ceremonial Building B.2, both of which have been published in preliminary reports (Soles and Davaras 1996). Several pieces of evidence indicate earthquake destructions during the Middle Minoan (MM) IIIB, Late Minoan (LM) IA, and post–LM IB periods: wave-cut underwater notches marking ancient coastlines; cracked and fallen blocks, including ashlar masonry; and collapsed floor deposits fallen from ground floor rooms into basement rooms. Since that time, we have found further evidence for these three events in addition to a fourth destruction at the end of the MM IIIA period, each of which left behind a sealed deposit with the pottery of the period intact, providing a clear picture of the different pottery styles of these periods.

The new evidence comes primarily from excavations that were carried out beneath the South Terrace of Building B.2 (Fig. 2). This terrace was located along the southern facade of this monumental building and provided access from Avenue 2—a major north–south street in the town—to the Theatral Area

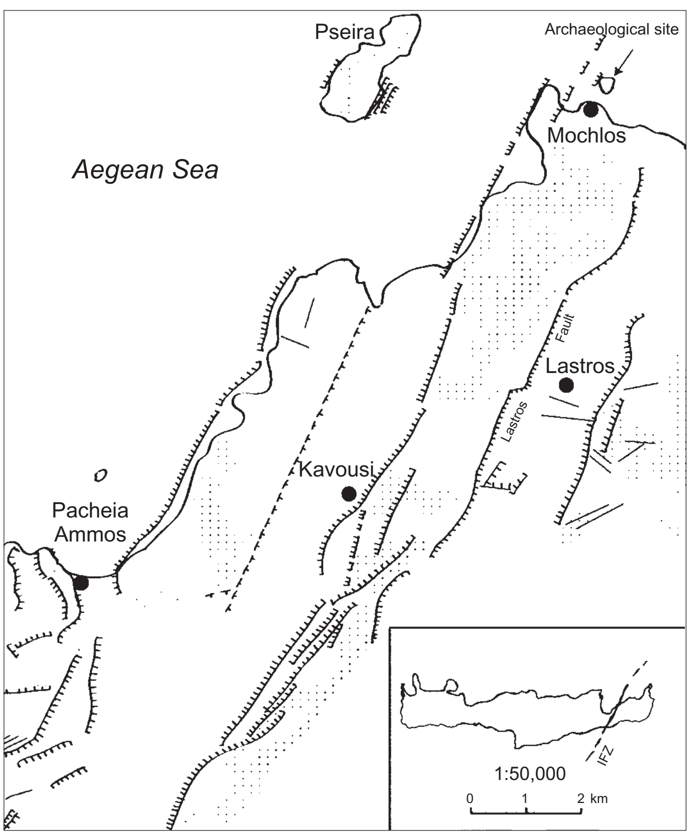


Figure 1. Tectonic map of the Ierapetra Fault Zone (IFZ) crossing eastern Crete. Drawing F. McCoy.

that lay at its western end (Soles 2010, fig. 32). Three different phases of construction, all dating to the Neopalatial period and belonging to the precursors of Building B.2, were uncovered beneath this terrace. In Phase 1, the remains of a kitchen with the largest hearth ever found at Mochlos (1.0 x 1.5 m and over 10 cm thick) was uncovered under the western end of the terrace (Fig. 3). It was full of cups, jugs, serving trays, and tripod cooking pans. The cups (majority of the vessels) include large and small conical cups—with several examples having a low carination, which develops into the bell cup type—and two decorated cups (Figs. 4, 5). The cups and other vessels include some with parallel striations on their bases and others with circular striations, indicating that the potter was beginning to use a more efficient technique for removal of the vase from the wheel. In the older case, the wheel was stopped before the vessel was removed, and in the newer case the wheel was still moving when the vessel was removed, thereby allowing uninterrupted production. Another result of the fast wheel rotation is apparent in the deep rilling on the exterior of new shapes such as bell cups, perhaps an attribute adopted from the older carinated cup type. White-on-dark decoration is rare and mostly limited to open running spirals, and grooved bands are rarer still, with both styles of decoration reserved for individualized drinking vessels. Many of these features survive from earlier MM IIB pottery, and they date the deposit in the kitchen to the very beginning of the Neopalatial period, MM IIIA, so it was no accident that a three-sided prism from Malia, dating to the end of the MM IIB period, lay in their midst.

The Phase 2 remains lay to the east of the kitchen under the middle of the South Terrace (Fig. 3). They consist of a terrace with a bench, a step down to an open yard, and the facade of a building with certain monumental details, namely a projecting anta at its southwestern corner and two antae flanking a monumental stepped entrance. Neatly laid stone courses formed the southern facade of the building, the northern part of which was demolished in the construction of the western pillar crypt in Building B.2. Several objects belonging to a kitchen assemblage lay in the yard along the southern side of this building: a large stone quern and hammerstone, a tripod cooking pot, a tripod kalathos, a large scored basin (not used as a beehive), and several vessels decorated with good MM IIIB tortoise-shell ripples (Fig. 6). As a result of these two deposits, we can now characterize MM IIIA and MM IIIB pottery at Mochlos, a characterization supported by other deposits that will be published in the next volume about the excavations at Mochlos (Table 1; Soles, forthcoming).

The Phase 3 (LM IA) deposit lies on top of and alongside the Phase 2 deposit beneath the eastern part of the South Terrace (Fig. 7). It also belonged to a kitchen and preserved a mudbrick oven that sat on top of the main Phase 2 building, the only oven found at Mochlos. The main room of the kitchen lay next to the oven alongside Avenue 2, with its western walls resting on top of earlier MM IIIB walls. Its hearth was preserved in the southwest

Pottery Date	Striations on Base	Tortoise-Shell Ripple Decoration	“Grooves” from MM II	Carination on Cups	White-on-Dark or Dark-on-Light?
MM IIIA	Mix of parallel and circular or spiral	Little to none	Present	Low on the body	Continuation of white-on-dark, especially spiral decoration
MM IIIB	Only circular or spiral	Plenty	None	Little to none	Decoration transitions to dark-on-light

Table 1. Characteristics of MM IIIA and IIIB pottery, by G. Doudalis and L. Kaiser.

Figure 2. South Terrace (at left) of Building B.2 before excavation, from the east. Photo J. Soles.

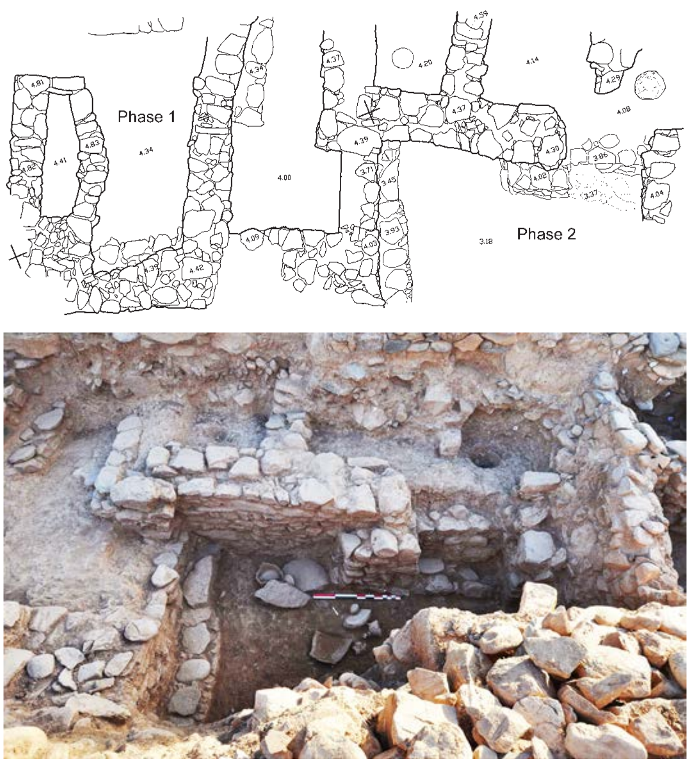


Figure 3. Plan of Phases 1 and 2 constructions, with view of the Phase 2 building, from the south. Drawing D. Faulmann; photo J. Soles.

Figure 4. Middle Minoan IIIA pottery from the Phase 1 construction. Photos C. Papanikolopoulos.

Figure 5. Middle Minoan IIIA rounded cup from Phase 1 construction (top) and LM IA Type B rounded cup from Phase 3 construction (bottom). Drawing D. Faulmann; photo C. Papanikolopoulos.

Figure 6. Middle Minoan IIIB pottery from the Phase 2 construction. Drawing D. Faulmann; photos C. Papanikolopoulos.

corner of the room to one side of a stone basin or "gourna" that was used for food preparation. A refuse bin sat in the northwestern corner of the space, and a pantry, probably provided with shelves, sat in the northeastern corner. Such pantries are features of many Neopalatial kitchens at Mochlos, and they are commonly stocked with cooking equipment and crockery—that is, eating and serving dishes. In this case, the pottery consisted of numerous cups, including many well-known LM I shapes. The conical cups from the deposit recall those from the MM III deposits, but they have narrower bases and are significantly smaller. Striations nearly disappear from the undersides of their bases, and rilling marks on the walls of the cups are barely visible, the result of new technology and the mastery of the potter's wheel. A variety of cups with rounded profiles appear, including bell cups and Type A rounded cups (sometimes called "tea cups") that are decorated either with running closed spirals with added red and white paint (unlike the open spirals of the MM IIIA cups) or with floral motifs like crocuses on a burnished buff surface (Fig. 8). Crocuses seem to be a favorite motif. The Type B rounded cup, which recalls in its shape the rounded cup from the Phase 1 deposit (Fig. 5), also appears. It springs from a prototype in the MM IIB period that continues into MM IIIA with the same characteristics—including a metallic-like slip and grooves, both indicative of skeuomorphism—and then through the MM IIIB, LM IA, and LM IB phases, showing elaborate decoration in each phase and suggesting a persistence in elite consumption practices.

