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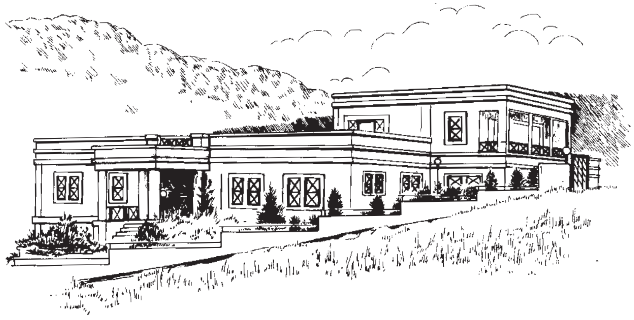

The Excavation at Mesolithic Damnoni: Investigations of a New Culture on Crete

Thomas F. Strasser, Eleni Panagopoulou, and Miriam Clinton

From 2008 to 2013, a collaborative project between the American School of Classical Studies (ASCSA) and the Ephoreia of Speleology-Palaeoanthropology of Southern Greece was conducted around the modern village of Plakias in southwestern Crete (Figs. 1, 2). In the first two years, our survey focused on paleosols in the region to find Mesolithic (ca. 9500–6500 B.C.) remains. In the following years we pursued an excavation at the nearby newly discovered site of Damnoni (Fig. 3). The excavation represents the first stratified Mesolithic site on Crete and, therefore, a culture previously unknown to archaeologists on the island. We hope that this excavation represents a modest beginning to expand our understanding of the early prehistory of the island and provides a novel line of inquiry for future archaeologists.

Figure 1. View of the excavation at Damnoni, near modern Plakias. Photo T. Strasser.

The excavations at Damnoni in 2011 and 2013 were carried out in small trenches that measured 1 x 1 m (Fig. 1). The retrieval system was systematic and careful: all soil was either dry sieved or floated. Because a microlithic industry is characteristic of the Greek Mesolithic, special dry sieves with a grid of >0.5 cm were made for the site, as was a new flotation device. With these meticulous excavation techniques in place and in coordination with the geologist Panayiotis Karkanas, we were able to locate the strata that bracketed the Mesolithic tools. Three strata were discovered: the topsoil, an Aeolian (wind generated) deposit with the majority of the Mesolithic artifacts, and a basal stratum of sterile paleosols (Fig. 4).

The site is small, with two areas ca. 10 x 10 m in size and with shallow deposition (Fig. 5). Much of the site may have been eroded away, but it must also be considered that Damnoni is less a habitation site than an activity area. Though the lithic deposition is relatively impressive in light of its age, there are no walls or any other indications of settlement. The easy access to fresh water nearby, as well as a shallow brackish cove attractive to flora and fauna, were probably the primary reasons for the Mesolithic exploitation of the region. The salient point, however, is that the site is not extraordinarily conspicuous. Because our team was looking at paleosols very intensively, we found the site despite the thick vegetation that lessened visibility. Future survey directors should keep this in mind because this site would most likely have been overlooked by large-scale reconnaissance.

We found a significant quantity of typical Mesolithic lithic artifacts (notches, denticulates, spines, and perforators among others). The most abundant raw material used was quartz, though many artifacts were made of chert, some of which have colors unfamiliar and uncommon to the region (Fig. 6). We also found obsidian in the Mesolithic stratum, which is presently under analysis. We hope further research into the stone sources and dates will lead to interesting conclusions on early seafaring and exchange.

Mesolithic tools have also been recently reported from Livari and Moni Kapsas in the southeast of Crete. Now that this new culture is being accepted as a new phase in Cretan prehistory, it seems very likely that more Mesolithic sites will be found, and an exciting new period in the island's history will continue to be revealed in the near future.

Figure 2. Crete showing the location of Plakias and Damnoni. Map E. McKenna.

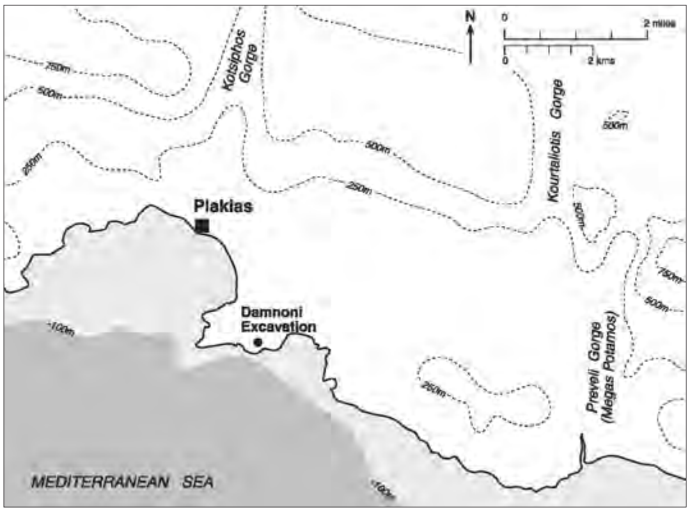

Figure 3. Location of the excavation at Damnoni. Map E. McKenna.

Figure 5. Damnoni cave from the south. The excavation was in front of the cave located in the center. Photo K. Waltz.

Acknowledgments

Many thanks to the Ephoreia of Speleology-Palaeoanthropology of Southern Greece, the 25th Ephoreia of Prehistoric and Classical Antiquities, ASCSA, the Archaeological Institute of America, INSTAP, the Loeb Classical Foundation, and Providence College.

Figure 4. Panayiotis Karkanas explaining the three strata at Damnoni: the brown topsoil, the dark orange Aeolian deposit with Mesolithic artifacts, and the rocky light orange paleosols that became sterile of artifacts. Photo T. Strasser.

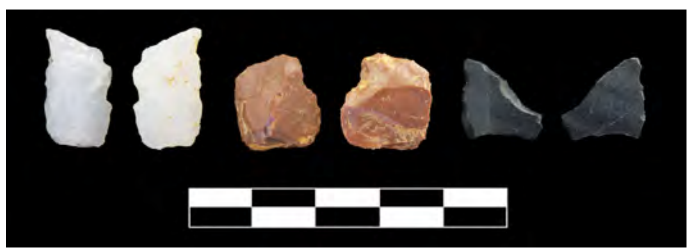

Figure 6. Quartz and chert stone tools. Photo N. Thompson.

A New Paradigm for Preserving Aegean Prehistoric Sites: The Role of Conservation Master Plans

Thomas Brogan and Stephania Chlouveraki

In March of 2014, the INSTAP Study Center for East Crete received a generous grant of $100,000 from the J.M. Kaplan Fund to develop new strategies for the conservation of prehistoric Aegean sites with earthen and rubble architecture. From among the many worthy sites in Greece, we selected two on Crete (Mochlos and Gaidourophas) and one on the mainland (Hagios Vasileios) with important, well-preserved buildings that require immediate attention. Our major aim is to provide excavators, local conservators, and technicians with appropriate and approved methodologies that can be applied to sites in the future in order to make a sustainable effort with long-lasting impact. To reach the widest audience, the results of the project will be presented in a workshop hosted by the INSTAP Study Center and published as one of the *INSTAP Archaeological Excavation Manuals*.

The first goal, which is key to our proposal, is to ensure that the conservation and maintenance of archaeological sites is incorporated into archaeological projects as an integral part of the overall program. The development of conservation master plans is crucial because it provides a comprehensive view of the current site condition and any potential threats, as well as the design and methodology for the implementation of short- and long-term conservation tasks. While various models exist in conservation literature, a thorough conservation study helps us identify the priorities of the project and create a plan of action for making the best possible use of the available resources for the long-term preservation of the site. A wide variety of conservation options, ranging from the basic stabilization of structures to the sheltering or reburial of parts of the site, either permanently or temporarily, can be considered.

