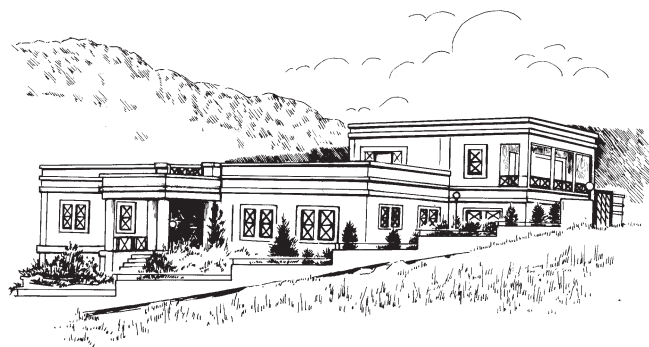


KENTRO

The Newsletter of the INSTAP Study Center for East Crete

Volume 11 (Fall 2008)



A WORKSHOP FOR DYEING WOOL AT PEFKA NEAR PACHEIA AMMOS

By Stavroula Apostolakou

In March of 2007, a bulldozer widening the highway near Pacheia Ammos uncovered a Minoan pithos burial and a small cave filled with Early Minoan III pottery. In the search for additional tombs, a series of cuttings in bedrock filled with sherds were discovered at a location called Pefka, across the road from the small cave and the Minoan burial. The 24th Ephorate excavated this site in 2007 and 2008 with technical assistance given by Thomas Brogan, Philip Betancourt, and personnel from the INSTAP Study Center (Figure 1). The evidence indicates that the site was a workshop making purple dye from murex shells, and it probably manufactured other colors as well.

Several vats were carved into the bedrock, and a deep well was found nearby (Figure 2). Many crushed murex shells were found in the workshop, including a clay jar filled with them that was discovered in the well (Figure 3). The crushed murex shells provide the clue for the use of the vats. We know from the writings of Pliny and other ancient writers that murex shells were

used to make the bright violet color called “royal purple” or “Tyrian purple.” Although workshops have not been found in Minoan Crete before now, the production of purple from murex

is well known from discoveries of workshops from other periods. Each animal has a tiny gland that can be removed and used for the color. Because thousands of murex shells must be collected to make a small amount of the dye, bright purple cloth was very highly valued. The process of preparing the dye was a lengthy one. Pliny

wrote that the animals were crushed to remove the glands, soaked in salt water for three days, and then heated for nine more days before the dye was ready to be used by pouring it into a vat to color the wool.

Some scholars believe the purple dye was discovered on Crete because crushed murex shells have been found with Middle Minoan pottery at several places on the island. The first such deposits of shells in Minoan Crete were discovered at Palaikastro and at Kouphonisi at the beginning of the 20th



Figure 1. Excavation at the site of Pefka.



Figure 2. The well at Pefka.

century, but they were not associated with any evidence for the workshop making the dye. The pottery with the basins at Pefka is from MM IIB.

The Pefka workshop was set up on a limestone hill overlooking the Gulf of Mirabello and the village of Pacheia Ammos. It consisted of nine vats carved into bedrock along with mortars to crush the murex shells and a depression with a drain to wash the wool before it was dyed (Figure 4). Basin 1 was a circular cutting 2 meters across. Basin 2, a rectangular carved depression a little over 4 meters long, was the upper opening for a well that was sunk 8.5 meters deep into the bedrock. The well was designed to provide fresh water for the operation, but it was unsuccessful because a hard layer of bedrock was reached before the water table, so the well was abandoned. It was then used as a place for the dirty water from washing wool by draining the water into it from Basin 4 (because lanolin [the oil in wool] floats, it can be drained off as the wool is washed).

The dyeing would have been accomplished in a row of similar basins that form a line east to west across the hill. All the basins were a little more than a meter long. Each one had a shallow trough cut at its side in order to allow the wool to be pulled out of the vat so the extra dye would drain back into the basin (Figure 5). The presence of so many basins suggests the workshop was making several different colors (each dye needs its own basin to keep the color as pure as possible).

Unfortunately, the buildings associated with these vats did not survive because extensive terrace building and other

construction in the area, including a guard house built during World War II, scavenged all the stones large enough for construction. The pottery and other artifacts, however, do survive, and they provide useful information on the workshop and its operation. The pottery includes large numbers of cooking pots that would have been useful in heating the dyes, as well as many jars, basins, and pithoi for storing the ingredients and the finished products. A few cups and other fine pieces show that the workers lived at their workshop. Only few loom weights were present, so the only step in the production of cloth that took place here was the dyeing of the wool; the spinning of thread and weaving of cloth took place elsewhere.

The scale of the workshop is palatial. The large number of basins for dyeing suggests a continuous operation on a large scale. If two or three persons were needed to prepare the ingredients, cut the firewood, and tend the fires for each color, wash the wool in preparation for inserting it into the vats, and dry and store it for shipment, and similar groups worked on each color, the workshop could have consisted of fifteen or more people, not counting additional personnel for preparing food and tending to other chores. A MM IIB prism seal found in the well and some pieces of the finest Kamarea Ware suggest that a supervisor was probably present to manage the operation. The seal is similar to examples from a workshop at Quartier Mu at Malia. Because of its large size, the workshop at Pefka was probably associated with one of the Minoan palaces, either Gournia, which is located nearby, or Malia, the place where the prism seal was made.



Figure 3. Ceramic jar (PAI 424/376) found to contain murex shells, from the well at Pefka.

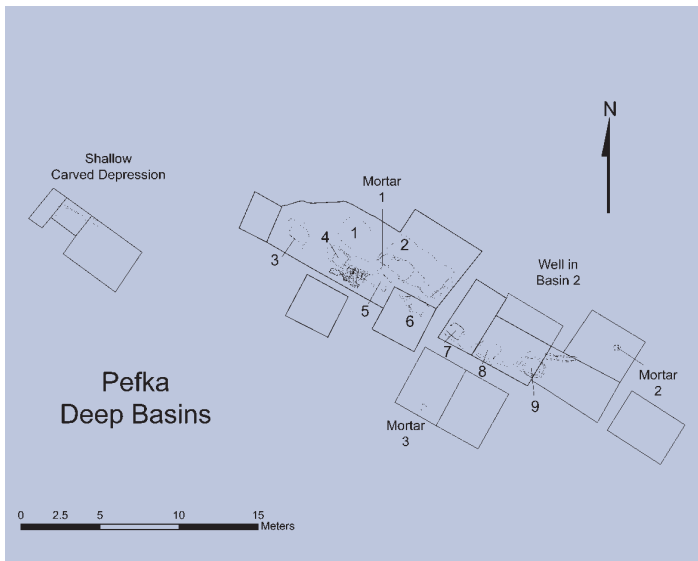


Figure 4. Plan of the Pefka workshop.



Figure 5. Detail of Basin 7.