All three deposits in Phases 1–3 belong to precursors of the great ceremonial building (B.2) that would be erected in this location in the LM IB period. It is significant that these earlier phases of construction feature extensive cooking facilities just

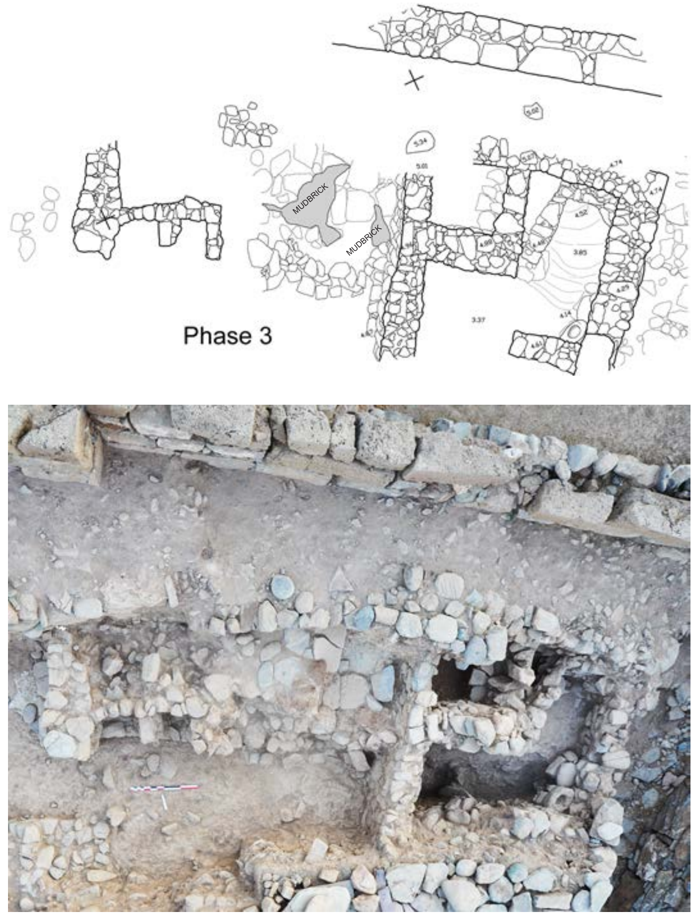


Figure 7. Plan and view of Phase 3 constructions, from the south. Drawing D. Faulmann; photo C. Papanikolopoulos.

like the final LM IB building, emphasizing the importance of feasting in the ritual practices of the town.

In Phase 4 (LM IB), the Mochlos builders carefully encased and preserved these earlier remains to erect the South Terrace over them, surrounding them with walls on the east and south and capping them with large paving stones, some marked with kernoi. In doing so, they created a processional passage that was entered from Avenue 2 at its east, was open on the south where it overlooked the isthmus that connected Mochlos to Crete, was closed by the monumental ashlar wall of Building B.2 that rose on the north, and then descended into the ground on the west where all earlier remains were cleared away to bedrock to create the Theatral Area. The Minoans of Mochlos constructed a sacred space that was bound up with remembrance, and with time. It is significant that the westernmost wall of the Phase 1 construction was reused as a step that led off the terrace and down to three newly constructed steps that led into the Theatral Area, which became the focal point and climax of the Phase 4 construction (Soles 2010).

Each of the three early phases of construction were preserved beneath later collapsed debris that can only be explained in terms of earthquakes, one of which occurred at the end of the MM IIIA

Figure 8. Late Minoan IA pottery from the Phase 3 construction. Drawing D. Faulmann; photos C. Papanikolopoulos.

period, another at the end of MM IIIB, and a third at the end of LM IA. Some of these may have been local. Others, like the one that occurred at the time of the Santorini eruption at the end of the LM IA period, may have been island-wide events (McCoy and Heiken 2000). All three, however, left their mark in the settlement remains found on land and in the underwater topography of the Mochlos straits where wave-cut notches in the beach rock mark periods of subsidence in the coastline that are coterminous with the three earthquakes (Soles, McCoy, and Suka 2017, fig. 2). The earthquakes precipitated the changes in the coastline and quite likely the changes in the pottery styles of each period.

Those were the realities of life in Neopalatial Mochlos—repeated earthquake destructions followed by repeated rebuilding, which marked a resolute, resilient, and optimistic population that was also mindful of its past and mindful of the destructions and harm they caused. The Mochlos inhabitants were very much aware of the earlier remains that lay beneath their feet, not only from the recent Neopalatial past that they still remembered—not only here alongside Building B.2 but everywhere beneath their town—but also from the far distant past. One thousand years of earlier occupation lay beneath the LM IB town, what Ruth Van Dyke and Susan Alcock refer to as "palimpsests of previous occupations" (Van Dyke and Alcock 2003, 1). The inhabitants of Mochlos were very much aware that they lived on top of these layers where generations of ancestors had lived before, and so they recovered Early Bronze Age artifacts like an Early Cycladic marble palette stored in the Theatral Area (probably from the Keros-Syros culture) or the collection of Early Minoan Vasiliki vases on display in the House of the Lady with the Ivory Pyxis as memorials of the past, and they conversely placed LM IB objects as offerings in the tombs of the Prepalatial cemetery. In doing so they were constructing a social memory, preserving the memory of the past and creating and strengthening a sense of community identity in the aftermath of the LM IA destructions.

The greatest evidence for earthquake activity at Mochlos belongs to the fourth phase mentioned here (Fig. 9), which is the last one in the Neopalatial period. This earthquake occurred approximately 100 years after the LM IA catastrophe and caused the ruin of the buildings that had been reconstructed in its aftermath, including the great ceremonial Building B.2. Large ashlar

Figure 9. Collapsed debris from the post–LM IB earthquake. Photo J. Soles.

blocks that adorned the facades of these buildings (sitting as quoins at the corners of walls and also fitted as coping stones between floors), upper story rubble walls, and the pancake collapse of ground floor rooms into rooms below suggest that this seismic event was particularly violent (Fig. 9). Before this disaster occurred, however, at the end of the LM IB period, the townspeople of Mochlos faced another more serious threat—an existential threat—that caused many of them to hide and bury their most important assets beneath the floors of their houses and flee the settlement, hoping that someday they might return. But of course they never returned. Mycenaean invaders drove away any who remained, looted the site, and desecrated its shrines (Wiener 2015). Mochlos never recovered. This final earthquake, which must have occurred after the Mycenaean looting, left the town in ruins and caused its abandonment for a decade or more until new Mycenaean settlers arrived and built a smaller and poorer town in the midst of the ruined debris (Soles 2008).

References

McCoy, F.W., and G. Heiken. 2000. "The Late-Bronze Age Explosive Eruption of Thera (Santorini), Greece: Regional and Local Effects," in *Volcanic Hazards and Disasters in Human Antiquity* (*Geological Society of America Special Paper* 345), F.W. McCoy and G. Heiken, eds., Boulder, CO, pp. 43–70.

Soles, J.S. 2008. *Mochlos* IIA: *Period IV. The Mycenaean Settlement and Cemetery: The Sites* (*Prehistoric Monographs* 23), Philadelphia.

———. 2010. "Evidence for Ancestor Worship in Minoan Crete: New Finds from Mochlos," in *Cretan Offerings. Studies in Honour of Peter Warren* (*BSA Studies* 18), O. Krzyszkowska, ed., London, pp. 331–338.

———. Forthcoming. *Mochlos* IVA: *Period III. The House of the Metal Merchant and Other Buildings in the Neopalatial Town* (*Prehistory Monographs*), Philadelphia.

Soles, J.S., and C. Davaras. 1996. "Excavations at Mochlos, 1992–1993," *Hesperia* 65, pp. 175–230.

Soles, J.S, F.W. McCoy, and R. Suka. 2017. "Evidence for Three Earthquakes at Mochlos in the Neopalatial Period, c. 1700–1430 BC," in *Minoan Earthquakes: Breaking the Myth through Interdisciplinarity* (*Studies in Archaeological Sciences* 5), S. Jusseret and M. Sintubin, eds., Leuven, pp. 307–325.

Van Dyke, R.M., and S.E. Alcock. 2003. "Archaeologies of Memory: An Introduction," in *Archaeologies of Memory*, R.M. Van Dyke and S.E. Alcock, eds., Malden, MA, pp. 1–13.

Wiener, M.H. 2015. "The Mycenaean Conquest of Minoan Crete," in *The Great Islands. Studies of Crete and Cyprus Presented to Gerald Cadogan*, C.F. Macdonald, E. Hatzaki, and S. Andreou, eds., Athens, pp. 131–142.

Eating Meat at Azoria

Flint Dibble

The inhabitants of ancient Azoria liked to eat meat. This conclusion is clear from the great number of animal bones and teeth recovered from the settlement (Figs. 1, 2). Filling 100 crates, it is one of the larger faunal assemblages excavated in Greece. Azoria is one of the most intensively sampled sites in Greece (Fig. 3). All ancient contexts were dry sieved, and 5,905 water flotation samples have been processed, creating over 10,000 bags of bones for me to study. This feat would not have been possible without the facilities and support of the INSTAP Study Center for East Crete (SCEC).

With excavation at Azoria finishing in 2017, I am only at the beginning of my study aiming to make progress as the post-doctoral fellow of the Malcolm H. Wiener Laboratory for Archaeological Science at the American School of Classical Studies at Athens. I will make full use of the resources of this new archaeological laboratory to examine the zooarchaeological assemblage from Azoria within the context of the settlement and within the larger context of Greek archaeology.