The second part of our program addresses the most pressing problem at prehistoric sites in Greece: the conservation of rubble and earthen architecture. For several years, we have drawn attention to the need for improving the methods and materials used in architectural conservation through our work at the William D.E. Coulson Conservation Laboratory of the INSTAP Study Center. While the use of earth-based binders in the construction of prehistoric buildings is well documented, the consolidation of such masonry has been carried out primarily with lime or cement-lime mortars. These mortars can be designed to be physically compatible with the original earth fabric (Fig. 1); they, however, can introduce both archaeological and aesthetic problems as they provide misleading information about the technology of prehistoric construction. In order to address this issue, we initiated a collaboration with the Restoration Department of the Greek Ministry of Culture (DAAM), targeting the development of earth-based mortars designed to suit the specific needs and character of prehistoric architecture. We first applied this new approach based on the use of earth mortars at Mochlos in 2010 and later at seven additional sites on Crete (Toumbakari, Chlouveraki, and Kesselouri-Rigopoulou 2012).

The first applications proved to be visually optimal, "archaeologically" compatible, and effective in stabilizing the structures (Figs. 2, 3). Moreover, the use of excavated soil and locally available building materials enhanced the sustainability of the

Figure 1. Application of lime mortar in a rubble/earthen wall structure. Photo S. Chlouveraki.

Figure 2. Physical and aesthetic compatibility achieved by earth mortar applications. Photo S. Chlouveraki.

Figure 3. Detail of Building C.6 at Mochlos after the extensive application of earth mortars. Photo I. Zachou.

interventions while also minimizing the cost of materials and eliminating the environmental pollution associated with the traditional production process. Since 2010, the mortars have been monitored regularly at Mochlos and several other sites on Crete and in the Cyclades; the experimental study of their properties and performance is still in progress. A major goal of our current program is to continue this work with a series of physico-mechanical and durability tests that will allow us to document the effectiveness and compatibility of earth mortars with the original fabric of the sites. The results will help strengthen our efforts to secure funding for large-scale field applications.

This summer, our team conducted condition surveys, risk assessment, and documentation at Mochlos, Hagios Vasileios, and Gaidourophas before proceeding with conservation applications that addressed the highest priorities as revealed by these reports (Fig. 4). At Hagios Vasileios, excavation continues to reveal a range of vulnerable and important architectural features each year, and we thus have adopted a rescue conservation policy that emphasizes minimum intervention and effective prevention (Fig. 5). A similar plan was developed for Gaidourophas where the excavation and documentation of the monumental building is still in progress. Mochlos, on the other hand, represents a much larger project whose current phase of excavation and study spans 25 years. Work here involved extensive cleaning of vegetation, management of excavation debris, and remedial conservation treatments according to vulnerability and risk factors (Fig. 6).

With our program, we also have the opportunity to train young conservation students and professionals to evaluate sites and applications and to document conservation treatments. Equally important is the retraining of skilled local technicians to apply these new materials and methodologies in the field (Fig. 7).

Finally, a web application is being developed that will allow us to link all the data and reports related to the condition, risks, and treatment of the site to the general site plan. This software provides a valuable tool to those working at the site and also a detailed archive for archaeologists and conservators approaching these sites in the future. As an offshoot of this project, we also created a blog to open a dialog among conservators, excavators, and site managers who are confronting similar problems and who wish to discuss and exchange ideas (http://sitecon.co).

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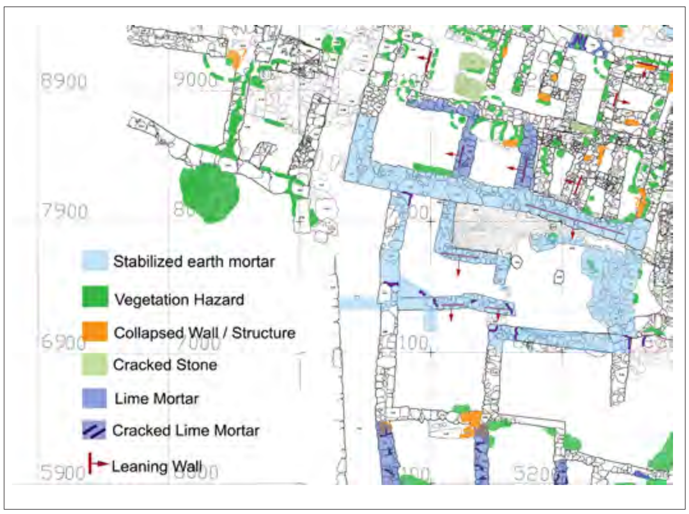

Figure 4. Example of documentation and mapping from the Mochlos condition survey. Drawing S. Chlouveraki, L. Chatzakis, L. Day.

Figure 5. On-site first aid and rescue treatments undertaken at Hagios Vasileios by V. Katsichti (left) and S. Chlouveraki (right). Photo D. Kondyli.

Figure 6. Mechanical stresses caused by root penetration, a major threat for the architecture of Mochlos. Photo S. Chlouveraki.

Figure 7. Applying earth mortars at Hagios Vasileios. On-the-job training by S. Chlouveraki (left) of conservator V. Katsichti (center) and technician Y. Zacharakis (right). Photo D. Kondyli.

Practical Use of Barcodes in Archaeology

W. Flint Dibble

With 100 items in your shopping cart, would you choose a line where the cashier had a barcode scanner or a line without one? Given that archaeological field, laboratory, and archival projects create hundreds of tags each day, it seems obvious to choose labels with an affixed barcode, not as a replacement but as an addition to the text and numbers already present on labels (Fig. 1). The decision to use barcoded labels can save a large amount of time and prevent error for minimal cost.

Archaeological projects usually identify spatial contexts, assemblages, or individual objects by unique identifier (ID) numbers or codes. These IDs are the backbone of every single project, providing context and additional information. It is essential, therefore, that these IDs are assigned and transcribed efficiently and without error. In a recent test of eight undergraduate students labeling 40 artifacts each, an error rate of 5.6% in mistakes or illegibility was discovered. In another test group of 25 Ph.D. candidates and post-doctoral individuals, a 4.4% error rate for handwritten transcription of 25 printed IDs was discovered along with a 2.4% error rate for typing transcription of the same printed IDs. For an assemblage of 10,000 objects, these error rates would result in approximately 500 errors. Eliminating such errors is critically important so that spatial context and cataloged information are consistently associated with archaeological objects.

In terms of time, printing labels is far faster than hand writing each label because archaeologists produce numerous nearly identical labels (Fig. 2). For each excavated stratigraphic unit, it is often necessary to produce two identical tags for each category of finds (e.g., ceramics, bone, lithics, metals, archaeobotanical samples, among others), and archaeologists often label objects in a sequence (e.g., A413-1, A413-2, A413-3, and so on). In each of these cases, it is simple to automate the printing of nearly identical labels onto the medium of your choice (e.g., paper, mylar, tyvek) with an appropriate layout (Fig. 3). In the same experiment with the Ph.D. candidates and post-doctorates mentioned above, it was determined that scanning a barcode is ca. 400% faster than writing an ID tag and ca. 500% faster than typing the same ID into the computer. For a project with tens of thousands of recorded IDs, the decision to use barcoded labels can save many working weeks.

The equipment needed for printing and scanning barcodes is quite affordable. A scanner is available for under $100. Most available printers will print on label paper, but if one wishes to purchase a portable printer for printing on tyvek or mylar, the cost is $100–$200. The time saved will easily make up for any

Figure 1. Assistant tagging zooarchaeological finds from Azoria at the INSTAP Study Center. Photo F. Dibble.

expenses. Several commercial software packages are available for designing and printing labels that include a barcode. Alternatively, one such program, ArchCode, will be available for free at www.oldstoneage.com beginning in October 2014. Designed by Harold Dibble and W. Flint Dibble, ArchCode implements barcodes into the workflow of archaeological projects by directly communicating with Microsoft Access databases, thus making it possible to customize your own label templates as needed. It has been successfully incorporated into numerous archaeological projects in France and Greece.

The use of barcoded labels is a relatively inexpensive and simple way to minimize error and increase efficiency on archaeological projects dealing with large inventories. Existing numbering conventions and overall label formats do not need to be changed. Barcode labels can be effectively incorporated into field, laboratory, or archival archaeological projects and integrated with already existing databases.