PILGRIMS AT SYMI VIANNOU: PRELIMINARY RESULTS OF THE PETROGRAPHIC ANALYSIS OF HOLLOW ZOOMORPHIC FIGURINES¹

By Eleni Nodarou, Christina Rathossi, Athanasia Kanta, and Alexia Spiliotopoulou

Introduction and Aim of Study

The sanctuary of Hermes and Aphrodite at Symi Viannou is situated at the southern flank of the Dikti mountain in central Crete. Under the auspices of the Archaeological Society at Athens, Dr. A. Lebessi has excavated at the site for 20 years (1970–1990). She and her team have brought to light a sanctuary that has been used for twenty-seven centuries without interruption (from the Protopalatial to the early Christian period), offering the opportunity to study continuity and change in cult practices over a long period of time (Lebessi 1981). Hollow animal figurines constitute a special category of votive offerings from this sanctuary. Although common in peak sanctuaries, they appear at Symi during the Late Minoan IIIC period as a sign of Mycenaean influence, and their use extends to the Subminoan, Geometric, and Archaic periods. The majority are representations of bovines, manufactured in a range of fabrics, and their size varies from a few centimeters to one meter (Figure 1)

(Kanta 1991). We carried out petrographic analysis on a number of specimens ranging in date from LM IIIC to the Geometric period. The analysis of the material will be complemented with more samples in the near future. At this stage, we used petrography to identify the nature of the fabrics used and the techniques of manufacture. We focused on the potential connection between fabric type and the chronology of the samples, and the standardization of production for the various periods. Moreover, it was hoped that petrographic analysis would provide new data for the question of whether the worshippers brought the figurines with them or procured them at the sanctuary.

Preliminary Results of the Analysis

Based on the petrographic analysis, we were able to establish several fabric groups and subgroups on the basis of their

mineralogical composition and texture. Two of the fabric groups included are characteristic of the rock and mineral suite encountered in the broader area of Symi, and they represent the local component of the assemblage. A third group may be imported.

Fabric Group 1 is a coarse fabric characterized by the presence of low-grade metamorphic rock fragments (mainly phyllite and slate) as well as sandstone, siltstone, chert, and quartz (Figure 2). This rock and mineral suite is compatible with the outcrops of the Phyllite-Quartzite series in the area of Viannos. The presence of optical activity is indicative of a relatively low firing temperature (750°–850°C). The figurines included in this group seem to belong to the 8th century B.C.

Fabric Group 2 is also a coarse fabric characterized by volcanic rock fragments (mainly basalt), rare quartz, siltstone, and sandstone (Figure 3). This rock and mineral suite is compatible with the ophiolite series and the flysch mélange outcropping in the area of Symi. The absence of optical activity and the color of the groundmass are indicative of a higher firing temperature (900°–1000°C). The figurines included in this group belong to the LM IIIC/Subminoan period.

Fabric Group 3 is a semi-fine fabric characterized by the abundance of white mica in the micromass, which gives the vessels a glittery surface (Figure 4). The other non-plastic

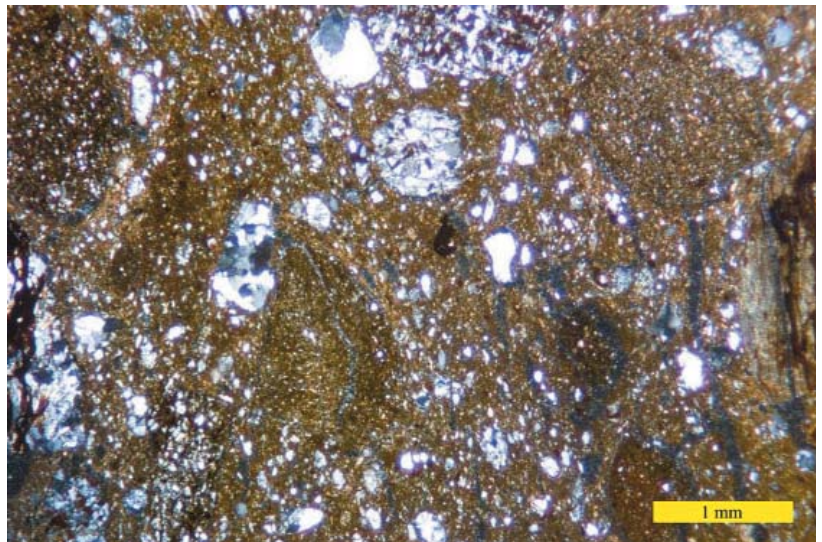


Figure 2. Fabric Group 1.

components include quartz, metamorphic rocks, and a few biotite fragments. This composition, although compatible with the Phyllite-Quartzite series, should not exclude a more distant provenance. The samples of this group seem to belong to the 8th century B.C.

Discussion

The connection of cult places with systems of production and consumption of votive offerings controlled by a central power and the local elites is a recurrent theme in studies concerned with Minoan peak sanctuaries. The case of Symi, however, is different. It is not a peak sanctuary, and, by the LM IIIC/Subminoan period covered by this study, the palatial system had collapsed. Symi, moreover, appears to have been located far from any known “urban” center.

From the petrographic analysis, it is evident that the majority of the hollow animal figurines were manufactured with raw materials that are compatible with the local geology. It can be suggested, therefore, that pottery workshops producing votive offerings for worshippers exist in the broader area of Symi.

With regard to technology, the manufacture of the figurines requires skill, experience, and solid knowledge of pyrotechnology. The combination of hollow and compact body parts seen in some figurines and their occasionally impressive size suggest the work of specialized artisans. More work is needed to



Figure 1. A clay bovine figurine from Symi Viannou.

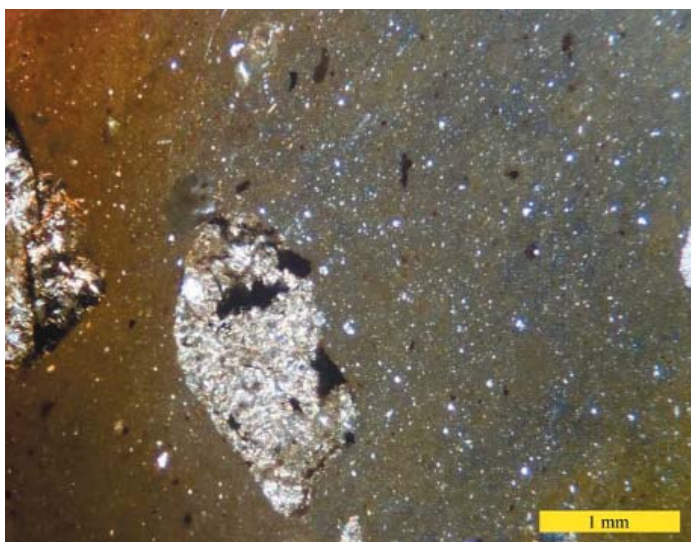


Figure 3. Fabric Group 2.