Having a large, well-collected zooarchaeological sample means that I can approach the topic of the diet at Azoria in a comprehensive manner. Because most animal remains were considered trash, they are usually heavily fragmented, and few specimens provide detailed information. I am only about one-third of the way through the study, but out of the 83,002 fragments I have examined thus far, only 10,860 specimens are identifiable to both anatomy and taxonomy. Of these identifiable specimens, only 584 display butchery marks, 217 show signs of burning, and 476 reveal relatively precise slaughtering ages. Given that the butchery marks, for example, are distributed across different animal species and different anatomical elements, we need large numbers of bones to begin to understand how animal carcasses were processed.

Figure 1. Student assistants, Rebecca Sigafoos and Stephenie King, processing Azoria faunal material at the INSTAP SCEC. Photo F. Dibble.

Figure 2. Matina Tzari (INSTAP SCEC conservator) and Jonida Martini (Azoria registrar) lifting a set of agrimi horn cores at Azoria. Photo F. Dibble.

The animal bones and teeth from Azoria carry a wealth of information about feasting practices, animal husbandry, sacrificial ritual, and even the disposal of rotting bones. My preliminary results suggest that the inhabitants of Azoria mostly raised and consumed goats in a mixed husbandry strategy with an emphasis on meat. Goats were followed by sheep, pigs, cattle, and smaller numbers of remains from other species both domesticated and wild. This taxonomic pattern is prevalent throughout the site, and it seems that the inhabitants of Azoria consumed similar animals in both domestic and civic settings.

Burned bone associated with the Proto-Archaic Building at Azoria suggests that the lower legs of victims were commonly offered. This practice is known from nearby Chalasmenos, and it is implied in the Homeric Hymn to Hermes. Similarly burned bones are also found on floors in several domestic contexts, potentially providing evidence for abandonment ritual in the early 5th century B.C. Several large deposits of bone associated with the Communal Dining Building give us the opportunity to examine civic dining practices. The carcasses in these middens were processed using cleavers in contrast to knife butchery prevalent in household assemblages. These cleavers were used by professional butchers, perhaps priests, to efficiently break down an animal for large-scale feasting events. While the type of meat (usually goat) consumed in this structure was similar to that consumed in houses, the cuts of meat served there differentiated civic feasts from other meals.

Figure 3. Students Miriam Chadima and Nikki Vellidis sieving excavated soil and looking for faunal material and other archaeological remains. Photo F. Dibble.

Meet the New Librarian

Despoina Papadopoulou is the 2017–2018 Library Fellow at the INSTAP Study Center for East Crete. She studied Law as well as History and Archaeology at the University of Athens. Despoina received her M.A. in Prehistoric Archaeology, and she currently is a Ph.D. candidate at the University of Athens. Her thesis is about the use of serpentine in Minoan Crete.

She has worked as a lawyer and as an archaeologist in Athens and Florina and has voluntarily participated in excavations and material recordings for university projects in Athens and Crete. This year she is very happy to be in the Center's library, maintaining and enriching the library catalog and assisting patrons and visitors.

Ten Centuries of Women's History: An Archaeological and Iconographic Approach to the Minoan Civilization

Caroline Trémeaud

Obtaining one of the Harriet Boyd Hawes Post-Doctoral Fellowships for Gender Studies was the occasion for continuing my work on understanding women's roles in the Aegean and confronting various types of direct and indirect data, using tools and methods developed during my doctoral research (Trémeaud 2014). My project is focused both on funerary data and indirect evidence concerning women's positions such as iconography and texts. The Harriet Boyd Hawes Fellowship allowed me to spend two months at the INSTAP Study Center in order to collect data.

Funerary Data

The extent and variety of the data published on Minoan funerary customs required sampling a small selection of funerary sites. For this project, I focused on Central Crete and the region around the Mirabello Bay (Fig. 1).

In Central Crete four cemeteries were studied: three in the Knossos area—Mavro Spelio (Forsdyke 1926–1927), Zafer Papoura (Evans 1905), and the Double Axe Group (Evans 1914)—and the cemetery at Phourni near Archanes (Sakellarakis and Sapouna-Sakellaraki 1991). These sites allowed me to obtain a coherent and significant set of funerary data. Knossos is an interesting case study because iconographic and textual data could be used thanks to the long-term occupation of the Minoan palace.

To enable comparisons and to question potential cultural differences between Knossos and the rest of Crete, another cemetery was selected in the region of the Mirabello Bay, Mochlos Limenaria (Soles 2008).

These five selected sites document funerary practices from the Early Minoan to Postpalatial periods (Table 1). This wide chronological framework is necessary to detect long-term variation in funerary practices, notably in male or female relationships.

Furthermore, one of the issues of this project is to question the links among women's and men's positions and social structures. To that end, it is interesting to document gender roles during these chronological phases, which are the periods of the appearance, growth, and end of the Minoan palatial system.

To study gender through funerary data, it is necessary to consider individual burials. Minoan funerary practices are complex and mostly involve collective burials where skeletal remains are manipulated. Many tombs were used over long stretches of time, from 200 up to 1,000 years. Moreover, constant new burial activities lead to disturbance of the majority of burials (Branigan, ed., 1998).

The inventory of funerary data for these sites requires distinguishing collective from individual burials (Fig. 2; i.e., when data allows for the association of one individual with or without grave goods). The complexity of funerary practices also requires a reconsideration of our methodology, which resulted in a two-step approach: the first for individualized burials and the second for collective burials.

Figure 1. Map of Cretan sites mentioned in the text.

Cemeteries	Prepalatial				Protopolatial or Old Palace			Neopalatial or New Palace					Postpalatial		
	EM I	EM II	EM III	MM IA	MM IB	MM IIA–IIB		MM IIIA	MM IIIB	LM IA	LM IB	LM II	LM IIIA	LM IIIB	LM IIIC
Zafer Papoura													■		
Mavro Spelio					■	■	■	■	■	■	■	■	■	■	
Double Axe Group													■	■	■
Phourni		■	■	■	■	■	■	■	■	■	■	■	■	■	
Mochlos													■	■	

Table 1. Chronology of the cemeteries studied.

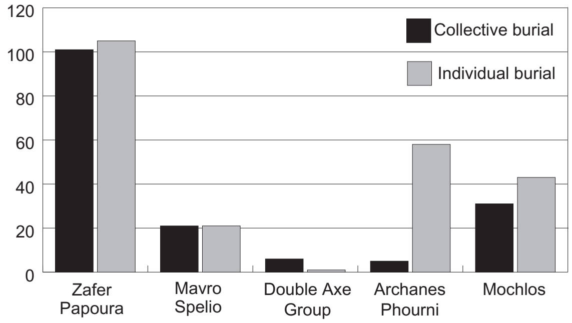


Figure 2. Number of collective and individual burials for each cemetery.

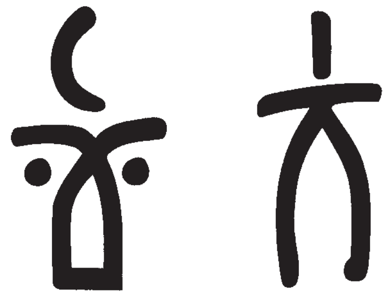


Figure 3. MUL ideogram (left) for woman and VIR ideogram (right) for man in Linear B (from Olsen 2014, 26).

Iconographical and Textual Data

At the end of the Minoan period, textual data exists regarding women's roles (Fig. 3; Olsen 2014). Barbara Olsen has shown that at Knossos women could be slaves, but they also could own their own land and could be property holders. Furthermore, it seems that some of them had an independent economic identity.

The female position at Knossos thus seems to be, like the male position in ancient society, more of a continuum between the slave at the lowest social rank and the upper social rank, the character of which is still a question.

The richness of Minoan imagery allows for the development of a gendered approach to anthropomorphic representation and ideas related to female positions. Different media were used—notably frescoes, seal iconography, and bronze figurines—and were studied in order to define the male and female roles. If previous scholarship (Marinatos 1987) proposed a traditional dichotomy of activities (with the male figure as hunter and warrior and the female figure as mother and nurturer), later research (Hitchcock 1997; Olsen 1998) contested this view and proposed a more nuanced point of view, underlying the possibilities for women to access a higher social status.

To Conclude

My work on Minoan society at the Study Center resulted in the collection of data for a new gender study on funerary customs, which is informed by both textual and iconographic data. This evidence shows the possibility of women's emergence in status based on rich feminine burials (like those of Tholos Tomb D at Archanes [Sakellarakis and Sapouna-Sakellaraki 1991]).

These first results are consistent with what I have highlighted in the north-alpine complex (i.e., the region between the Mediterranean and northern Europe [Brun 1995, 15]) during the Bronze and Iron Ages. As in other ancient Mediterranean societies (i.e., the Etruscan people in Italy and the Argaric culture in southeastern Spain), the Minoan world shows the possibility for women to access a high social status, but even this does not seem to be a long-term pattern.

As a next step, I will analyze the funerary data in detail to define the male and female roles more precisely.

References

Branigan, K., ed. 1998. *Cemetery and Society in the Aegean Bronze Age* (*Sheffield Studies in Aegean Archaeology* 1), Sheffield.

Brun, P. 1995. "From Chiefdom to State Organization in Celtic Europe," in *Celtic Chiefdom, Celtic State: The Evolution of Complex Social Systems in Prehistoric Europe*, B. Arnold and D. Blair Gibson, eds., Cambridge, pp. 13–25.

Evans, A.J. 1905. "The Prehistoric Tombs of Knossos: I. The Cemetery of Zafer Papoura: With a Comparative Note on a Chamber-Tomb at Milatos," *Archaeologia or Miscellaneous Tracts Relating to Antiquity* 59, pp. 391–525.

———. 1914. "The 'Tomb of the Double Axes' and Associated Group, and the Pillar Rooms and Ritual Vessels of the 'Little Palace' at Knossos," *Archaeologia or Miscellaneous Tracts Relating to Antiquity* 65, pp. 1–94.