Figure 2. Barcoded zooarchaeological finds from Azoria. Photo F. Dibble.

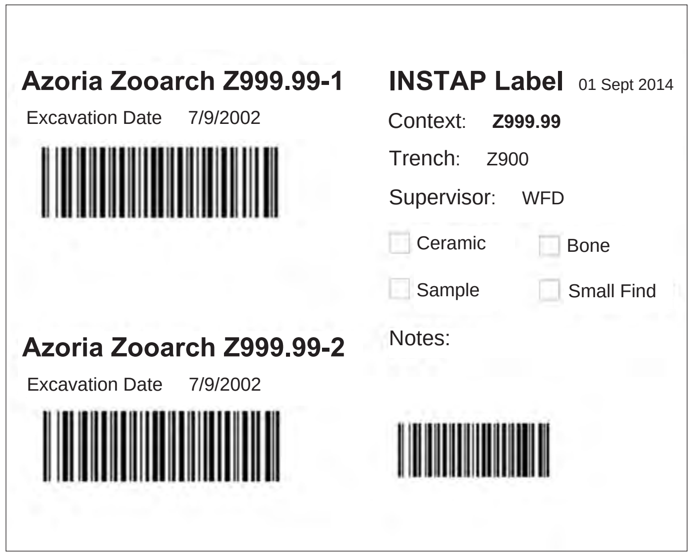

Figure 3. Sample barcodes for zooarchaeological finds from Azoria.

Meet the New Librarian Fellow for 2014–2015

Hello *Kentro* readers! My name is Gabriella Lazoura, and I was born in Agrinio in western Greece. I am a graduate of the Department of History and Archaeology of the University of Athens where I completed my Master's degree in Prehistoric Archaeology. I am excited to be a part of the INSTAP Study Center team, and I am enjoying my year in East Crete!

Gabriella in the Kentro library. Photo S. Flouri.

We Would Like to Thank . . .

Stavroula Flouri of Hagios Nikolaos has finished her term as the 2013–2014 Librarian Fellow of the Study Center. She studied physics as an undergraduate at the University of Crete, and her M.A. thesis was entitled "Science for the Conservation-Restoration of Cultural Heritage" at the University of Bologna.

Stavroula was first associated with the Kentro while working on her thesis, which benefited from the application of the center's Laser-Induced Breakdown Spectroscopy (LIBS) instrument. LIBS is used for the elemental characterization of various archaeological materials (see *Kentro* 6, 2003).

During her term, Stavroula greatly assisted staff and visitors alike. She enriched our digital library, expanded our acquisition of printed volumes, and ensured their maintenance. We will miss Stavroula, and we wish her all the best in her future endeavors!

Stavroula at home in the Kentro library. Photo Ch. Papanikolopoulos.

The 2014 Richard Seager Fellowship

Emilia Oddo

As the recipient of the 2014 Richard Seager Doctoral Fellowship, I spent four weeks at the INSTAP Study Center for East Crete conducting research for my Ph.D. dissertation entitled *From Pots to Politics? Analysis of the Neopalatial Ceramic Assemblage from Cistern 2 at Myrtos-Pyrgos, Crete* (University of Cincinnati). The thesis has a twofold intent: it aims both to present a detailed study of the pottery assemblage and its archaeological context (Cistern 2 and its stratigraphy) and to situate that pottery within a broader social and political context, testing the feasibility of the "pots and politics" approach, which suggests that a society's sociopolitical organization can be partly inferred from its ceramic remains (e.g., Knappett 1999, 2002; Van de Moortel 2002). At Myrtos-Pyrgos, Cadogan and Knappett have already considered the validity of this approach for the Protopalatial period, concluding that the site had strong economic and political ties with the Malia-Lasithi region (e.g., Cadogan 1995; Knappett 1999). During the Neopalatial period, however, the political situation changed: according to Cadogan's observations on the site's architecture, Myrtos-Pyrgos might have been under the cultural and perhaps political influence of Knossos (Cadogan 1995). Yet, analysis of the site's Neopalatial pottery and ceramic production may paint a different picture.

Built during the Protopalatial period, Cistern 2 fell into disuse either at the end of the Protopalatial period or very early in the Neopalatial period. The cistern was then filled with various types of material, among them rubble, stone blocks, and pottery. The Neopalatial ceramic assemblage in the upper fill of Cistern 2, consisting principally of Late Minoan (LM) IA pottery with scanty LM IB examples, is one of the largest from the site (ca. 2,000 sherds) with the highest amount of well-preserved fine decorated ware. Up to 70–75% of the sherds join and in many cases form nearly complete pots. Stratigraphical and taphonomic analyses suggest that this assemblage was most likely dumped inside the cistern in one episode: the pottery rarely shows wear (sherds have sharp edges), indicating that it was buried rapidly, shortly after breakage, and was not left exposed to the elements.

In order to contextualize ceramic production at Myrtos-Pyrgos, I carried out significant comparative work, examining firsthand the material from a broad variety of Neopalatial sites in Crete. Contrary to my initial expectations, the comparison suggested that

Figure 1. Hemispherical cup with a spiral motif (73/P304) from Myrtos-Pyrgos. Photo E. Oddo and drawing D. Evely.

the material from Myrtos-Pyrgos does not have strong similarities with Central Crete and that closer ties can be identified with an eastern Cretan production. This eastern connection prompted my interest in coming to the INSTAP Study Center in order to test my preliminary observation by examining key Neopalatial ceramic assemblages from both the north and the south of the region. As the 2014 Seager Fellow, my research plan was to study the pottery from four pivotal sites in the east: Mochlos and Gournia in the northeast and Chryssi and Braïmiana in the southeast. From each site, I selected specific deposits, all of them contemporary with Pyrgos's Cistern 2 assemblage or slightly later, as in the case of Chryssi. My analysis produced intriguing results, allowing me not only to confirm that Cistern 2's pottery is part of the eastern ceramic tradition, but also to place it within the range of southeastern ceramic production. The latter is an extremely interesting consideration because the southeastern region of Crete (in the immediate vicinity of Ierapetra) is still in the course of being archaeologically explored.

The ceramic similarities among the assemblages were established on the basis of stylistic observations of the fine tableware: (1) the occurrence of particular shapes and decorations typical of Cistern 2's assemblage, (2) the patterns in which both shape and decorative features are represented in each assemblage, and (3) the occurrence within each one of the assemblages in question of several "key shapes" and "key decorative motifs"—that is, the most characteristic shapes and motifs of Cistern 2. This three-fold approach can be exemplified by using one of the best-represented shapes in the assemblage of Cistern 2, the hemispherical cup.

At Myrtos-Pyrgos, the hemispherical cup is characterized by thin walls, a globular body, a strongly everted rim, a flat or raised base, and a strap handle that often bears a rivet on top where the handle meets the rim (Fig. 1). The occurrence of hemispherical cups within a Neopalatial assemblage is not surprising: from Knossos to Zakros to Phaistos, this shape is well documented in the Neopalatial dark-on-light ceramic repertoire. Across the island, however, the same shape occurs in local (restricted to individual sites) and regional variants with slightly different stylistic features, both in shape and decoration. In Neopalatial production at Pyrgos, the typical hemispherical cup has a very metallic appearance, emphasized in particular by the strongly everted rim, the characteristically thin walls, and the frequent rivet. The vessel has a remarkably glossy surface, a hallmark of the ceramic production at Pyrgos, and it always has dark-on-light decoration: running spirals and crescents are the best-represented motifs (Figs. 1 [spiral], 2 [crescent]). This particular version of the hemispherical cup, with this shape and decoration (particularly the crescent motif), is typical of eastern Crete, from Malia (Pelon 1970) to Mochlos (Barnard 2001; Barnard and Brogan 2003), and Braïmiana (pers. obs.).