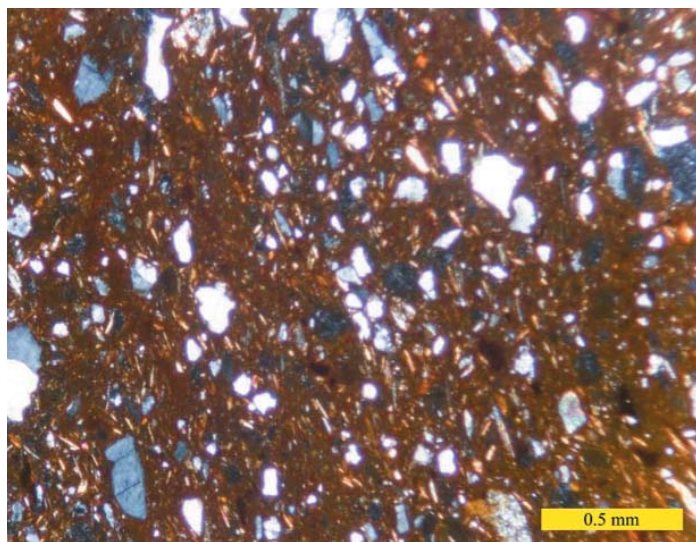


Figure 4. Fabric Group 3.

see whether the same workshops also produced the pottery used at the sanctuary and the small settlements nearby. The next step in our study will be a comparison of the LM IIIC phase of the sanctuary with that from contemporary sites like Kavousi (Day et al. 2006) and Karphi (E. Nodarou and L. Day, forthcoming).

Finally, there appear to be significant differences between the figurines of the LM IIIC/Subminoan and the Geometric periods in terms of fabric and the technology of manufacture. The Geometric material, in particular, seems to be more diverse in terms of the selection of raw materials and less standardized in its production. This study is still at an early stage, making it difficult to evaluate the meaning of these differences; it may, however, be connected with broader changes in the historical, economic, and social conditions that existed during this period of transition in Cretan history.

References

- Day, P.M., V. Kilikoglou, L. Joyner, and G.C. Gesell.** 2006. "Goddesses, Snake Tubes, and Plaques: Analysis of Ceramic Ritual Objects from the LM IIIC Shrine at Kavousi," *Hesperia* 75, pp. 137–175.
- Kanta, A.** 1991. "Cult, Continuity and the Evidence of Pottery at the Sanctuary of Syme Viannou, Crete," in *La Transizione dal Miceneo all'Alto Arcaismo: Dal palazzo alla città. Atti del Convegno Internazionale, Roma, 14–19 Marzo 1988*, D. Musti, A. Sacconi, L. Rocchetti, M. Rocchi, E. Scafa, L. Sportiello, and M.E. Giannotta, eds., Rome, pp. 479–505.
- Lebessi, A.** 1981. "Η συνέχεια της κρητομυκηναϊκής λατρείας. Ἐπιβιώσεις καὶ ἀναβιώσεις," *ArchEph* 1981 [1983], pp. 1–24.

¹ This is a concise version of a paper presented at the 5th Symposium of the Hellenic Society of Archaeometry (Athens, 8–10 October 2008).

Acknowledgments

We would like to thank Dr. A. Lebessi for allowing the study and sampling of the material and the Directorate of Conservation of the Greek Ministry of Culture for providing sampling permits.

THE ARCHEM PROJECT TURNS FIVE

By Andrew Koh

In October of 2003, with the careful planning and support of Tom Brogan and Eleanor Huffman of the INSTAP Study Center for East Crete, I managed to collect the first several dozen samples of organic residue from the site of Mochlos in East Crete for the ARCHEM Project. Now, more than five years later, we have collected more than 3,000 samples from 40 sites in 4 countries. Our goal is to assemble a library of organic residues collected by non-destructive extraction and to fully integrate this with the overall archaeological process.

The growth of our project has allowed for and necessitated the inclusion and training of graduate students.

They were selected carefully for their background in archaeology to support ARCHEM's mission of incorporating archaeochemistry as a component within archaeological projects; our model for this was the inclusion of such better-established disciplines such as paleobotany and faunal analysis, which now have become standard and vital elements of many excavations.

A very important collaboration was formed this past summer between ARCHEM and Dr. Christophoros Vallianos and his wife, Despina, of the Museum of Cretan Ethnology Research Centre in Vori, Crete (Figure 1); this cooperation benefits both organizations. We now have the use of a GC-MS instrument (Gas Chromatography and Mass Spectrometry) that greatly streamlines the three-step process of extraction, instrumentation, and interpretation of organic residues. The GC-MS couples the powerful separation potential of gas chromatography with the specific characterization ability of mass spectroscopy,

thereby providing the most accurate identification of materials.

In addition to equipment, the Vallianoses also have agreed to share their considerable knowledge of Cretan ethnology. They have granted us access to ethnographic records detailing cultural practices on Crete that have died off in recent years but bear remarkable similarities to Minoan practices. Their

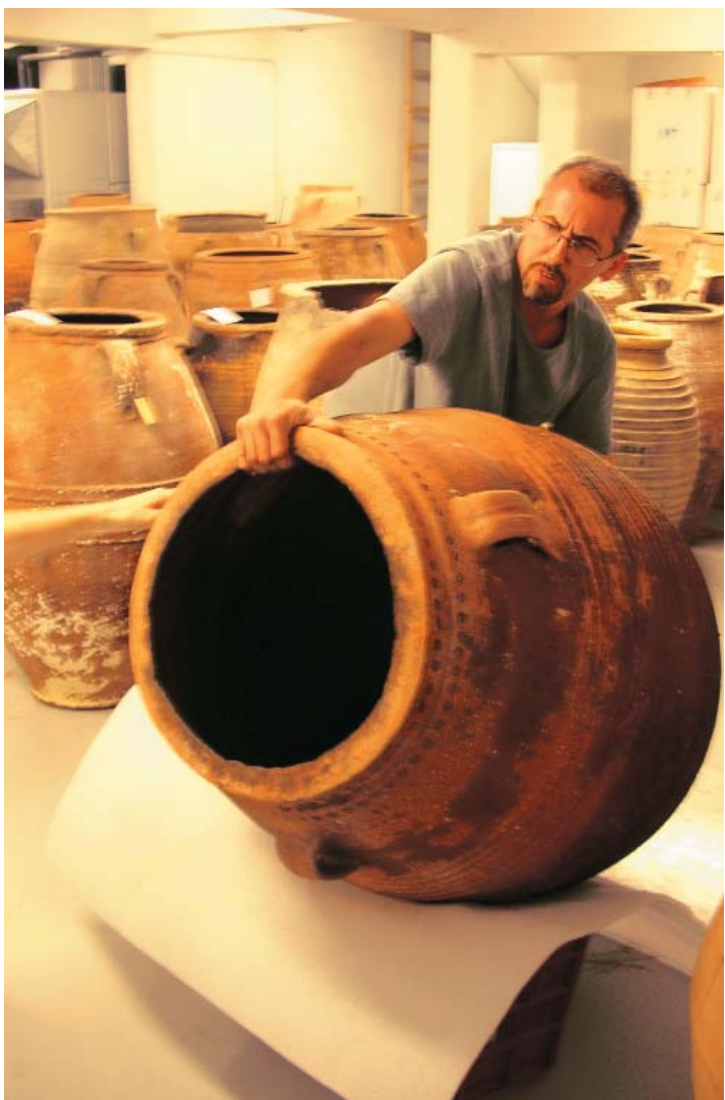
cooperation has added greatly to our collecting of modern reference samples that may have originated from conditions similar to those in antiquity. In this endeavor, scholars such as Jennifer Moody, Oliver Rackham, and Peter Warren have been of invaluable service to the project in the past.