Forsdyke, E.J. 1926–1927. "The Mavro Spelio Cemetery at Knossos," *BSA* 28, pp. 243–296.

Hitchcock, L.A. 1997. "Engendering Domination: A Structural and Contextual Analysis of Minoan Neopalatial Bronze Figurines," in *Invisible People and Processes: Writing Gender and Childhood into European Archaeology*, J. Moore and E. Scott, eds., London, pp. 113–130.

Marinatos, N. 1987. "Role and Sex Division in Ritual Scenes of Aegean Art," *Journal of Prehistoric Religion* 6, pp. 23–34.

Olsen, B. 1998. "Women, Children, and the Family in the Late Aegean Bronze Age: Differences in Minoan and Mycenaean Constructions of Gender," *WorldArch* 29, pp. 380–392.

———. 2014. *Women in Mycenaean Greece: The Linear B Tablets from Pylos and Knossos*, London.

Sakellarakis, J.A., and E. Sapouna-Sakellaraki. 1991. *Archanes*, Athens.

Soles, J.S. 2008. *Mochlos* IIA: *Period IV. The Mycenaean Settlement and Cemetery: The Sites* (*Prehistory Monographs* 23), Philadelphia.

Trémeaud, C. 2014. *La production des "grandes femmes", la relation des femmes avec la richesse et le pouvoir aux âges du Bronze et du Fer dans le domaine celtique nord-alpin*, Ph.D. diss., Université Paris 1 Panthéon-Sorbonne.

The Petras Cemetery in the Early Minoan II Period

Metaxia Tsipopoulou

The unplundered Pre- and Protopalatial cemetery at Petras, Siteia, in eastern Crete, has been excavated since 2004 (Tsipopoulou, ed., 2012, 2017). It is the largest cemetery in Crete for these periods (Early Minoan [EM] IB–Middle Minoan [MM] IIB, ca. 2800–1800 B.C.) excavated in the 21st century. The earliest tombs are situated at the southwestern edge of the small plateau of the Kephala hill, a very strategic location, less than 50 m north of the Final Neolithic (FN)–EM IA settlement, the place of the ancestors. This area is the end of the natural path leading to Kephala from the later settlement on Hill I (Fig. 1).

To date 17 house tombs, one burial rock shelter, and three burial pits have been excavated (Fig. 2). The thousands of depositions are secondary, with only seven exceptions of primary burials. It is important to point out that this cemetery was not the burial place for the totality of the Petras community, but only for elite families. The very significant quantity of the skeletal material excavated by osteoarchaeologists under the direction of Sevi Triantaphyllou (University of Thessaloniki) is offering very important new data about the people who lived in a gateway and subsequently palatial community in East Crete during the Pre- and Protopalatial periods, including their health status and even their social organization (Fig. 3). The rich grave goods of metal objects, jewelry, seals, stone vases, decorated pottery—many of them exotic, imported prestige items—show affluence and high social (and administrative?) status (Tsipopoulou, ed., 2017).

In February 2015 the 2nd Petras Symposium was organized, entitled "Petras, Siteia: The Pre- and Protopalatial Cemetery in Context." It was a very good opportunity for the international, interdisciplinary Petras team of 26 scholars from nine countries to present the various categories of finds, architecture, skeletal material, and grave goods and to discuss these topics with other colleagues who have excavated and/or studied burial groups of the same periods in East Crete, or who have presented various theoretical approaches on the social and political organization of the area.

This brief article offers the chance to present important new finds of the last two years from the Petras cemetery. They give a much more nuanced picture than we thought previously. Since 2013 the excavation produced a significant amount of data concerning the EM IIA and IIB periods.

Near the southern edge of the small plateau, two EM II house tombs (15 and 17; Fig. 4) were excavated, and just to the north of them a third one (12) was also uncovered. Their plans are rectangular, without entrances, and they are divided with parallel walls into four or five rooms. The richest in skeletal materials and other finds was House Tomb 17, although its plan is not completely preserved. All three of these tombs, as well as two more house tombs of the same period (6 and 13)—which are very badly preserved and situated to the east of House Tombs 12, 15, and 17—were covered (probably in EM III), and this area remained open and free of buildings when the most important house tomb of the cemetery (2) was built in MM IB in order to give direct access to it (Fig. 2).

To date there is evidence for eight EM II house tombs (Fig. 2), although there are only two complete plans that are identical, but of different size. Furthermore in 2017, we excavated two very rich, elite EM IIA primary burials in pits defined by walls under the later House Tomb 2, Area 9 (Fig. 5). A further EM IIB primary burial was excavated in House Tomb 17 in 2016 (Fig. 6). A very interesting and significant find was House Tomb 12, a rectangular structure divided into five small spaces by horizontal walls. It was found empty (except for a few sherds) and filled with medium-sized stones. This was a case of "killing" a building, possibly because the social unit that built it and used it had to be "punished" for some reason. This is a unique case in the Petras cemetery. All other EM II structures were covered with care, and both their architectural remains and their contents were respected.

As is known, in the MM IB period, just before the erection of the palace, the Petras cemetery was organized with corridors between the various house tombs and two large open areas for ceremonies. In the earlier periods though, there was no such spatial organization, and the tombs were adjacent to each other with different orientations. The excavation and studies of the last three years, however, revealed that there were—even then—other spaces for ceremonies to honor the dead, involving eating and drinking. These ceremonies were taking place not in large open spaces, but rather in closed rooms, adjacent to the areas containing the burial deposits. A very good example is the eastern room of House Tomb 16 (ca. 5 x 2 m) that was equipped with a long L-shaped bench, on top of which were found approximately 40 vases, including several imported specimens from South-Central Crete and from the rest of the Aegean, such as a sauceboat.

The end of the EM II period was a time of probable upheavals, mirrored in destructions, often by fire, and abandonments of many (or most) settlements. At Petras, although no fire destruction has been identified in the settlement during this period, it is certain that there was abandonment, and the houses of the subsequent EM III period had a different orientation. The elite Petras cemetery now tells the same story and shows very clearly the architectural changes, which probably reflected significant political or administrative changes as well.

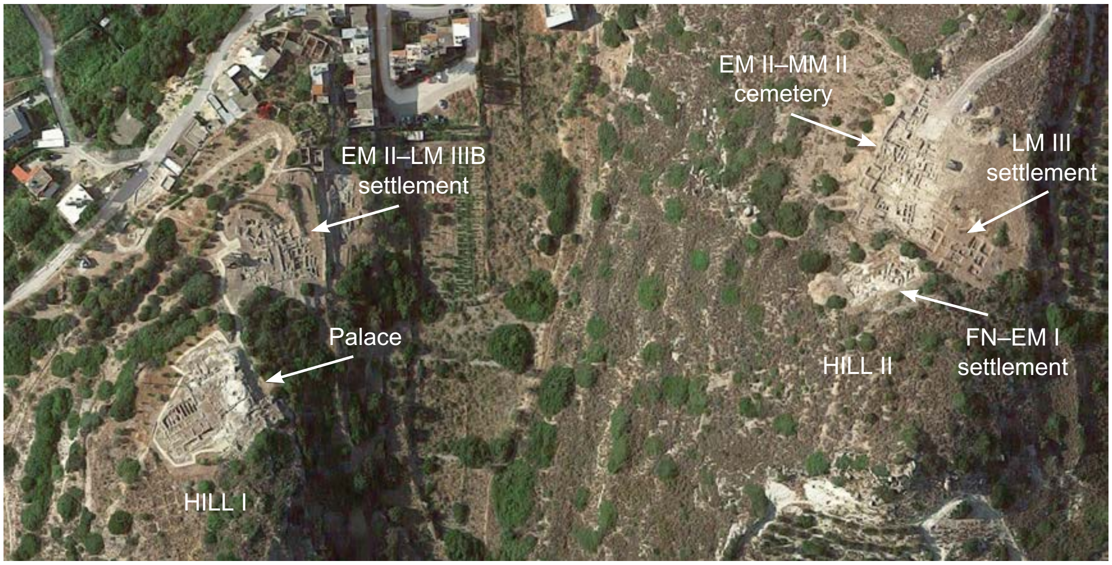


Figure 1. Petras: Hill I (EM II–LM IIIB settlement and palace) and Hill II (FN–EM I settlement, EM II–MM II cemetery, and LM III settlement). North at top of photo. Google Earth photo edited by A. Psychas.