The mere occurrence of a particular vessel shape in a particular style (such as the hemispherical cup) does not represent per se a ceramic tradition, whether intra- or inter-regional. A better perspective instead comes from the study of other ceramic typologies commonly occurring with the hemispherical cups. My analysis of the four assemblages at the INSTAP Study Center showed that the combination of shapes and decorations from these sites are very compatible to the assemblage of Cistern 2. In all cases, for example, hemispherical cups occur together with at least two other key shapes in the Cistern 2 assemblage: the rounded cup (convex profile, with the rim slightly turning in, a flat or raised tronco-conical base, and a vertical handle that is rounded or ovoid in section); and the in-and-out bowl (bowls with elaborate decoration on the vessel's inside and outside surfaces), a shape represented in unusually high percentages at Myrtos-Pyrgos. Moreover, at all four sites, these shapes occur with the same stylistic features as the ones from Cistern 2. Yet, among the four sites considered (Mochlos, Gournia, Braïmiana, Chryssi), the pottery from the southeast, and in particular from Braïmiana (LM IA), is the closest to the pottery from Cistern 2 in terms of shape, decoration, and general character of the assemblage. As such, it is possible to situate generally the Neopalatial pottery from Myrtos-Pyrgos even more specifically with the southeastern ceramic production of Crete.

The results of my work as the 2014 Seager Fellow at the INSTAP Study Center will form an important part of the final chapter of my dissertation, enabling me to discuss aspects of ceramic as well as cultural-political regionalism in Bronze Age Crete. As briefly presented above, the contextualization of the Myrtos-Pyrgos production within the ceramic tradition of eastern and southeastern Crete ultimately supports the identification of a ceramic macro-region and a micro-region. Whether such macro- and micro-regions also indicate different scales of cultural and political interactions is an intriguing topic that I will explore further in my dissertation and hope to discuss in the upcoming 2015 annual meeting of the Archaeological Institute of America.

I would like to express my thanks to the INSTAP Study Center for granting me the Seager Fellowship, and I would like to thank everyone there who made my time pleasant and productive. In particular, I wish to express my gratitude to Tom Brogan, Philip Betancourt, Jeffrey Soles, Vance Watrous, Kostas Chalikias, Eleni Nodarou, and Eleanor Huffman for their help and advice.

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Figure 2. Hemispherical cup with cresents (N 8012) from Myrtos-Pyrgos. Photo E. Oddo and drawing D. Evely.

Archaeometallurgy at the Kentro

Alessandra Giumlia-Mair and Susan C. Ferrence

Our project uses X-ray fluorescence spectroscopy (XRF) to systematically analyze metal finds from Minoan Crete. We are seeking to discover as much as possible about the archaeometallurgy and to identify the range of alloys and techniques used by the local artisans. XRF is a well-known, fast, and non-destructive scientific method that quantitatively identifies the elements used to create ancient objects. Methods like Atomic Absorption Spectrometry (AAS) or Inductively Coupled Plasma Spectrometry (ICPS) are more precise, but they require destructive samples that have to be dissolved in

Figure 1. Alessandra Giumlia-Mair operating the XRF equipment in the basement storage area of the Kentro. Photo S. Ferrence

Figure 2. Our workspace in the archive of the Kentro. Photo A. Giumlia-Mair.

acids to prepare the solutions for analysis. Besides being non-destructive—a very important characteristic in the study of archaeological artifacts—the XRF analyzer: (1) quantifies over 30 elements, (2) rapidly determines which elements are present in the object, (3) enables quick collection of data (which can be elaborated at a later point), and (4) offers considerable reductions in terms of costs and time (Hahn-Weinheimer, Hirner, and Weber-Diefenbach 1995; Lutz and Pernicka 1996; Giumlia-Mair, Kassianidou, and Papasavvas 2011, 15–16). We used XRF on a group of metals from Gournia and obtained valuable information about fabrication processes and various stages of production from the casting of blanks to the finishing of the objects (Ferrence and Giumlia-Mair 2014). With this in mind, we decided to carry out our work on artifacts housed at the INSTAP Study Center for East Crete.

Analyses at the Kentro

Since June of 2010, Alessandra Giumlia-Mair and her husband Josef Mair have travelled to Crete each summer from northern Italy in a car full of scientific devices. They work as a team at the Study Center on the XRF program of analyses together with Susan Ferrence. Thomas Brogan identified the ideal working place to set up the equipment for the project: the northeastern corner of the basement storage area (Fig. 1). In this area, the temperature does not fluctuate drastically over the course of the work day, the floor is stable, and only a few people are present who might inadvertently disturb the XRF equipment, which is quite sensitive to changes in temperature, humidity, and vibrations. A person walking by the instrument may interrupt the measurement in process (each analysis can require up to 15 minutes of X-ray exposure on any given object). It is important, therefore, to find the best location to set up the equipment. Furthermore, it is imperative for people to keep a safe distance from the system when it is directing X-rays at an object because they can be dangerous for humans. We use the basement archive as our workspace with a second computer for annotation and a digital microscope for photography (Fig. 2).

Methodology

An important part of archaeometallurgical research is examining each object under magnification in order to identify manufacturing traces and details, many of which are not visible to the naked eye. Certain physical characteristics represent evidence for casting, hammering, sharpening, and polishing among other fabrication techniques that would have been used in a Minoan metallurgical workshop. Using magnification to recognize evidence of manufacture helps to target the locations of XRF analyses on the object, thereby improving the scientific results. Furthermore, all parts of the selected objects are microscopically examined to assess their condition and select the best spots for analytical measurement. Metallic looking areas (as opposed to tarnished and/or oxidized spots) are normally selected for analysis. In the case of corroded copper-alloy artifacts, areas with a thin cupritic patina are preferred. Areas with thicker patina or visible corrosion products must be avoided. If corrosion is present, the data is considered qualitative only.

X-ray fluorescence spectroscopy was carried out with transportable equipment consisting of an X-ray source, a transformer, a tripod, a stabilizer, and a laptop computer. This equipment has been expressly developed for analyses of cultural heritage objects, and it utilizes dedicated software for the analysis of ancient metals. Each measurement typically takes 10–15 minutes, but it can be longer if necessary, for example, when the analyzed area is small. The exact spot of a measurement is indicated by a laser pointer, and the equipment gives an audio signal when the distance from the surface of the object is at the correct point. This system ensures that the angle and distance from the object are always the same for each analyzed piece, enabling more precise calculations.

The most important tool for this kind of scientific analysis is a set of standards used to routinely calibrate the system. The standards used by Giumlia-Mair have been specifically produced by AGM Archeoanalisi Laboratory in Merano, Italy, for the analysis of ancient metals of various compositions. For the Minoan Bronze Age, standard samples of copper containing single alloying elements (5% Sn; 1% of As, Sn, Ag, Fe, Pb; 0.5% As, Ag, Fe, respectively) and composite alloying elements (e.g., 1% Sn, As, Fe, Pb in Cu; 1% As, Sn, Ag, Sb, Fe in Cu; 1% Sn, Ag, Au, As in Cu) are vital to this research, as well as various other alloys with different silver and gold percentages. The standards of known composition are compared with the analysis results from the ancient objects, allowing for the calculation of possible drifts in the spectra due, for example, to a change in temperature, humidity, or other parameters that can affect the performance of the system.

Metal Artifacts from Petras

The first program of analyses was performed on the finds from the Prepalatial cemetery of Petras, which has been under excavation since 2004 by Metaxia Tsipopoulou. The cemetery has revealed countless important artifacts and architectural features. It is composed of many house tombs and at least one rock shelter, all of which contained mostly disarticulated human remains along with grave goods such as pottery, stone vessels, beads, seals, jewelry, and metal objects among other items (see Part II in Tsipopoulou, ed., 2012).

To date, the metal artifacts from the cemetery number over 250 cataloged pieces. The corpus is composed of different classes of objects, such as jewelry (pendants, rings, bracelets), objects for personal use (tweezers [Fig. 3] and cosmetic scrapers), weapons (a dagger and a knife), small tools (awls and fish hooks), and sheet fragments (probably belonging to small vessels and ornaments). The finds are made of copper-based alloys, gold, silver, and lead. We carried out ca. 100 analyses, and the data are being processed. During the testing of the objects, we noticed some significant peculiarities of the metallurgical tradition of the time and interesting production techniques, including the use of certain alloys that would allow for good performance by the tool or other type of object.