Figure 2. Dr. and Mrs. Vallianos with the 2008 ARCHEM team.

Last May, INSTAP senior conservators Michel von Roggenbucke and Kathy Hall extracted residue samples from eight pithoi in the collections of the Museum's Research Centre; these vessels date from various times over the past 500 years (Figures 2–4). Not only are these Cretan pithoi remarkably similar in function to those from antiquity, but they also have ethnographic documentation detailing their history and patterns of use. We now have been able to include reference samples of resinated red wine, olive oil, honey, and wheat—all with clear provenances—to the ARCHEM collection

Two more projects that we initiated this past summer were the study of the production of purple dye from murex shells and the Cretan honey industry. Our interest in involving ARCHEM in the study of purple dye was due to recent discoveries at the industrial areas of Pacheia Ammos, Chrissi Island, and Papadiokampos. Dr. Vallianos' knowledge of the honey



Figures 2 and 3. Michel von Roggenbucke and Kathy Hall extracting ethnographic samples.

industry convinced us to add honey samples to our assemblage.

During the summer of 2008, graduate student Thomas Harwood, a veteran of earlier ARCHEM projects, with the support of a stipend grant from the Provost of Wayne State University, concentrated on researching the history of purple dye production (with help from Pliny the Elder, among many sources, and some ethnographic baskets at the Vori Museum). He focused his attention on the ancient process of extracting the hypobranchial gland mucous, which is the precursor to purple dye, from the shells. After capturing several dozen murex snails, Tom painstakingly experimented in isolating their mucous until he successfully obtained enough for GC-MS analysis at Vori, supplying ARCHEM with some excellent reference samples for purple dye (Figure 5).

Dr. Vallianos went to great pains to provide another graduate student, Jennifer Meyer, with two noteworthy honey samples to use as reference (Figure 6). One sample came from Rouvas in the mountains above the Mesara; this honey is produced by bees utilizing only thyme and oregano flowers. A second sample from Selacano above the Ierapetra plain contains honey produced only from pine tree flowers. After some encouragement from Dr. Vallianos during a breakfast meeting, we tasted the distinct flavor of our honey samples; this is the first time ARCHEM project members actually got to experience the flavor of our samples. These honey samples may help us to understand the geographic distribution of honeys in antiquity. In April of 2009, Tom and Jen will present the initial findings of their research at the 105th Annual Meeting



Figure 4. Pithoi from the Museum of Cretan Ethnology.

growing awareness of the significant contribution that the careful gathering and study of organic residues can make to our understanding and reconstruction of life in the ancient world, we at ARCHEM will continue our efforts to perfect our techniques and increase our knowledge base.

of the Classical Association of the Middle West and South (CAMWS) in Minneapolis.

After five years, we have been able to establish the foundation for a comprehensive collection of comparative samples of organic materials for Crete and for other areas of the ancient world. With the continuing support of our colleagues and the



Figure 6. Jen Meyer obtaining ethnographic honey samples.



Figure 5. Tom Harwood preparing murex samples.

SURVEY SAYS: 2008 SURVEY PROJECTS BY THE INSTAP PUBLICATION TEAM (SKOTEINO CAVE, MYCENAE, KYNOS, PAPADIOKAMPOS, AND CHRISSI ISLAND)

By Antonia Stamos

Skoteino Cave was mapped from the 18th to the 22nd of June 2008. At the request of Loeta Tyree, the survey team included the author, Jon Frey from Michigan State University and Antonis Alexakis, a member of the Speleological Organization of Crete. After three years of mapping Skoteino Cave with an electronic distance meter (EDM) total station that can produce only a two-dimensional rendering of the floor of the cave, this season the Skoteino project rented a Riegl Terrestrial Laser Scanner for four days. This scanner produces three-dimensional maps, and it proved ideal for mapping the walls and ceiling of the cave and capturing the interaction, accessibility, and overall appearance of the main entrance to the cave (Level

I) and the corridors of Level II. Unlike an EDM, the laser scanner does not require the use of a hand-held prism mounted on a pole, but instead utilizes small circular reflector patches that are attached to the cave's walls and act as guides for the processing software (Figure 1). The more reflectors the scanner can see in any particular scan, the more accurate the merging of the scans by the processing software.

Compared to traditional mapping with a total station, mapping with the laser scanner was fast, even though several

setups were necessary in order to provide enough reflector overlap in each scan. This system of collecting points is called a "point-cloud," in which thousands of points are collected per second. To demonstrate the speed and the sheer amount of data that was collected during the four days of mapping, con-

sider that with the EDM we collected more than 5,000 points in three seasons of mapping, about 35 days all told. With the laser scanner, we were able to scan up to 11,000 points per second. The laser scanner is also able to scan up to 80° vertically and 360° degrees horizontally, and it has a range of 650–2,000 meters, easily reaching the craggy ceiling of the cave. Another advantage was that we were able to overlay the scans with a

series of color photographs taken by the digital camera mounted atop the scanner, thereby adding color to the black and white scans.

Geophysical surveys using both ground penetrating radar (GPR) and fluxgate gradiometer continued for a sixth season at Mycenae with expanded surveys below the Oil Merchant's Complex and along the Panagia Ridge. The surveys were conducted from the 23rd of June through the 10th of August, with

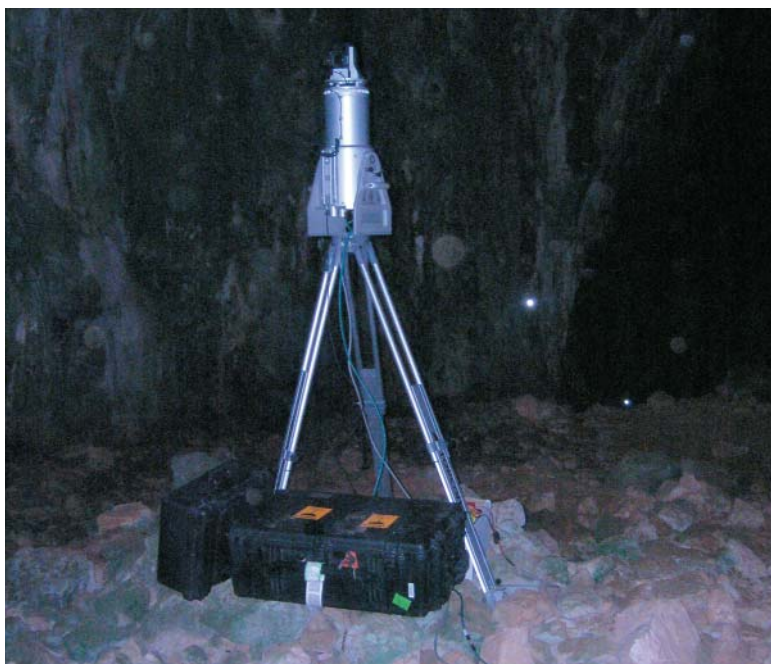


Figure 1. Skoteino Cave. Riegl 3D laser scanner set up in Level I with some of the reflectors shining in the darkness.