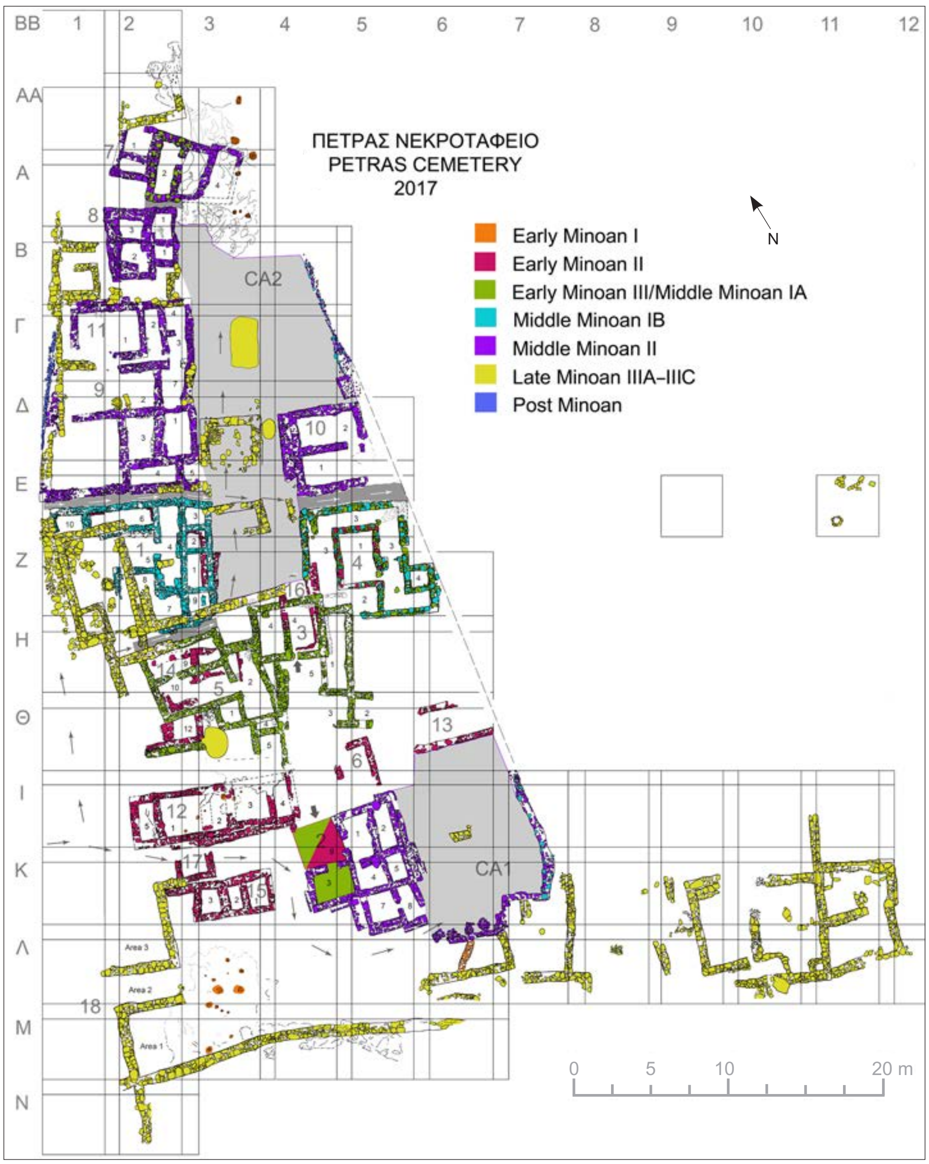


Figure 2. Petras cemetery: 2017 plan with numbered house tombs and ceremonial areas (CA) from the Petras excavation archive. Plan M. Clinton, M. Tsipopoulou, and G. Kostopoulou.

References

Tsipopoulou, M., ed. 2012. *Petras, Siteia: 25 Years of Excavations and Studies. Acts of a Two-day Conference Held at the Danish Institute at Athens, 9–10 October 2010* (*Monographs of the Danish Institute at Athens* 16), Aarhus and Athens.

———. 2017. *Petras, Siteia: The Pre- and Proto-palatial Cemetery in Context. Acts of a Two-day Conference Held at the Danish Institute at Athens, 14–15 February 2015* (*Monographs of the Danish Institute at Athens* 21), Aarhus and Athens.

Figure 3. Petras cemetery: 2017 plan of EM II burial contexts with numbered house tombs and ceremonial areas (CA). Plan M. Clinton, M. Tsipopoulou, and G. Kostopoulou.

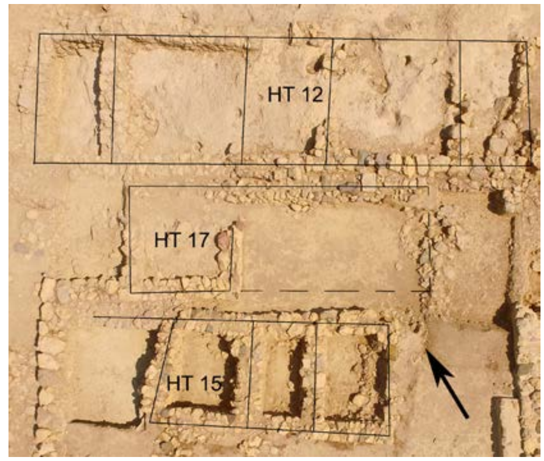


Figure 4. Petras cemetery: aerial photo of House Tombs (HT) 12, 15, and 17. Image M. Clinton and A. Psychas.

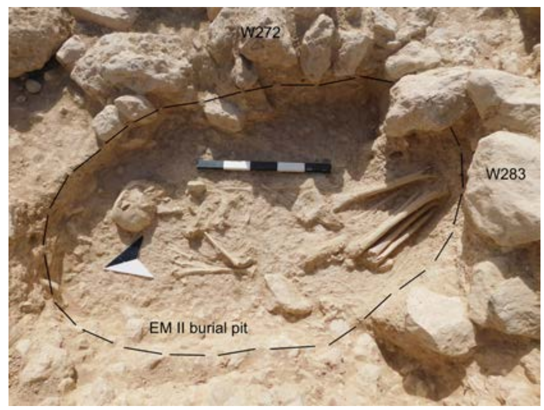


Figure 5. Petras cemetery: House Tomb 2, Area 9, EM II burial pit (W = wall). Image D. Rupp and A. Psychas.

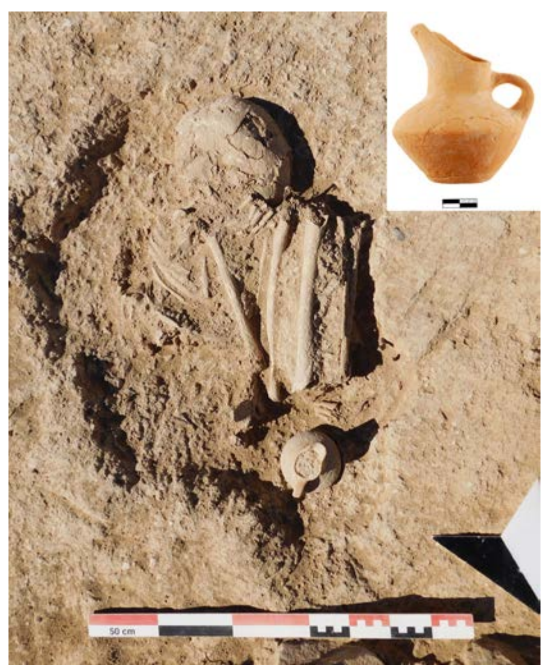


Figure 6. Petras cemetery: House Tomb 17, EM II primary burial. Photos M. Tsipopoulou and Ch. Papanikolopoulos.

Report on Research in 2016 Supported by the Richard Seager Fellowship

Katerina Boukala-Karkagianni

The subject of my doctoral research is the Prepalatial period at Petras, Siteia, through the study of undisturbed ceramic contexts. Petras constitutes one of the most important centers of habitation in East Crete: the only site with a palatial building of the Protopalatial period and with human occupation and activity from the Final Neolithic period (FN; middle of the 4th millennium B.C.) until the end of the Bronze Age (ca. 1200 B.C.; Tsipopoulou 2012a, 47–60). The excavations that have been taking place in the area for over 30 years have unearthed abundant architectural remains and rich deposits in two neighboring locations, Hill I and Hill II.

The earliest evidence of habitation has been found on Hill II (Kephala), dated between FN IV and Early Minoan (EM) IA (Papadatos 2012; Tsipopoulou 2012a, 56–60). During EM IB or EM IIA, occupation moved from Hill II to Hill I, while on Hill II a cemetery was built next to the abandoned FN IV–EM IA settlement and was used until the Protopalatial period (Tsipopoulou 2012a, 47–60; 2012c).

The settlement on Hill I appears to be rather extensive during EM IIB, and it probably covered a large part of the hilltop. It is possible that the situation was similar during the following EM III/Middle Minoan (MM) I period. From this phase, however, only a few architectural remains have survived because the buildings of the settlement were destroyed and the plateau was levelled in order to make space for the construction of the palace (Tsipopoulou 1999, 847–848). Nevertheless, soundings made underneath the foundations and the floors of the palace have revealed thick soil deposits as well as pottery of the Prepalatial period.

The meticulous excavation of these soundings (hereafter stratigraphic trenches; Fig. 1) took place in the excavation periods of 1994 and 1995. A total of 23 trenches were opened. Of those, seven are in various areas of the court, two are in the corridors on the northern side of the palatial building, two are outside the palatial building to the northwest, and 12 are inside the rooms of the palatial building. The trenches measure generally 1 x 1 m or 1 x 0.5 m, and they either reached the bedrock or stopped with the appearance of architectural features (Tsipopoulou and Wedde 2000).

The goal of the research thus is the reconstruction of the early history of Petras, from the establishment of the settlement in EM IB–IIA until the construction of the palace in MM IIA, through the study of pottery. The primary material of my doctoral research is the Prepalatial pottery that was found in the stratigraphic trenches underneath the palace and the remains of an EM IIB house, which was found on the northeastern edge of the small plateau of Hill I (Tsipopoulou 2012a, 49–50).

The study focuses on both the technology and typology of the pottery in an effort to examine not only the consumption, but also the production of pottery at Petras in a diachronic perspective. To do so, the pottery is categorized by wares, and each ware is studied according to the fabrics, shapes, and decoration or surface treatment. I also attempted to separate local production from imports. Furthermore, the study of the shapes of the vessels is not based on their typology, but on their use and social importance, such as their use in feasting or other social events, which included the mass consumption of food and drink.

Beyond the main issues—such as the development of the pottery itself, the ceramic types that were used, the context of their use (everyday use, ceremonial, funerary), and the changes and innovations of ceramic technology—additional questions arise.