Figure 3. Fragment of tweezers with decorative rivets made of silver (PTSK ME 05-124) from the cemetery of Petras. Photo Ch. Papanikolopoulos.

Other analyses (ca. 50 tests) were performed on metal objects from the settlement of Petras. They consisted of Minoan pins, chisels, tools, and similar objects and post–Bronze Age artifacts such as Byzantine bullae and Venetian and Ottoman coins.

Metal Artifacts from Mochlos

A third batch of over 200 analyses was carried out on metal objects from the excavation at Mochlos, directed by Jeffrey Soles and Costis Davaras. Approximately 60 of the analyzed objects are Late Minoan (LM) III. These data have been published, and they give interesting insight into the metallurgical tradition of this period (Giumlia-Mair 2011; Soles et al. 2011). Among the examined objects are gold decorations and fragments and several classes of copper-based objects such as ornaments, weapons, tools, vessels, everyday objects, and also semi-finished products. Ingots and semi-finished materials (Fig. 4) are particularly important for the reconstruction of the working processes. Furthermore, Soles pointed out the spots on site where the metal hoards were located and described the position in which the objects were found (Fig. 5). All this information is relevant and very useful for the interpretation of the XRF results.

Conclusion

The Kentro and its staff have been very hospitable to our ongoing program of XRF analyses. The institute facilitates the work on metal objects from several excavations in the local region. The analytical results are adding important new information to our knowledge of the archaeometallurgy of eastern Crete, for example, the Egyptian influence on LM III gold jewelry from Mochlos (Giumlia-Mair 2011) and the preparation of specific metal alloys for crafting different types of everyday objects and other prestige goods at Gournia (Ferrence and Giumlia-Mair 2014). Significant new results about the metal objects and technologies used in the creation of items from the Petras cemetery will be presented in 2015 in Athens at the next Petras conference, organized by Metaxia Tsipopoulou.

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Figure 4. Metal strip (CA268) from Mochlos. Similar examples come from Gournia and Papadiokambos. With all probability, they were traded as semi-finished products. Photo A. Giumlia-Mair.

Figure 5. Jeffrey Soles (right) discussing the excavations at Mochlos with Shari Stocker (left) and Susan Ferrence (center). Photo A. Giumlia-Mair.

With Gratitude

We are happy to announce that a generous donation by Stephen and Alison Bodurtha has been made to the INSTAP Study Center for East Crete in honor of Dr. David Schiller, Dr. Cornelie Ladd, and Ms. Geraldine Woods of the Horace Mann School in Riverdale, New York, in acknowledgment of their history of inspiring high school students and nurturing in them a love of classical studies.

All of us at the INSTAP Study Center for East Crete would like to thank Henry Davis and Cynthia Harrison, who donated money for the purchase of an Olympus SZ40 microscope for the William D.E. Coulson Conservation Laboratory. The microscope has become an invaluable addition to the lab for our conservators.

If you would like to donate to the Study Center, we would be pleased to accommodate your request. Contact Tom Brogan (tombrogan@instapstudycenter.net) or Elizabeth Shank (elizabethshank@instapstudycenter.net).

Matina Tzari using the new microscope in the Coulson Laboratory. Photo K. Hall.

Stratigraphic Excavations at Azoria in 2014

Donald C. Haggis and Margaret S. Mook

Excavations at Azoria in 2014 have changed the way that we perceive the structure of the urban center in the 6th century B.C., as well as our understanding of the history of the settlement in the periods before the large-scale renovation of the site at the end of the 7th century. Discontinuous patterns of settlement structure in the Early Iron Age (EIA) are reflections of changes in the broader cultural topography of the Kavousi and Mirabello regions.

The results of the first phase of excavation and especially the work conducted over the past two seasons have demonstrated that Early Iron Age buildings were disturbed, destroyed, or buried at the time of the late 7th-century B.C. rebuilding of the site, a visible horizon of large-scale slope modification and monumental construction. In stratigraphic soundings beneath Archaic levels, we find deeply bedded walls of Late Minoan (LM) IIIC date, constituting the foundations of substantial buildings, which, because of the terrain and the depth of the foundations, were left largely intact. While LM IIIC pottery is ubiquitous throughout the site in Archaic foundation deposits, good examples of the LM IIIC settlement remains have been found in situ in several trenches (B1200, B1700, B3100, D200, D600) on the west slope of the South Acropolis. Recently excavated examples are in B800 and B5000 (on the southwest slope) where LM IIIC walls and occupation deposits were essentially contained by cobble fill deposits supported by Archaic (late 7th century) spine walls. This pattern of preservation may be related to the efficacy of building on steep terraced slopes as well as the considerable depth of the walls and occupation deposits—logically, the uppermost Early Iron Age levels were destroyed, while deeper walls occasionally survived the renovation.

Figure 1. The Late Minoan IIIC Building (B800) cut by the Archaic Service Building. Photo D. Haggis.

Figure 2. The Late Minoan IIIC Building (B800): southeast corner and floor surface. Photo L. Thompson.

The Late Minoan IIIC Building (B800)

An excellent example of this pattern of preservation is the Late Minoan IIIC building recovered in B800, which we began to excavate in 2013 (Fig. 1). In 2014, we finished digging to the floor level in the south part of the room, exposing the full extent of the east and south walls and the southeast corner (Fig. 2). To the south, we discovered a segment of wall (measuring 2.5–3.0 m) abutting the south wall at its western end and extending to the south where it is built on and against two large boulders, evidently dislodged bedrock (Fig. 1). It is clear that another room of the building extended out to the west, perhaps conforming to the bedrock terrain. No evidence of a room existed to the north, but this spur wall extending to the south suggests that there was another small room to the south, but given the bedrock shelf exposed in the south scarp of the trench, the room would not have been longer than 3.5 m north–south.

The building thus appears to have extended to the south and west where it was destroyed by the Archaic Service Building (Fig. 1), originally constructed at the end of the 7th century. On the north, south, and east sides, the structure appears to have been built into the natural slope of the hill; soundings, however, demonstrate that the building was constructed into Final Neolithic (FN) occupation layers containing pottery and chert implements. This evidence of FN occupation suggests an extension of the Neolithic settlement above and to the east of B700, B1200, and B1700 where FN architecture and habitation remains were recovered in 2003 and 2004.

The north room is large, though normal for LM IIIC (about 18 m^2)—some 6.0 m north–south by 3.0 m wide, though the actual width can only be estimated (Fig. 1). The floor consists of very hard-packed yellowish phyllitic silt, bedded at the southern end by a leveling fill (measuring 10–20 cm deep), that was built above the bottom courses of the south wall. The walls are preserved to about a meter high (3–5 courses) and are constructed with medium- to large-sized boulders on both faces, with smaller cobbles filled in the fabric of the wall. While the function of the space remains uncertain—drinking, cooking, and storage vessel fragments were found on the floor—there is no reason at this point to think that the north room was not part of a house, whose rooms extended to the south and probably up-slope to the east.

The Late Minoan IIIC Wall and the Peribolos (B5000)

On the southwest slope, immediately above and to the east of the Late Minoan IIIC–Protogeometric (PG) tholos tomb (B3700), we opened a test trench about 5.0 meters long (north–south) and 2.50 m wide (east–west). The area of the sounding is bordered on the east by the face of a segment of the Archaic spine wall—exposed in the east scarp of B3700—and on the west, by the uppermost eastern wall of the Archaic room B3700.

The *sondage* penetrated the level of the Archaic street, which was contained by the spine wall on the east and the back wall of Archaic rooms B3700 and B3800 (Figs. 3, 4).