permission for the surveys provided by the director of the D.E.P.A.S. excavations at Mycenae, Christofilis Maggidis. The gradiometer surveys were conducted by Edward Blinkhorn, a graduate student from the University of York, and were assisted by myself, Allison Cuneo, a recent graduate from Dickinson College, and Will Gilstrap, a graduate student from California State University, Long Beach. The graduate students who assisted with the radar surveys included: Jennifer Danis, a Dickinson College graduate; Katie Lantzas, a graduate student at the University of Sheffield; and Jason Miller and Will Gilstrap, both graduate students from CSU–Long Beach.

The focus of the ongoing geophysical survey at Mycenae is to define the extent of the lower town of Mycenae. To accomplish this goal, we are surveying the terraces surrounding the citadel using both GPR and gradiometer. We work with a Geoscan FM256 fluxgate gradiometer with automatic data-logging facilities; the gradiometer functions as a handheld magnetometer to detect and record anomalies in the vertical component of the earth's magnetic field. The advantage of the gradiometer over the GPR is that it does not require physical contact with the ground; therefore, it is the ideal geophysical machine for surveying areas which are not suited to the radar. Another benefit is that the gradiometer is held at the operator's side during data collection while the radar requires

extensive preparatory work. Because there is no need for ground contact, a survey can be conducted through overgrowth, brush, and even over low terrace walls, which allows us to survey previously unreachable areas.

Last year's GPR and gradiometer surveys of South West Bank II (SWB II) produced almost identical results (Figure 2), something which is typically rare. The efficacy of both machines was further supported by the excavations begun at Mycenae in 2007 that produced material and information correlating with the survey data from both the GPR and the gradiometer. At the end of the sixth season, thanks to geophysical mapping around the citadel, excavators have been able to identify not only ancient structures, but also traces of a road and at least two possible gates that would have monitored access into the lower town.

We also conducted additional geophysical surveys this year at the hilltop site of Kynos at the request of Fanouria Dakoronia and Petros Kounouklas. Located in Boeotia, Kynos is a small coastal site with continuous occupation from the Neolithic through the Hellenistic periods. As with the 2006 survey season, the excavators hoped that I could use the GPR to locate the continuation of the building and storage bins that had been found along the eastern edge of the excavation. With this goal

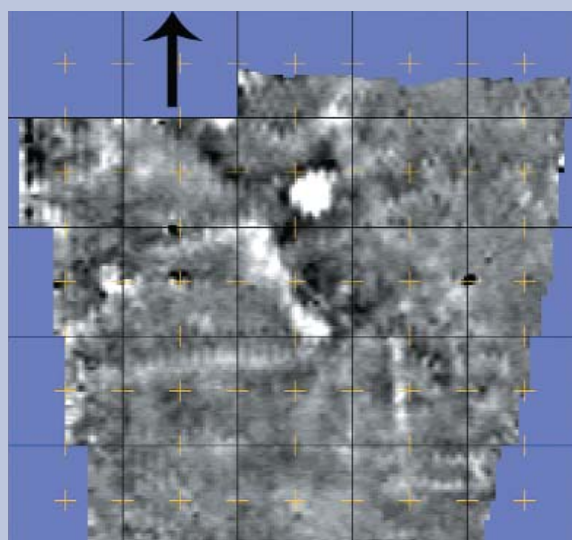
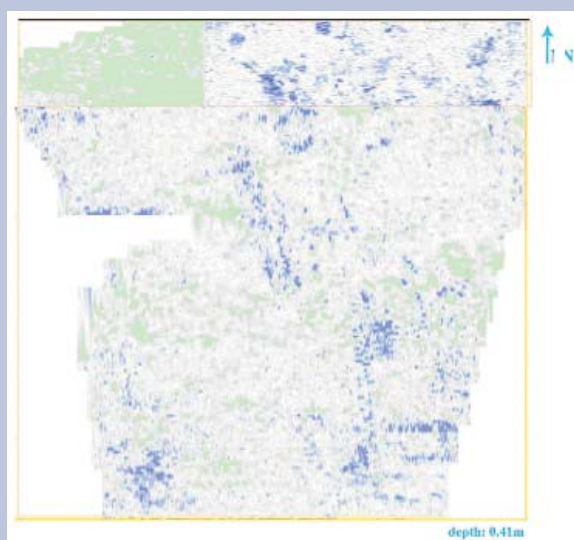


Figure 2. Mycenae. The SWB II GPR (left) and fluxgate gradiometer (right) results showing almost identical underground anomalies.

in mind, a survey grid was placed between the eastern limits of the excavated site and the fence marking the site's boundary. As soon as we began collecting data, we realized that we were right on target.

This was the second year that ground penetrating radar was conducted at Papadiokampos, a site located along the northern Cretan coastline just west of Siteia. The geophysical survey was requested by the directors of the site, Chrysa Sophianou of the 14th Ephorate, and Tom Brogan, director of the INSTAP Study Center. The radar grids were set up adjacent to the excavation trenches in Area A in order to try to locate additional structures in that area. After initial processing, we found several walls within the vicinity of House A.1 and additional anomalies farther to the southwest. Next year we plan to place radar grids in Area C in the hope of locating the boundaries of the prehistoric settlement.

We also continued the topographical surveying at Papadiokampos from the 15th to the 26th of September. Miriam Clinton, a graduate student from the University of Pennsylvania, was trained to use the Study Center's EDM, and we were assisted by Vangelis Phiorakis. During the last three seasons we produced a detailed contour map of the coastline (including Areas A through C) with surface archaeological features, and we mapped modern structures such as roads, property lines, and houses (Figure 3). This year's goal was to map Area D and to begin moving inland toward the hills. Thanks to ArcGIS informational software, we were able to create a three-dimensional map combining the topographical information with the ancient remains; this provides a greater appreciation for the extent of the Minoan settlement, as well as its relationship within the Cretan landscape (Figure 4).

Due to adverse weather, we were only able to spend two days of topographical mapping on Chrissi Island: the 18th of June and the 30th of September 2008. Despite the short survey period, some of the remains visible on the surface, including those excavated earlier in the summer, have been mapped. We

will continue mapping the remaining surface walls and any additional excavated features in 2009; we also hope to combine this data with a topographical map that portrays the relationship of the Minoan structures to the Roman settlement and its associated tombs that are located farther east.

By granting a richer awareness of a site, geophysical prospection is steadily becoming a vital tool for archaeologists as a non-destructive means to supplement and enhance results obtained during excavation.