An important question concerns continuities and discontinuities between the phases of the Prepalatial period at Petras. Changes in ceramic production and consumption can provide information about social development or changes in the organization of the settlement itself. The preliminary study of the material from the FN IV–EM IA settlement and from the EM IB burial rock shelter indicates an uninterrupted transition between these early phases (Nodarou 2012, 86; Papadatos 2012, 73–75). We think that it is possible to approach the continuities and discontinuities between the subsequent phases of the Prepalatial period in a similar manner, through the examination of the aforementioned undisturbed contexts, despite the fact that most of them are not the result of continuous stratigraphy and do not come from undisturbed deposits. For example, a focus on the differences between the EM I and EM II periods may provide answers concerning the abandonment of Hill II and the foundation of the settlement on Hill I. These differences also could indicate whether there was a movement of the same population or whether the new settlement was founded by groups of people that came from elsewhere. Another issue concerns the extent and character of the settlement, and perhaps also the use of its areas in which the ceramic contexts were found.

Of particular interest is also the relationship of Petras with two regions: (1) the Cyclades before and after the Kampos Group phase, based on the evidence from the FN IV–EM IA settlement

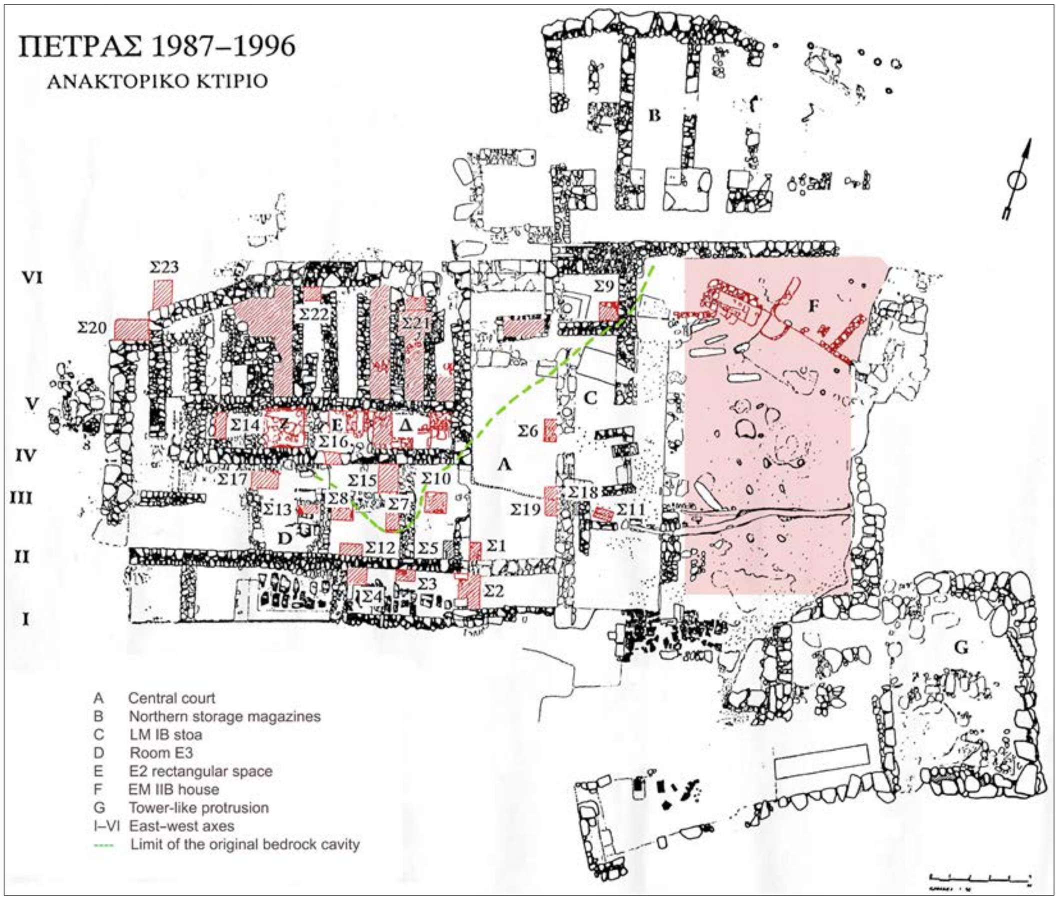


Figure 1. Plan of the Petras palace with Stratigraphic Trenches Σ1–Σ23 in red hatching (Petras Excavations Archive, ©M. Tsipopoulou).

at Kephala (Papadatos 2012, 72–75) and the burial rock shelter (Nodarou 2012) in the cemetery (Tsipopoulou 2012b); and (2) other centers of pottery production in Crete such as the Mirabello region. Important new evidence for the contacts of Petras with the Cyclades, other areas of Crete, and perhaps Anatolia recently has been found in the excavation of the Pre- and Protopalatial cemetery on Hill II. It is therefore of particular importance to examine whether similar evidence also can be seen in the ceramic assemblages of the settlement.

A third key issue of my doctoral research is the verification of the date of the construction of the Petras palace. Preliminary study of the pottery from the stratigraphic trenches led the excavator to suggest a rather belated construction after the end of MM IB, which is after the construction of all the other Protopalatial palaces in Crete that are traditionally dated to the beginning of MM IB or perhaps earlier. The detailed study of the ceramic material from the stratigraphic trenches, together with the parallel study of the already published context of the Lakkos (Haggis 2007), will allow us to test this dating, which is of crucial importance for the understanding of the social conditions and the historical context within which the Petras palace was established and constructed.

During my five weeks of study at the INSTAP Study Center, the material from 15 out of 23 stratigraphic trenches was studied. The pottery is fragmentary, and there are no clear layer divisions due to the disturbance of the Prepalatial deposits by levelling works that took place before the erection of the palace. Nevertheless, the earlier pottery tends to be found in the lower levels, while the later pottery comes from the upper levels of the stratigraphy.

Each stratigraphic trench was studied separately. Sherds of each stratum were sorted according to ware and fabric, and joins were identified (Fig. 2). All the observations and measurements made for each of the trenches were recorded in Excel files. Fabrics were identified with the help of a portable microscope (Dino-Lite) provided by the Study Center and checked by the petrographer of the Study Center, Eleni Nodarou.

The material will be approached on the basis of ware categories in accordance with other published studies of Prepalatial ceramic material (e.g., Wilson and Day 1994). At the same time, the shapes and fabrics that could be identified were taken into account, mostly for sherds that could be safely dated. In other cases, however, the dating of sherds was not possible due to the fragmentation of the pottery, and for that reason the dates are given in broader chronological horizons—that is, Early Prepalatial (FN–EM IIA), Late Prepalatial (EM III–MM IA), and Protopalatial.

After the study of the 15 stratigraphic trenches, general observations were made concerning the periods and the intensity of use of Hill I at Petras. The rarity of FN and EM IA material on Hill I supports the hypothesis that, in this period, the main center of habitation at Petras was on Hill II (Papadatos 2012). The presence of a few FN and EM IA sherds on Hill I could be seen as off-site pottery or could represent minor episodes of human presence or activity. The percentage of EM IB–IIA material is significantly larger, indicating the movement of the settlement to Hill I at the same time when Hill II became a burial ground, at least on the basis of the evidence from the burial rock shelter. It is of particular importance that one of the most frequent ceramic wares of the EM IB–IIA period is the calcite-tempered dark burnished pottery, which is traditionally characterized as Cycladic type or Cycladic related because it has technological affinities with the Cycladic pottery of the so-called Kampos Group (Tsipopoulou 2012b). Apart from this Cycladic-type pottery, however, there are no indications, for the time being, of trade with other areas.

A large part of the pottery can be dated to EM IIB, perhaps suggesting an increase in the size and the importance of the settlement. Many imports from the Mirabello area were identified in this period, as is the case also at other sites such as Myrtos Phournou Koriphi (Whitelaw et al. 1997). Undoubtedly, the increase of pottery imports, particularly from the Mirabello region, is indicative of consumers' preferences, but it may reflect indirectly the rise of Mirabello as an area of specialized pottery, with workshops producing highly esteemed ceramic products.

The bulk of the pottery is dated to the EM III–MM IA period, suggesting a further increase in the size and importance of the settlement. In contrast, the pottery from the subsequent MM IB period is rather limited. This is surprising because MM IB is the period that immediately precedes the construction of the palace. We thus would expect much more MM IB pottery as a result of the disturbances connected with the erection of the palace in MM IIA. We hope that the continuation of research and the comparative analysis of the MM IA and MM IB pottery from the stratigraphic trenches with the pottery from the Lakkos (Haggis 2007) will clarify this problem, which is crucial for the precise dating of the construction of the palace.

Figure 2. Pottery from the stratigraphical trenches during study at the INSTAP Study Center. Photo K. Boukala-Karkagianni.

References

Haggis, D. 2007. "Stylistic Diversity and Diacritical Feasting at Protopalatial Petras: A Preliminary Analysis of the Lakkos Deposit," *AJA* 111, pp. 715–775.

Nodarou, E. 2012. "Pottery Fabrics and Recipes in the Final Neolithic and Early Minoan I Period: The Analytical Evidence from the Settlement and the Rock Shelter of Kephala Petras," in M. Tsipopoulou, ed., 2012, pp. 81–88.

Papadatos, Y. 2012. "Back to the Beginnings: The Earliest Habitation at Petras on the Basis of the Evidence from the FN–EM I Settlement on Kephala," in M. Tsipopoulou, ed., 2012, pp. 69–79.

Tsipopoulou, M. 1999. "Before, During, After: The Architectural Phases of the Palatial Building at Petras, Siteia," in *Meletemata. Studies in Aegean Archaeology Presented to Malcolm H. Wiener as He Enters His 65th Year* (*Aegaeum* 20), P.P. Betancourt, V. Karageorghis, R. Laffineur, and W.-D. Niemeier, eds., Liège, pp. 847–856.

———. 2012a. "Introduction: 25 Years of Excavations and Studies at Petras," in M. Tsipopoulou, ed., 2012, pp. 45–68.

———. 2012b. "Kampos Group Pottery from the Cemetery of Petras, Siteia," in *Philistor. Studies in Honor of Costis Davaras* (*Prehistory Monographs* 36), E. Mantzourani and P.P. Betancourt, eds., Philadelphia, pp. 213–222.