Excavation through the Archaic street level exposed layers of packing and Archaic cobble fill (ca. 40–50 cm deep), layered on top of a segment of a substantial Late Minoan IIIC wall, running north–south with the terrace. We did not reach the base of the wall in 2014. One goal of our work in 2015 will be to expand the area of this sounding to the north, south, and east in order to expose as much as possible of the LM IIIC building.

Overlying the Late Minoan IIIC wall, we discovered a peculiar feature: a single line of stones, two courses high, running about 2.0 m north–south and parallel with the LM IIIC wall, but slightly to the east of its east face (Figs. 3, 4). This line of stones curves slightly to the west at its southern end and appears to have been bedded with a row of small slabs of schist. The linear structure is a narrow and slightly curving wall—an enclosure or peribolos—bedded on a layer of red gravelly soil with largish stone inclusions. The matrix of the fill is very loose rocky soil, rather different from the cobble fill above, dating to the 7th century B.C. Unfortunately, there is no well-consolidated surface associated with this feature. At its southern end, the stones of the peribolos are braced by two small boulders, which abut the east face of the LM IIIC wall and rest on the rocky fill at a lower level. These boulders also seem to form a corner of a structure—the edge of a platform that uses the top extant course of the LM IIIC wall but extends in a line to the west, up to or bonding with the back wall of B3700.

The location of the peribolos is interesting. It appears to have been constructed with reference to both the LM IIIC wall and the LM IIIC–PG tholos tomb (Figs. 3–5). That is, it is constructed directly on top of the LM IIIC wall—not utilizing the earlier wall as a foundation, but acknowledging and concealing the LM IIIC building. Furthermore, the peribolos seems to have been placed with reference to the tholos tomb, which was surely a visible monument at the time of construction. The placement and shape of the wall and the platform at its southern edge form a curve that mirrors the approximate curvature of the tomb itself, as if it were centered to conform to the location of the tomb underneath. A possible function of the space shaped by the peribolos is the creation of an offering platform or a small shrine or enclosure for offerings to ancestors.

Whatever the function of this structure, it is certainly contemporary with the construction of the adjacent Early Iron Age–Orientalizing (O) Building, and it antedates the 7th-century construction of the terrace, cobble fill layer, and street (Fig. 5). The peribolos was most likely part of the overall design of the EIA–O Building whose patterns of access and communication seem to have led from north to south, and ultimately into the space in front of the tholos tomb.

Figure 3. B5000 from north: EIA peribolos and LM IIIC wall. Photo L. Thompson.

Figure 4. B5000 from southeast: EIA peribolos and LM IIIC wall. Photo L. Thompson.

The Early Iron Age to Orientalizing Building

A notable exception to the destruction of EIA buildings during the renovation phase of the late 7th century B.C. is the suite of rooms comprising the EIA–O Building (Fig. 5). In 2006, we had exposed the well-built south facade of a building, along with a deposit of animal bones, ash, and pottery—principally drinking and serving vessels of Late Geometric (LG) and Early Orientalizing (EO) date. Work in 2013 allowed us to identify a core building consisting of a large square room with a central hearth, which was eventually subdivided into two separate rooms (B4100); a back northern room or antechamber (B4400); and a long narrow room with a pottery kiln at its northern end (Fig. 5).

Excavation in 2014 has allowed us to reevaluate the form and function of the building. It now appears that it was much larger

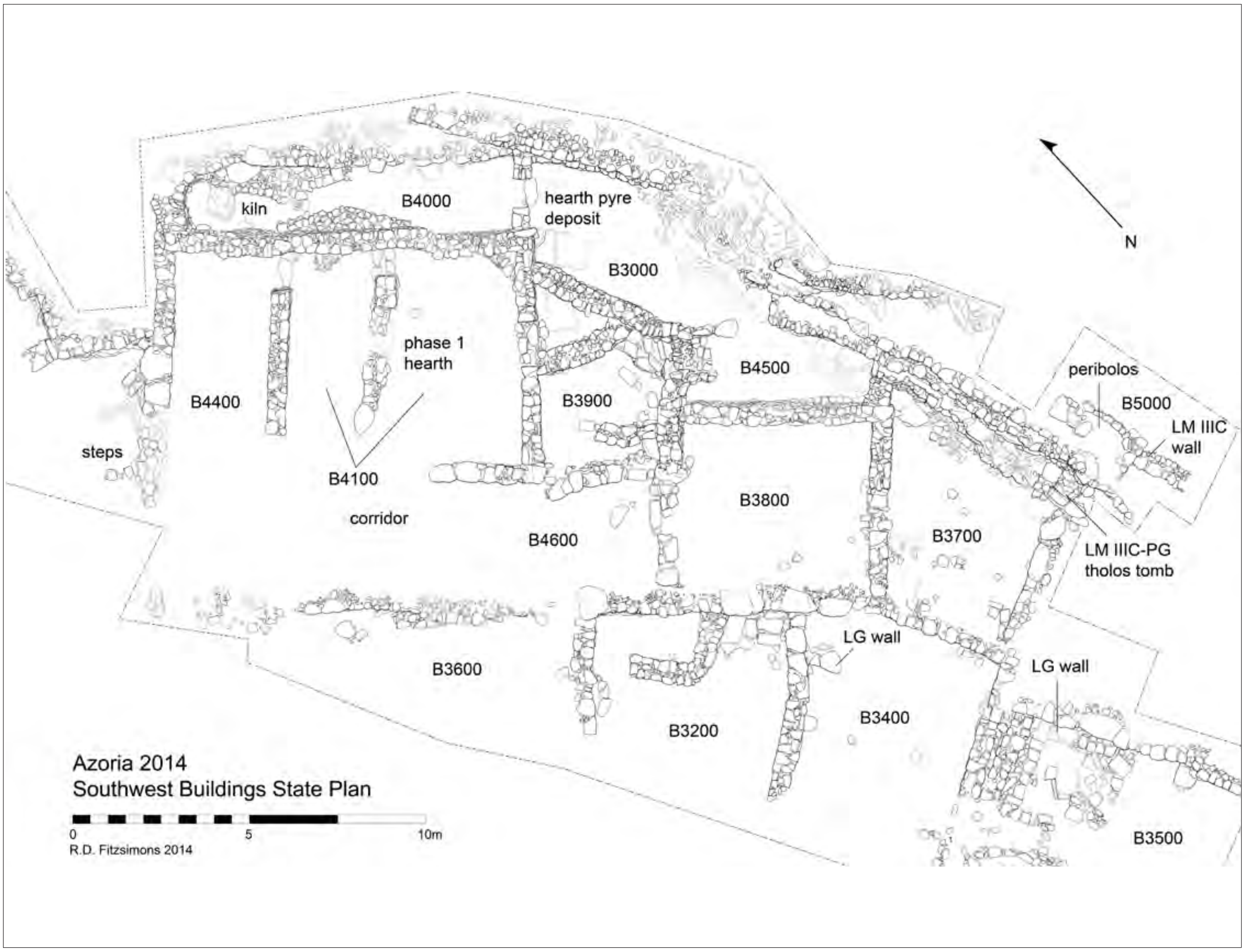

Figure 5. State plan of the Southwest Buildings: EIA–O Building. Drawing R.D. Fitzsimons.

than we thought, incorporating an entrance in the north (B4300) and a corridor (B4600) running along the west side of the main building (B4400 and B4100). The corridor leads south to a sequence of separate rooms in B3900, B3000–B4500, B3800, and B3700 (Fig. 5). The southernmost room, B3700, incorporated the LM IIIC–PG tholos tomb in its southeast corner. The corridor and rooms B3900, B3800, and B3700 continued in use throughout the 6th century B.C., thus obliterating traces of their earlier functions. A sequence of 8th–7th-century floor surfaces was recovered in B3900, B3000, and B4500, confirming the pre-Archaic date of the foundations. Although it looks as if an effort was made to fill the main building with Archaic cobbles at the time that the entire east side of the building was filled to support an Archaic street (B4000–B3000), the walls of the building must have remained visible, and the southernmost rooms, B3800 and B3700, were reintegrated into the Archaic settlement.