Figure 3. Papadiokampos. Detailed view of map (made with AutoCAD) depicting both modern (red) and ancient (blue) features mapped during survey seasons 2006–2008.



Figure 4. Papadiokampos. Bird's-eye view of Areas C and D from the sea with ancient walls visible on both the surface and in the scarp; created by importing the topographical points into ArcGIS.

APHRODITE'S KEPHALI

By Philip P. Betancourt



Figure 1. Aphrodite's Kephali, looking south.

Aphrodite's Kephali is a hilltop fort overlooking the north-south road across the Isthmus of Ierapetra (Figure 1). It is situated high above the modern highway west of the modern village of Episkopi. The site was excavated by the 24th Ephorate in projects directed by Theodore Eliopoulos in 1996 and Stavroula Apostolakis in 2003. The architecture was cleaned and consolidated to preserve it in 2006 and 2007, and a new plan was made for the Ephorate at that time by the writer and graduate students from Temple University and the University of Pennsylvania.¹

This hilltop site is a unique record from Early Minoan I, a period that is very little known from this part of Crete. The architecture consists of a small building and a courtyard surrounded by a fortification that included small compartments along part of its length (Figure 2). The building had two rooms—one at the south with a bin constructed of small stones and one at the north with a bench along its northern

wall. A circular support helped brace the lower part of a post that held up the roof.

Just north of this little building was a large area where fires had burned the soil to a red color and north of this was a courtyard. The most likely interpretation is that this was a signal fire area next to an open space where people could seek refuge in case of danger. Storage here was both in small clay vessels and in large pithoi that could hold 165 kilograms of goods. Nine (or more?) pithoi were present, which would have been a substantial amount of storage for this period. The wall around the top of the site would also have enclosed the entrance to a small cave that would have provided water and additional room for storage.

The site furnishes some new evidence for the unsettled and obviously dangerous conditions existing in this part of Crete at the beginning of the Early Bronze Age. This is not the first refuge site excavated in this region that comes from the

historical phase at the end of the Neolithic and the beginning of the Bronze Age when many new residents seem to have settled in this part of Crete. A refuge site at Monastiraki Katalimata, perched high on the face of a cliff at the Cha Gorge on the eastern side of the Isthmus valley, had pottery left by Final Neolithic people who sought shelter on this high and inaccessible cliff. Krzysztof Nowicki excavated the site as part of an excavation project directed by Metaxia Tsipopoulou. The fort at Aphrodite's Kephali shows that conditions continued to be dangerous into the beginning of the Early Minoan period.

The pithoi from this site are among the earliest known from Crete. Stefi Chlouveraki mended the example presented here (Figure 3) at the Conservation Laboratory of the INSTAP Study Center. The decoration on the shoulder, a design called a "herringbone motif," consists of a vertical row of chevrons that some say recalls the bones of a fish. It is similar to the design on many Cycladic vases in other shapes, suggesting that the design was borrowed from the north.

¹ The writer is grateful to T. Eliopoulos and S. Apostolakou for permission to publish the site. Research for this work was funded by grants from INSTAP and Temple University.

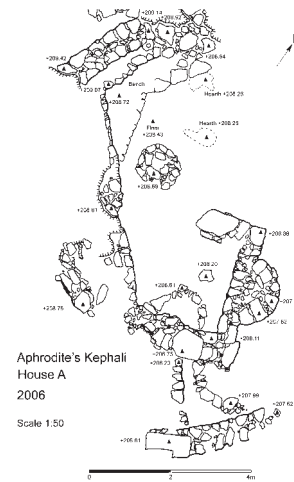


Figure 2. Aphrodite's Kephali, House A.



Figure 3. Restored pithos from Aphrodite's Kephali with a "herringbone motif."

2008 TRAVELING CONSERVATION

By Michel von Roggenbucke

Since the creation of the INSTAP Publication Team in 1998, up until a few weeks ago when the conservation "tool-case" came back home to Greece, I have had the pleasure of contributing to some of the most significant archaeological excavations in the Aegean and the Mediterranean.¹ Each season brings excitement and compensations, and the 2008 season provided for an especially productive and adventurous journey.

It is always a challenge to arrive on location and rapidly install a perfectly functional conservation lab, from the ground up in some cases. The job requires instant adjustment to just about any kind of working conditions, and the conservation

work itself, which needs to be of the best quality and quickly accomplished, is always both delicate and demanding.

The museums of Siteia, Hagios Nikolaos, Herakleion, Rethymnon, Marathon, Limnos, Izmir, and Çe°me, and the archaeological sites of Kato Zakros, Choiromandres, Knossos, Smari and Pitsidia, Tsepi, Koukonisi, Liman Tepe, Bakla Tepe, Çe°me-Bağlararası, Panaztepe, and Alalakh have been the main "work-stations" of this long journey. My companions throughout these travels have included Doug Faulman, the Publication Team Artist; Chronis Papanikolopoulos, the Photographer;² Kathy May and Erietta Attali also were companions on this journey for quite a long time, working as photogra-



Figure 1. The author performs site conservation at Liman Tepe.

phers for the Publication Team, and in some cases, Kathy Hall, our second Publication Team Conservator. At the INSTAP Study Center I have had the pleasure of working for the excavations of Mochlos, Pseira, Chrysokamino, Hagios Charalambos, Petras and Chalasmenos, Vronta and Azoria, as well as on projects involving analytical techniques—X-ray, archaeochemistry, and laser induced breakdown spectroscopy (LIBS). Winter provided an opportunity for us to catch up on extra work from the busy summer months and to keep the “conservation engines” running.

One of the most rewarding projects of these highly productive years was serving as liaison between the Research Center of the Ethnographical Museum of Crete in Vori and the INSTAP Study Center for East Crete. The impressive equipment at the Research Center was crucial to our work on the analysis of extracted organic residue samples. The Research Center also provided the perfect venue for the gas chromatography-mass spectrometry (GC-MS) workshop that Kathy Hall and I organized there in the summer of 2007.

My personal interest was the sites in Turkey, not only because of my family heritage, which gave me a strong bond with the culture and the language of the country, but because of the importance of these sites for Aegean prehistory. Every year, I was impressed with the professionalism and devotion shown by the professors, students, and workmen at these sites.

Since first joining the Publication Team in the summer of 2002, I have had the opportunity to work on objects made from

many different materials—ceramic, ivory, stone, glass, faience, and metal. I worked on the treatment of a wide range of artifacts from many sites throughout Turkey: the settlement and burials of Early Bronze Age (EBA) Bakla Tepe, and also the Late Bronze Age (LBA) chamber tomb of Mycenaean-Anatolian character; EBA and LBA material from Liman Tepe (Figure 1); and objects from the late Middle Bronze Age (MBA) site of Çe^ome-Bağlararası. During my first year, I helped with the conservation of the stunning ivory objects from Panaztepe at the Archaeological Museum of Izmir.