———. 2012c. "The Prepalatial–Early Protopalatial Cemetery at Petras, Siteia: A Diachronic Symbol of Social Coherence," in M. Tsipopoulou, ed., 2012, pp. 117–131.

———, ed. 2012. *Petras, Siteia: 25 Years of Excavations and Studies. Acts of a Two-day Conference Held at the Danish Institute at Athens, 9–10 October 2010* (*Monographs of the Danish Institute at Athens* 16), Aarhus and Athens.

Tsipopoulou, M., and M. Wedde. 2000. "Διαβάζοντας ένα χωμάτινο παλίμψηστο: Στρωματογραφικές τομές στο ανακτορικό κτίριο του Πετρά Σητείας," in *Πεπραγμένα Η' Διεθνοῦς Κρητολογικοῦ Συνεδρίου*, A' (3), Herakleion, pp. 359–377.

Whitelaw, T., P.M. Day, E. Kiriatzi, V. Kilikoglou, and D.E. Wilson. 1997. "Ceramic Traditions at EM IIB Myrtos, Fournou Korifi," in *Texnh: Craftsmen, Craftswomen, and Craftsmanship in the Aegean Bronze Age* (*Aegaeum* 16), R. Laffineur and P.P. Betancourt, eds., Liège, pp. 265–274.

Wilson, D.E., and P.M. Day. 1994. "Ceramic Regionalism in Prepalatial Central Crete: The Mesara Imports at EM I to EM IIA Knossos," *BSA* 89, pp. 1–87.

Study Center Fellowship News

Support the Seager Fellowship

The Richard Seager Doctoral Fellowship was created in 2009 with the goal of helping doctoral candidates use the resources at the Study Center to bring their dissertations closer to completion. With your help, we can reach our goal of $4,000 for the 2019 fellowship. We are happy to announce that this fall we will be able to award our 10th fellowship to a qualified candidate for 2018! Our 2017 recipient, Katerina Boukala-Karkagiani, reports on her work in this issue of the newsletter (see p. 23).

Support the Hawes Fellowship

We are pleased to announce that the Hawes Post-Doctoral Fellowship for Gender Studies will be offered again in 2018 to a qualified applicant! The fellowship was established last year with the goal of incorporating gender studies in Aegean Bronze Age archaeology to highlight various aspects of ancient life that have not yet received sufficient attention. The two recipients of last year's fellowships, Drs. Julie Hruby and Caroline Trémeaud, have written articles about their research for this issue of our newsletter (see pp. 3, 18). This fellowship is open to those in the fields of Anthropology, Art History, Ancient History, or Classics. The recipient of the 2018 fellowship will use the Study Center's resources to aid their research. The Hawes Fellowship was founded with the generous support of the Ms. Foundation. With your help, we can reach our goal of $3,000 for another fellowship in 2019 or $6,000, which would enable us to offer two fellowships.

Donations

Please send your checks to Elizabeth Shank in Philadelphia (see p. 32). They should be made out to the INSTAP Study Center for East Crete, with either "Seager Fellowship" or "Hawes Fellowship" written on the memo line. If you would like to donate in euros through direct deposit, please contact Eleanor Huffman at eleanorhuffman@instapstudycenter.net. You may also donate online:
http://www.instapstudycenter.net/general-information/donate.html

The Lustral Basin Frescoes from Chania, Crete: Conservation of the West Wall Dado Panel

Angeliki Kaintirmoglou and Elizabeth Shank

Introduction

In western Crete, the modern town of Chania was established on top of the ruins of the Minoan settlement of Kydonia, which is also the name of the Classical city at the same site. Excavations in 1989, 1991, and 1997 in Daskaloyanni Street in the district of Splantzia uncovered a large Late Minoan I building complex (Andreadaki-Vlasaki 1988; 1992; 2002; 2005; Niniou-Kindell 1989). This Neopalatial complex contains a lustral basin or adyton that measures 2 x 2 m, and it is extensively decorated with frescoes. Conservation and study of thousands of these fragments under the direction of Maria Andreadaki-Vlasaki has been ongoing since 2014. The project has been supported by the Institute for Aegean Prehistory, the INSTAP Study Center for East Crete, and the Ephorate of Antiquities of Chania.

The excellent excavation and preservation of the fresco fragments has aided us tremendously, not only in our conservation effort, but also in our understanding of the fresco program of the room. All four walls of the adyton contained frescoes depicting rockwork dadoes, each surmounted by bandwork, a red background, and a zone of running spirals executed without the aid of a compass. The painted dado from the western wall of the room was found in situ (Fig. 1) and was removed from the wall in 1989 and placed in a metal frame, its fragments surrounded by modern, quick-set plaster (Fig. 2). The dado was

Figure 1. The painted dado fresco panel in situ on the western wall of the LM I adyton during excavation in 1989 in Chania. Courtesy Chania Archive.

very well preserved, though the fresco fragments were buckled in some areas due to an earthquake.

Over the past two years, with the help of Christaleni Alifieraki, the fresco fragments from the upper portion of the west wall have been studied, conserved, and pieced together. It became clear that the best presentation of the wall would be to incorporate the painted rockwork dado into the same composition as these upper wall fragments. The painted dado panel had not been cleaned or conserved since 1989, and we knew that it could be improved by flattening the buckled pieces. The surface of the painted dado's fragments had accumulated dirt and dust, and the modern plaster filled gaps between the frame and the fresco fragments. This modern plaster was a mixture of unknown materials, and it would not match the newer plaster that we were about to use. In short, the 1989 frame and its accompanying conservation material had to be removed. With the help of Angelidis Panagiotis and Haris Karaiskos, conservators from the Directorate of the Conservation of Antiquities from Athens, we were ready to begin our work on the west wall frescoed dado.

Initial Assessment

The 1989 frame of the west wall's painted dado was rectangular and constructed of aluminum. When we looked at the back of the panel, a metal grid filled with polyurethane granules and covered by gauze was visible (Fig. 3). It appeared that the glue that was used was epoxy. We knew that we would need to see what was underneath this surface. We removed some of the granules, trying to find the back of the fresco fragments (Fig. 4). When we "dug" enough, we surprisingly saw that the back of the fresco was covered with epoxy as well! While we were feeling desperate and discussing what to do, we noticed a very small puncture in the surface of the epoxy layer where we were able to see that the epoxy was not fixed to the fragments but was actually stuck to the layer of gauze. The gauze looked like a plastic crust stuck to the back side of the panel. It appears that the glue failed to soak into the ancient plaster because either the dust or the Casein that was used over the gauze prevented it from doing so. The painted fresco dado was never really fixed within the frame. After this discovery, it was obvious that the only thing holding the fresco fragments to the panel was the modern plaster that was filling the gaps!

Figure 2. Overhead view of the dado fresco in its 1989 frame. Photo C. Alifieraki.

Figure 3. The back of the dado fresco panel in its 1989 frame. Photo C. Alifieraki.

Figure 4. Haris Karaiskos begins removing polyurethane granules and epoxy from the back of the 1989 panel. Photo C. Alifieraki.

Turning the Frame Upside Down

We were very happy to see that we were able to move to the next step—safely removing the fresco from the frame. We would have to secure the entire panel to protect the fragments first and

Figure 5. Angeliki Kaintirmoglou cleans and stabilizes the front painted surface of the fresco. Photo C. Alifieraki.

Figure 6. Angeliki Kaintirmoglou and Panagiotis Angelidis affix a large sheet of gauze to the painted surface of the fresco. Photo C. Alifieraki.

Figure 7. Haris supervises the construction of the new wooden frame by Giannis Slalidis with Michalis Papadakis and Panagiotis Angelidis. Photo C. Alifieraki.

Figure 8. A large piece of nylon is placed over the gauze for further protection of the painted surface of the fresco by Haris, Angeliki, and Panagiotis. Photo by C. Alifieraki.

then turn it upside down. We devised a detailed procedure to accomplish our goal. First, dust was removed from the painted surface of the fresco with a small brush. Then, the painted surface of the fresco was stabilized using 2%–4% Paraloid resin (Fig. 5). The painted surface of the fresco was covered for protection with gauze that was affixed with 15%–20% Paraloid resin (Fig. 6). The fresco, in its 1989 aluminum frame, was placed face up on a wooden board. We then placed a larger wooden frame around the 1989 aluminum frame (Fig. 7). The entire panel was then covered with a piece of nylon (Fig. 8). We poured gypsum onto the surface of the nylon that covered the fresco in order to stabilize this side of the dado. On top of the dried gypsum layer we placed pieces of foam to further protect the painted surface. Another wooden board was placed on top of the foam, creating a "sandwich" with the fresco in the middle (Fig. 9). Additional wooden struts which formed a ladder-like shape were placed on top of the sandwich for increased stability. Orange belts were tightened around the entire package (Fig. 10), and then we were able to turn the "sandwich" upside down.

Removing the Frame

After removing the orange belts, the wooden ladder-like support, the wooden board, and the nylon and foam, the back of the panel was revealed (Fig. 11). We had to remove the polyurethane granules, the metal grid, and any other conservation materials from the 1989 work on the panel. A considerable amount of epoxy glue had been used, and it became clear that the metal grid would be difficult to extract. We decided to cut the grid into small pieces with a power saw, carefully keeping the saw at a safe distance from the back surface of the prehistoric fresco (Fig. 12).

Figure 9. A wooden board is placed on top by Michalis Papadakis and Giannis Slalidis, creating the "sandwich" that holds the fresco panel, under the supervision of Panagiotis and Haris. Photo C. Alifieraki.

Figure 10. Belts are tightened around the "sandwich" by Giannis while Michalis and Haris hold the wooden struts in place. Photo C. Alifieraki.

Figure 11. The fresco panel has been successfully flipped upside-down so that the back of the 1989 panel is exposed. Photo C. Alifieraki.