The building's main period of use belongs to the 8th and 7th centuries, with an abandonment phase coinciding with the late 7th-century rebuilding of the site. While the evidence of use of 8th-century pottery within the building does not constitute an ante quem or ad quem date for the foundation, given the stratified LG remains in the vicinity (B3500), a LG date is likely for the initial construction of the building.

The Main Building

In trench B4100, a series of small *sondages* was excavated for the purpose of studying the chronology and stratigraphy of the surviving floor surfaces recovered and left in situ in 2013, across the east side of the south room of the building (Figs. 5, 6). From this stratigraphic work, it is now clear that the building had a sequence of three distinct occupational phase changes belonging to the 7th century B.C. In the first phase, the south room consisted

Figure 6. B4100: south hall of the main building. Photo D. Haggis.

Figure 7. B4100: northeast corner showing occupation phases. Photo L. Thompson.

of a spacious open hall, about 6.0 x 7.0 m in area, with a hard-packed, yellowish-green phyllitic clay floor. An oval clay hearth was centered in the room, roughly on axis with the doorway in the south wall. A doorway in the northeast corner of the room lead up a step into the north or back room of the building, A4400, which had no distinctive features indicating function, though the shape of the room suggests either storage or vestibule space.

In the second phase (Fig. 6), the floor level on the south side of room B4100 was raised significantly (ca. 40 cm), evidently using available LG–EO debris from within the room, as well as considerable phyllitic clay (perhaps roofing material) to form a second surface. The phase 2 surface was well constructed, and there is evidence of the use of small pebbles and rounded to sub-rounded gravel to form a kind of paving. Along with the elevated floor level, a new cross wall was inserted into the room with more space afforded the southern part of the room. Although severely displaced and badly damaged by the subsequent leveling of the structure at the end of the 7th century B.C., the phase 2 cross wall would have created two separate rooms in the space of B4100 with a connecting doorway in the east on line with the door leading north into B4400. The phase 2 floor on the south has a fine pebbled surface, best preserved near the doorway leading to the north room (Fig. 7).

Built directly over the hearth, the placement of this cross wall evidently changed the room's function. This is to say that in its initial phase, the space was designed to be a large open hall with a central hearth—cooking and dining are the likely functions (Figs. 5, 6). Given the size of the space (some 40 m^2 in area), the quality of construction, and the large central hearth, we might infer a large number of participants and a public function for the building and the room. Preserved on the earliest floor, in the northeast area of the room, was a fragment of an ox skull—the top part of the cranium and the base of the horn cores—possibly a bucranium displayed within the building (Figs. 7, 8).

In the room's last phase, the floor levels on both north and south sides of the cross wall were raised again—approximately 10 cm on the north side of the room, and about 20 cm on the south. These three floor surfaces, corresponding to distinct architectural changes within the building, may be linked to a neat sequence of three surfaces recovered in a narrow triangular *sondage* excavated just outside the building in B3900 in 2006. Here, trapped between an Archaic retaining wall and the 7th-century B.C. diagonal wall were a sequence of three well-preserved clay floors, indicating three occupation phases immediately outside the entrance to the main building, and very likely corresponding to formal buildup of floors within the main building. The main goal of our stratigraphic work in 2014 was to understand the use phases and the topography of the area to the south of the main building, and to correlate the stratigraphy with the three floors recovered in B4100 and B3900 with the area to the south.

Stratigraphic Soundings in B4500 and B3000

Work in B4500 revealed a deep level of fill—a layering of phyllitic clay and cobble deposits, some 60–70 cm deep, extending across the space behind B3800 and into B3000 (Figs. 5, 9). The material consists of alternating layers of phyllitic clay, cobbles, gravelly soil, ash, and burned debris identical to that recovered in our original *sondage* in B3000 in 2006. This material is clearly a deep leveling deposit corresponding to the third phase of occupation in the main building and B3900. Underneath this leveling fill, a sequence of earlier occupation surfaces was recovered, corresponding to the earliest two occupation levels in the main building. The excavation in B4500 also confirmed that the original construction and use of room B3800 are contemporary with the main building to the north.

In the earliest phases of the building, the area of B3900, B3000, and B4500 formed a dog-leg corridor and roofed space extending from the front of B4100 and to the back of B3800 (Fig. 5). The phase 2 floor within B4500 contained a small lekane, a

Figure 8. B4100: ox cranium and horn from phase 1 floor. Photo L. Thompson.

Figure 9. B4500: phases of occupation. Photo D. Haggis.

grinding stone, and a quern, suggesting food preparation in this space (Figs. 10–12). In the final phase of the building, the entire area of B4500 and B3000 was filled with the debris mentioned above and retained by the east wall of B3800 and a diagonal wall that supported a raised floor surface providing access to the kiln in B4000 (Fig. 13). It is at the end of this phase that the use of the kiln was eventually discontinued, and B4000 was remodeled with a doorway in the south and an earthen floor surface that extended over a deep fill layer, obscuring the entrance and stoking chamber of the kiln.

Our stratigraphic excavations within the building in 2014 and Rodney Fitzsimons' on-going study of the architecture have resulted in a reevaluation of the plan and history of the EIA–O Building (Fig. 5). It is clear that the main entrance into the building would have been from the north, up a short staircase (B4300), and through a doorway in the north wall of the structure. That door would have led to a long corridor (B4600) running south along the western edge of the main building (B4100, B4400) and leading directly into B3800 as well as into a spacious hall (B3900) in front of the doorway into B4100. This north-to-south access and progression within the building as well as the southern aspect of the facade of B4100 would suggest that the focal point of the complex is room B3700 with the tholos tomb built into its southeast corner. That is to say, the visual axis and line of communication from the doorway at the northern end of B4600 extends directly through B3800 and up to the dromos of the tholos tomb in B3700.

Figure 10. B4500 from east: phase 2 floor with quern and lekane in situ. Photo L. Thompson.

Comments on the LM IIIC and Early Iron Age Stratigraphy

Stratigraphic work at Azoria is presenting us with some interesting patterns. Underlying the Archaic phase (late 7th to early 5th centuries B.C.), two distinct periods of activity have clear architectural and stratigraphic correlates with well-preserved and articulated physical remains. These are the LG period—often with well-stratified and continuous occupation into the 7th century—and LM IIIC, in which standing architecture and habitation deposits are remarkably well preserved, even if partially destroyed during the Archaic rebuilding. Protogeometric and sub-Protogeometric (9th and early 8th century B.C.) phases, however, remain surprisingly elusive. The final burials in the tholos tomb in B3700 are clear indications of PG activity on the site, while Protogeometric and Geometric pottery, figurines, and other artifacts have been recovered in both Archaic foundation levels, as well as recycled and reused in late Archaic abandonment contexts (Haggis et al. 2007, 276, 293; Haggis and Mook 2011; Haggis et al. 2011, 31–36). Their original use contexts have not yet been found. Interestingly, these periods are well represented on the neighboring site of the Kastro, which is continuously stratified between the LM IIIC and LG periods. Azoria, by way of contrast, surprisingly lacks indications of this continuous occupation.

The missing 10th- and 9th-century buildings could well be the result of the aggressive modification of the terrain in the late 7th century, which certainly involved the removal and disturbance of EIA levels. Alternatively, it could be a condition of the continuous use of buildings and floor surfaces into the LG and EO phases of occupation, in effect obliterating their remains or at least obscuring their visibility. Further, it is possible that the PG–LG settlement at Azoria was not as robustly developed as we have proposed in the past.