In 2006, together with Kostis Nikakis, I worked on site conservation projects at Liman Tepe: an EBA I fortification wall, storage compartments of an administrative complex, and a staircase from the late EBA II. We presented our project at the international symposium, “Studies on Historical Heritage,” in Antalya in September of 2007. I worked once again with Kostis at Liman Tepe to lift a LBA pithos burial of a teen-age individual; yet one more of those projects which made me happy with my chosen profession.

For the excavation seasons of 2003 and 2004, smaller scale site conservation projects were organized at the site of Çe^ome-Bağlararası. In 2004, an entire late MBA kitchen was found, as though frozen in time for a few thousands of years, with cooking pots still sitting next to the hearth and the flint-stones



Figure 2. Removing objects from the kitchen excavated at Çe^ome-Bağlararası in the early evening hours.

waiting in front of the opening of the oven to light a fire; an earthquake had destroyed the house before the fire could be lit. The quantity of objects and their state of preservation provided an opportunity for extensive archaeological study. The conservation work, starting with the removal of the objects from the ground, was fascinating and intense (Figure 2). Excavations often lasted into the early evening hours, followed by sorting at the dig-house. Other work included taking samples, extracting organic residue, cleaning objects, and the mending, plastering, and painting of complete artifacts. Thirty-five out of more than 50 intact artifacts soon will be displayed at the local Museum of Çe°me (Figure 3). The kitchen will be published separately, according to the excavators, after the study of all the materials is completed.

Of great interest as well are the artifacts and mud-bricks from Alalakh (Tell Atchana), another Publication Team project that started last year. The site is valuable not only from an archaeological point of view, but also enthralling from a conservator's viewpoint. This year, the work focused mainly on metal artifacts from the site. Two large cooking pots, various other pottery vessels, and beads from a variety of materials also were conserved. A large piece of charcoal found in the level IV palace courtyard trench was lifted and prepared for dendrochronology and C¹⁴ analysis, or for in-situ examination next year. The excavators



Figure 3. Objects from the Çe°me-Bağlararası kitchen after conservation.

also are involved in experimental archaeology; they built a house with traditional techniques and materials, and a bread oven. They also have made a large number of mud-bricks to be used in the building of another house (Figure 4).

The conservation of the mud-bricks of Tell Atchana, together with completing the organization of the conservation labs and storage areas (most especially for metals), both in Liman Tepe and Alalakh, are a few of the projects to look forward to as the journey of this conservator continues.

1 I am grateful to Kostis Nikakis, who has been a second “university” for me. Also, many thanks to my colleagues, Buket Aladag, Ezgi Ozpamir, Polly Westlake, Eftihia Papadopoulou, and Argiris Koniditsiotis for participating and helping with the conservation work in Turkey over different excavation seasons.

2 Kathy May and Erietta Attali also were companions on this journey for quite a long time, working as photographers for the Publication Team.



Figure 4. Bricks made for experimental purposes at Tell Atchana.

Congratulations!

All of us at the Study Center would like to congratulate Michel von Roggenbucke on his new position of Special Laboratory Teaching Staff at the Department of Archaeology and Art History of the National and Kapodistrian University of Athens. Michel has worked as a Senior Conservator of the INSTAP Publication Team since 1998, and is known to us as a friend and excellent conservator. Michel, we wish you all the best.

CONSERVATION OF IVORY PLAQUES FROM ELEUTHERNA AT THE INSTAP STUDY CENTER

By Pinelope Marinou



Figure 1. Fragments of ivory plaques.

Introduction

As part of my final year thesis at the Department of Conservation of Antiquities and Works of Art at Athens, I undertook a project entitled: “Study and Conservation of Late Roman Ivory Plaques from Ancient Eleutherna, Crete” under the supervision of Mrs. A. Malea. The conservation work took place at the W.D.E. Coulson Conservation Laboratory of the INSTAP Study Center for East Crete under the supervision of Mrs. Klio Zervaki.

The material is dated to the 4th century a.d. and comes from the excavation of the Roman villa in the East Sector of

Eleutherna by the University of Crete. I want to thank the Director, Prof. P. Themelis, for kindly offering me this material for my thesis. Ivory plaques like the new finds from Eleutherna were used in antiquity to cover small wooden or metal chests where cosmetics, jewelry, and other valuables were kept.

Conservation Procedure

When the material arrived at the Study Center, it was still in blocks of soil collected during the excavation, which were wrapped in gauze. The blocks were first photographed and then

scanned by x-ray and tomography in order to identify the position, quantity, and condition of the ivory fragments contained in the soil. After removing the gauze, it was possible to identify hundreds of fragments, including the head of a woman, the torso of a man, and part of a scene involving a nereid and a triton. Most importantly, we discovered the figure of Dionysos in the form of Lykeios Apollo (Figure 1).

All the fragments were mechanically cleaned and joins between pieces were found (Figure 2). When necessary, the gaps in conserved fragments were consolidated (see Figure 1). The final step involved storing all the fragments properly in foam-lined boxes with a neutral pH (Figure 3).

Archaeometric Analysis

During the macroscopic study and cleaning of the material, we observed differences in the texture of various ivory fragments and found that some of them preserved traces of red color. It was important to carry out further analysis to determine if the textural differentiation was due to the nature of the material (bone versus dental) and also to examine the elemental composition of the coloring substance.

Ten non-joining pieces were submitted for Scanning Electron Microscopy–Energy Dispersive-x analysis at the Coulson Laboratory. The analysis showed that fragments with a rough surface and heterogeneous texture are bone, while fragments with a smooth surface and homogeneous texture derive from dental material. Moreover, the analysis demonstrated the presence of lead (Pb) on all the fragments, which might be the result of a coloring or covering material used by the ancient craftsmen. Finally, the analysis showed that the coloring agent used was an iron oxide, a material that has been widely used in antiquity for the production of the color red.

Acknowledgments

I would like to thank Klio Zervaki for her help in organizing this project, and Dr. Tom Brogan and the staff members of the INSTAP Study Center for their hospitality and support during my stay.



Figure 2. The author at work in the W.D.E. Coulson Conservation Laboratory at the INSTAP-SCEC.



Figure 3. Storage of the ivory fragments.



LECTURE SERIES

On November 18, 2008, Eleni Hatzaki, Assistant Professor in the Department of Classics at the University of Cincinnati, presented a paper titled "Mortuary Ritual and Society in Late Bronze Age Knossos, Crete: the Temple Tomb in Context."

Please join us for an illustrated lecture.
**KEROS: RETHINKING THE CYCLADIC
EARLY BRONZE AGE**

University of Pennsylvania Museum
By Professor Colin Renfrew, McDonald Institute for Archaeological
Research, Cambridge University

January 14, 2009

5:30 PM

Reception in the
Mosaic Gallery

6:00 PM

Lecture in Rainey
Auditorium

7:30 PM

Gala dinner
with the speaker

REPORT FROM THE 2008–2009 LIBRARY FELLOW

By Melissa Eaby

Having spent the past few years completing my dissertation in the INSTAP Study Center for East Crete's library, I was excited to take on the job of librarian for the 2008–2009 term. As part of my fellowship, I have been involved in a variety of projects both inside and outside of the library.