Figure 12. Panagiotis uses a power saw to carefully cut through the conservation material on the back of the panel. Photo C. Alifieraki.

When we removed the grid we were able to see a central aluminum brace that helped stabilize the 1989 panel. More epoxy glue was stuck to the central brace and the gauze used on the back of the fresco panel. The only way to remove the gauze was by bending and breaking it using a small spatula and scalpel. In areas where the epoxy was too thick for these tools to work effectively, we used a Dremel power tool to cut the backing into smaller, removable pieces (Fig. 13). The modern plaster was removed with a dryer used in conservation—the hot air softened the plaster so that it could be removed with a scalpel. Finally, we could remove the central aluminum brace with the power saw.

Flattening the Mural

After we had successfully removed the aluminum frame, the epoxy, and the modern conservation materials, we removed all

Figure 13. Removing the conservation material with a Dremel power tool. Photo C. Alifieraki.

Figure 14. Weights are placed on the back of the panel to flatten the fresco. Photo C. Alifieraki.

Figure 15. Angeliki finishes cleaning the front of the fresco. Photo E. Shank.

dust and dirt and stabilized the fresco using 5%–7% Paraloid resin. Then we had to flatten the buckled panel. To do this, we had to select the correct cracks from which to remove the soil so that we would make space for the deformed areas. After this, we dropped acetate into each area so that the plaster softened, and we could apply weights to the surface until the acetate dried (Fig. 14). When we removed the weights, the areas were flattened. We repeated this process, and the fresco improved even more. Plaster was added to the back of the panel in order to further protect and stabilize the fresco.

When the plaster dried, we placed a thick piece of foam over the fresco's back surface for protection and placed the wooden board on top, creating a "sandwich" just as we had done previously. It was then possible to safely turn the dado panel over so that its painted surface would be exposed and ready for cleaning.

Cleaning the Mural

The layer of gauze was removed from the front surface of the fresco with acetone. This was a difficult and painstaking process. Unfortunately, the cracks in the fresco were full of soil, so we removed this using acetone, which was then used to clean the painted surface (Fig. 15). The newly conserved painted rockwork dado is now ready to be incorporated into a reconstruction of the entire west wall of the adyton. This will become part of a three-dimensional recreation of the adyton, which will be displayed in the new Archaeological Museum of Chania.

References

Andreadaki-Vlasaki, M. 1988. "Υπόγειο άδυτο ή 'δεξαμενή καθαρμών' στα Χανιά," *AAA* 21 [1993], pp. 56–76.

———. 1992. "Χρονικά ΚΕ' ΕΠΚΑ," *ArchDelt* 47 (B', 2 Chronika) [1997], pp. 566–571.

———. 2002. "Are We Approaching the Minoan Palace of Khania?" in *Monuments of Minos: Rethinking the Minoan Palaces. Proceedings of the International Workshop "Crete of the Hundred Palaces?" Held at the UCL, Louvain-la-Neuve, 14–15 December 2001* (*Aegaeum* 23), J. Driessen, I. Schoep, and R. Laffineur, eds., Liège, pp. 157–165.

———. 2005. "Cultes et divinités dans la ville minoenne de La Canée. Quelques réflexions," in *Κρησ Τεχνιτησ: L'Artisan Crétois. Recueil d'articles en l'honneur de Jean-Claude Poursat, publié à l'occasion des 40 ans de la découverte du Quartier Mu* (*Aegaeum* 26), I. Bradfer-Burdet, B. Detournay, and R. Laffineur, eds., Liège, pp. 17–27.

Niniou-Kindell, V. 1989. "Χρονικά ΚΕ' ΕΠΚΑ," *ArchDelt* 44 (B', 2 Chronika) [1995], pp. 581–583.

SALE
New Titles in Autumn 2017

INSTAP ACADEMIC PRESS

The Wall Paintings of the West House at Mycenae
(*Prehistory Monographs* 54, 2017) by Iphiyenia Tournavitou

296 pp., 39 B/W figures, 37 B/W plates, 2 color plates, ISBN 978-1-931534-88-8.
Hardback. ~~US$80.00~~ **US$64.00**. ~~UK£55.00~~ **UK£44.00**.

The Galatas Survey: Socioeconomic and Political Development of a Contested Territory in Central Crete during the Neolithic to Ottoman Periods (*Prehistory Monograph* 55, 2017)
by L. Vance Watrous, D. Matthew Buell, Eleni Kokinou, Pantelis Soupios, Apostolos Sarris, Sabine Beckmann, Georgos Rethemiotakis, Lee Ann Turner, Scott Gallimore, and Mark D. Hammond, with contributions by Kapua Iao, Amy Heimroth, and Brice Erickson

464 pp., 20 tables, 37 B/W figures, 69 B/W plates, ISBN 978-1-931534-89-5.
Hardback. ~~US$80.00~~ **US$64.00**. ~~UK£55.00~~ **UK£44.00**.

Ayia Sotira: A Mycenaean Chamber Tomb Cemetery in the Nemea Valley, Greece
(*Prehistory Monographs* 56, 2017) by R. Angus K. Smith, Mary K. Dabney, Evangelia Pappi, Sevasti Triantaphyllou, and James C. Wright, with contributions by Panagiotis Karkanas, Georgia Kotzamani, Alexandra Livarda, Camilla MacKay, Maria Ntinou, Maria Roumpou, Alan M. Stahl, and Georgia Tsartsidou

364 pp., 62 tables, 54 plates, ISBN 978-1-931534-90-1. Hardback. ~~US$80.00~~ **US$64.00**. ~~UK£55.00~~ **UK£44.00**.

House X at Kommos: A Minoan Mansion near the Sea. Part 2: The Pottery (*Prehistory Monographs* 57, 2017)
by Jeremy B. Rutter, edited by Joseph W. Shaw and Maria C. Shaw

574 pp., 123 B/W figures, 22 B/W plates, ISBN 978-1-931534-91-8.
Hardback. ~~US$80.00~~ **US$64.00**. ~~UK£55.00~~ **UK£44.00**.

The Alatzomouri Rock Shelter: An Early Minoan III Deposit in Eastern Crete (*Prehistory Monographs* 58, 2017)
edited by Vili Apostolakou, Thomas M. Brogan, and Philip P. Betancourt, with contributions by Vili Apostolakou, Philip P. Betancourt, Thomas M. Brogan, Joanne E. Cutler, Heidi M.C. Dierckx, Susan C. Ferrence, Floyd W. McCoy, Evi Margaritis, Dimitra Mylona, and Eleni Nodarou

274 pp., 71 B/W figures, 49 plates, ISBN 978-1-931534-93-2.
Hardback. ~~US$80.00~~ **US$64.00**. ~~UK£55.00~~ **UK£44.00**.

For sales in US$:
Casemate Academic, 1950 Lawrence Rd., Havertown, PA 19083.
Tel: 610-853-9131. Fax: 610-853-9146.
info@casemateacademic.com https://www.oxbowbooks.com/dbbc/instap

For sales in UK£:
Oxbow Books, 47 Church Street, Barnsley, S70 2AS, UK.
Tel: +44 (0)1226 734350. Fax: +44 (0)1662 734438.
orders@oxbowbooks.com https://www.oxbowbooks.com/oxbow/instap

For institutional access to PDFs:
https://www.jstor.org/publisher/instappress

JSTOR

Use discount code 858-17 when ordering from www.oxbowbooks.com. Sale ends December 31, 2017!

INSTAP Study Center for East Crete

United States Academic Office

Philip P. Betancourt, *Executive Director*
Elizabeth Shank, *United States Coordinator and* Kentro *Editor*
INSTAP Academic Press, Kentro *Production*

INSTAP Study Center for East Crete
2133 Arch Street, Suite 300
Philadelphia, PA 19103, USA
Tel. 215-496-9914
Fax. 215-496-9925
elizabethshank@hotmail.com

The Study Center is affiliated with the Mediterranean Section of the University of Pennsylvania Museum of Archaeology and Anthropology and the History of Art Department at the University of Pennsylvania.

Members of the Managing Committee

Philip P. Betancourt	Margaret S. Mook
Thomas M. Brogan	Jerolyn E. Morrison
Leslie P. Day	James D. Muhly
Susan C. Ferrence	Jenifer Neils
Geraldine C. Gesell	Elizabeth Shank
Donald C. Haggis	Jeffrey S. Soles
Floyd McCoy	Thomas Strasser
Jennifer Moody	L. Vance Watrous

Study Center in Crete

Thomas M. Brogan, *Director*
Eleanor J. Huffman, *Business Administrator*
Stephania N. Chlouveraki, *Site Conservation Specialist*
Kathy Hall, *Senior Conservator*
Matina Tzari, *Conservation Technician*
Chronis Papanikolopoulos, *Chief Photographer*
Doug Faulmann, *Chief Artist*
Eleni Nodarou, *Ceramic Petrographer*
Dimitra Mylona, *Faunal Analyst*
Despoina Papadopoulou, *2017–2018 Librarian Fellow*
Matina Papadaki, *Soil Flotation Technician*
Michalis Solidakis, *Maintenance Personnel*
Maria A. Koinakis, *Custodian*

INSTAP Study Center for East Crete
P.O. Box 364
Pacheia Ammos
Ierapetra 72200
Crete, GREECE
Tel. 30-28420-93027
Fax. 30-28420-93017
tombrogan@instapstudycenter.net
eleanorhuffman@instapstudycenter.net
www.instapstudycenter.net

Celebration!

The INSTAP Study Center for East Crete celebrated its 20th anniversary on July 29, 2017. Over 300 friends and colleagues came together for stimulating lectures, delicious food, and entertaining live music. We were grateful to share this milestone with so many of our supporters.

Eleanor Huffman and Tom Brogan listening to the band play late into the evening. Photo N. Vogeikoff-Brogan.