Our preconception of the EIA occupation and our working model of settlement development have been based on a number of assumptions. First, on analogy with the Kastro stratigraphy—as well as current models that suggest large-scale nucleation in the 10th and 9th centuries on Crete—we expected Azoria to have a parallel continuous growth and expansion throughout the Early Iron Age, perhaps reaching a peak in size and scale between the 10th and 8th centuries. Second, both the existence of the PG tholos tomb and the remarkable preservation of EIA pottery in Archaic contexts across the site suggested residues of earlier occupation and thus indications of displaced cultural phases. The narrative that we have been constructing for the history of the site, therefore, remains grounded in an essentially evolutionary framework of continuous growth and expansion of settlement, leading to a horizon of reconstruction or renovation which we have characterized as urbanization—the phase transition in the late 7th century that culminated in the construction of the Archaic city

The preliminary evaluation of the results of our work in 2014 is, however, now leading us to visualize more of a discontinuous and uneven structuring of the settlement throughout its history. We are not proposing a gap in the use of the site in the 10th and 9th centuries, only that the kinds of activities and the nature of the occupation may not represent a continuous expansion and growth of the settlement.

So far the best evidence we have for continuous and contiguous settlement in pre-Archaic levels across the excavated area belongs to LM IIIC. Azoria was certainly a large and important primary site in the region, and it was significantly larger than

Figure 11. B4500 phase 2 floor with lekane in situ. Photo L. Thompson.

both the neighboring sites of Vronda and Kastro. The second major phase is represented by a well-preserved transition in the late 8th to early 7th centuries B.C., which may be localized (or at least concentrated) on the peak and slopes of the South Acropolis. Indirect evidence exists of EIA bronze and iron metallurgy, ritual activity, cremation burial, and ultimately the construction of an elaborate, multi-room building which incorporated a Late Minoan IIIC–Early Protogeometric tholos tomb at its southern end. While the function of the building itself requires further study, we can say that it was used for supra-household drinking and dining, given the size of the main room and central hearth in B4100, the predominance of drinking and serving vessels, and the hearth pyre dump from B3000 recovered in 2006. The Cretan hearth temple, house temple, and funerary chapel are probably the most compelling models for the building's function.

The Azoria tholos tomb itself indicates reuse similar to the pattern of mortuary deposition at Vronda and neighboring

Figure 12. B4500 excavation of lekane. Photo L. Thompson.

Figure 13. B4000 kiln, showing three use phases. Photo D. Haggis.

cemeteries at Skala and Skouriasmenos. We wonder if Azoria might have been a focal point in the broader region for burial and post-funerary rituals throughout the EIA—it is likely that the tholos is only one of several tombs on the slope, originally built in LM IIIC, but continuing in use after an abandonment of the settlement in the 11th century. An intensified and perhaps renewed interest in Azoria in the LG period could, in fact, be part of the process of mortuary elaboration that we see at Vronda as well with the continued use of tholoi and the construction of pyres and burial enclosures within the abandoned settlement.

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The Friends of the INSTAP Study Center for East Crete Need Donations for the 2015 Seager Fellowship

This Richard Seager Doctoral Fellowship was established in 2009 with the goal of enabling candidates to use the facilities of the INSTAP Study Center to bring recipients' dissertations closer to completion. Since then, four awards have been granted, resulting in numerous articles and two finished dissertations. With your help we can reach our goal of $4,000 and provide this fellowship to a qualified applicant for 2015. If you would like to help fund the 2015 fellowship, please send a check to the attention of Elizabeth Shank and payable to the INSTAP Study Center for East Crete at our Philadelphia office (see p. 24). Please write "Seager Fellowship" in the memo portion of your check. If you would like to make a donation in Euros through direct deposit, please contact Eleanor Huffman (eleanorhuffman@instapstudycenter.net).

View of Pacheia Ammos from the Study Center. Photo S. Ferrence.

Phantom 2 Quadcopter Photography at Papadiokampos, Azoria, and Mochlos

Hugh Thomas

On the 30th of June, I was fortunate to collaborate with the INSTAP Study Center for East Crete on a special project. The purpose of my visit was to aerially photograph various sites using my modified Phantom 2 quadcopter. This drone is small and lightweight, but powerful enough to lift a 16-megapixel Canon camera. I control the drone from the ground while using a wireless video transmitter to view the subject matter in real time. In this way, not only can individual buildings or features be photographed, but the system can shoot large transects of a site, allowing for the creation of photogrammetry models.

My arrival in East Crete brought with it the prospect of Beaufort 8 winds (considered gale-force winds on the Beaufort windforce scale) beginning within 48 hours, so speed was of the essence. I first shot the picturesque shoreline houses of Papadiokampos for Chrysa Sofianou of the 24th Ephorate of Prehistoric and Classical Antiquities. There my drone was greeted enthusiastically by the locals, unfortunately of the wrong species. While photographing the second house, a hawk became interested in the quadcopter and began circling it because it either was confused by this white flying object or was keen for a fight. It was decided that we should not stay and find out.

Over the next day I photographed large stretches of both the wonderful sites of Azoria and Mochlos. Unfortunately, by noon on Wednesday, the 2nd of July, the wind had already begun to measure Beaufort 5, the limit for safe flight by the drone. Although my trip was brief, it produced some fantastic photos including Figure 1 from Mochlos. I would like to offer my thanks to Tom Brogan, Jeffrey Soles, Donald Haggis, and Doug Faulmann for their assistance. For more photos from my trip and information about aerial photography and drones, please visit www.heliosphotography.net.

Figure 1. Aerial photograph of the Minoan town of Mochlos. North at left. Photo H. Thomas.

Capital Campaign for the Study Center

The INSTAP Study Center for East Crete is dedicated to the study of the prehistory of Crete from earliest times through the early Iron Age with an emphasis on the Minoan civilization. Our work continues a 100-year tradition of archaeology by American scholars on Crete, beginning with the pioneering work of Harriet Boyd and Richard Seager.

The Study Center serves as the base research center and storage facility for several large American excavations and surveys in Crete. Without the Center, American excavations and surveys could not function. It provides these projects and qualified individuals with state-of-the-art facilities: a library; several large study areas; and laboratories for conservation, petrography, photography, and geographic information systems (GIS). The staff offers a wide range of technical services including illustration, conservation, photography, ceramic petrography, and geophysical and faunal analysis. The Center also sponsors a traveling publication team to deliver these services to archaeologists working at museums and sites throughout the wider Aegean region, including colleagues who would otherwise have no access to such analyses.

The Center also places great emphasis on teaching and training students through internships and tours for local public schools and for undergraduate groups from the U.S., Greece, and other European countries. The summer lecture series and workshops serve as a nexus for scholarly discourse, while its newsletter and website announce new discoveries to the wider public.

Since its foundation, the Center has become a unique and vital resource for specialists dedicated to exploring and preserving the cultural heritage of humankind. The next step is to ensure that the Center continues to be able to meet the challenges faced by future generations of scholars, students, and visitors.

Fund Raising

The Study Center is currently engaged in a fundraising campaign with a goal of $20 million to advance the Center's mission and meet its annual operating costs for the next 100 years. The Center receives no governmental funding and accordingly relies totally on contributions from private foundations and individuals to meet its annual operating costs, which are just over $1,000,000. The campaign will run through 2017, and all private gifts and grant support during the campaign period will count toward the total goal.

Naming opportunities are available to honor significant contributions. Areas of specific interest include staff support, primarily through endowed positions, and lab sponsorship targeting new technologies and research initiatives (e.g., ancient DNA, chemical residue analysis, and cyberarchaeology).

The Center is a 501(c)(3) tax-exempt organization, and donations made directly to the INSTAP Study Center for East Crete are tax deductible for U.S. residents to the full extent of the law. Donations may be made by personal check, by the wire transfer of funds to the Center's First Republic Bank account in America, or by gifts of securities. For more details please contact us in Philadelphia or Crete (see p. 24).

Entrance to the Study Center. Photo E. Shank.

INSTAP Study Center for East Crete

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Gloria Steinem visited the Kentro this summer. At Knossos, clockwise from top: Thomas Brogan, Jerolyn Morrison, Amy Richards and sons Webber and Beckett, and Gloria Steinem. Photo G. McGuire.

Congratulations to Melissa Eaby and Vangelis Fiorakis who were married in Kavousi on May 9, 2014. Left to right: Despoina Koudouma, Vangelis Fiorakis, Melissa Eaby, and Christos Mazonakis. Photo E. Huffman.