From May to October, the library acquired over 150 new books and off-prints through purchases, our exchange partners, and donations, and this number will only increase over the course of the year. In this same period, numerous books and journals have been bound or rebound in order to help preserve them. I have been able to make active use of our interlibrary loan program, borrowing books for visiting scholars from our partners at the University of Crete at Rethymnon and the British School at Knossos. In addition, I reorganized our lending library of paperbacks (in the hallway) by genre to make books of interest easier to find and to keep the ever-growing mystery section under control. I also rearranged the archives to make more efficient use of space, as well as organized the Director's personal and Publication Team files according to the system created by Eleutheria Daleziou in 2006–2007. A complete inventory of the archives is one of many projects to be completed later in the year.

The librarian fellowship has also allowed me to assist in several excavation-related projects. I organized the transfer of

antiquities from Priniatikos Pyrgos to one of two new containers on the Center's property. Each of these containers will be able to hold up to 336 crates and finds from other excavations will soon be transferred to the second container to free up space

in the main antiquities cage; the inventory of antiquities stored at the Center (SCEC crates) will be continued later in the year. I have also done work for the Pacheia Ammos, Chrissi, and Papadiokambos excavations in varying capacities. In addition, the excavation notebooks currently stored in the archives will be scanned as PDFs later in the year as an alternate form of storage.



Melissa Eaby in the Study Center's library.

As an independent research project, I am also studying Unit A.2 from Chalasmenos. This two-room building dates to the LM IIIC period and consists of a single square room with stone-lined bin to which a long rectangular room with central clay hearth, bench, bin, and two platforms was added. The finds from this building include vessels for storage, food preparation, drinking and food consumption, as well as stone tools and burned and unburned animal bones. While my study is still in its preliminary phase, it is hoped that the evidence will contribute to our knowledge of LM IIIC settlements in east Crete and also aid in better understanding the relationship between Chalasmenos and other nearby sites, such as Kastro, Vronda, Vasiliki Kephala, and Vrokastro.

REPORT FROM THE CENTER

By Eleanor Huffman and Stephania Chlouveraki

We were honored to have the opportunity to participate in the National Endowment for the Humanities Storage Symposium: Preservation and Access to Archaeological Materials, held at the UCLA Fowler Museum of Cultural History, June 6–8, 2008. Our presentation, “Stimulating Research and Preserving Greek Heritage: the Development of a Centralized Archaeological Repository with Laboratories and Comparative Collections in East Crete,” focused on the ongoing mission of the INSTAP-SCCEC, and how that mission has developed and grown since the facility opened in 1997.

We present here an overview of the major themes of our paper.*

The mission of the Center is as follows:

The INSTAP Study Center for East Crete is a unique facility for archaeological research, especially in the area of Aegean Prehistory. The Center is committed to stimulating and facilitating publication in the broader field of Cretan studies, with a focus on archaeology and ethnology.

The Center provides storage space for artifacts from American and Greek-American excavations in eastern Crete and offers services for the primary study of excavated material to both member projects and individual scholars. On a broader level, the Center also functions as a base of operations for individuals engaged in a wide range of Cretan research topics unrelated to the member projects. The numerous facilities

and services at the Center are available to both individuals and projects.

During the past ten years this mission has expanded to meet the growing needs of the international archaeological community in East Crete. In the process, we have transformed existing

storage and conservation facilities, and converted our photographic laboratory from film to digital. Whenever possible, we have purchased mobile equipment that can be used both at the Study Center and at remote locations around the Aegean.

We have added new analytical capabilities** such as The W. A. MacDonald Laboratory for Petrography and a full-time petrographer, Eleni Nodarou; a LIBS (Laser Induced Breakdown Spectroscopy) instrument, which allows us to per-

form non-destructive elemental analysis; sampling for and analysis of organic residues of vessels; a Faxitron X-ray unit offers opportunities for technological studies of various materials; and subsurface geoprospection via GPR (ground penetrating radar).

The Study Center now houses objects and records from 8 excavations and 4 survey projects and regularly hosts temporary transfers of finds from other excavations in East Crete. In addition, our ongoing analytical work is also generating thousands of samples in many forms and sizes that require special storage environments. All of these materials are tracked by a computerized inventory. As a result of these diverse activities storage of



Stephania Chlouveraki (L) and Eleanor Huffman (R) visiting the J. Paul Getty Museum.

finds is becoming a major concern. We are constantly faced with the challenge of developing new solutions to improve the storage and handling of all this material.

A great boost to our efforts was the recent addition of an expanded archival space which was funded through the generosity of the Friends of the INSTAP Study Center for East Crete. We now have an adequate space in which to manage the daunting array of paper and digital records which includes material from the excavations and all the departments of the Study Center. This has had the additional benefit of freeing up more space for our ever-growing collection of books (more than 3000), periodicals (more than 1000), and offprints (more than 2500) in the Center's Library.

Finally, our recent leap into the digital world has created a mountain of vulnerable computer files (e.g., more than 6,000 photographs were taken in the past year alone by our photography department) which need to be stored, backed-up, and tracked.

We came away from the conference with the realization that we are not alone in facing the problem of safe storage. Many

institutions suffer from the same limitations—inadequate space, lack of funding, unsuitable environmental conditions, and under-staffing. Throughout the presentations and subsequent fruitful discussions at the conference, we learned a lot from people's experiences and achievements by the application of innovative techniques to finding effective solutions to many of the unique storage issues that confront archaeologists today. Furthermore, we became aware of the challenges that the future will bring.

* The proceedings of the conference tentatively are entitled *Preservation and Access to Archaeological Materials: Managing Portable Collections on Site* and are to be published by the UCLA Cotsen Institute in a digital format, with edits and introduction by Ellen Pearlstein. The publication will be freely available through *eScholarship*, part of the University of California Digital Library, by the end of 2009.

** To learn more about INSTAP-SCEC and its facilities, please visit <http://www.instapstudycenter.net>

Congratulations!

Stephania Chlouveraki attended the 10th Conference of the International Committee for the Conservation of Mosaics (ICCM), which was held in Palermo from the 20th to the 27th of October. She delivered a paper entitled "Observations on the Technology of the Early Christian Basilica of Saint Lot, Jordan."

As recognition of her dedication and contribution to the field, she was elected to the board of ICCM. The board consists of 10 members who represent an international professional body consisting of 350 members for 40 countries.



Melissa Eaby (L) and Peggy Mook (R) begin arranging pottery from Azoria for a "group photograph" by Chronis Papanikolopoulos. Photograph by N. Raines.



Chronis begins the photography session in the Study Center's courtyard. Ian Bensberg, Melissa Eaby, Peggy Mook, and Donald Haggis observe. Photograph by N. Raines.

The Friends of the INSTAP Study Center for East Crete

Membership

Joining the Friends of the INSTAP Study Center for East Crete indicates your support of our ongoing mission to provide the best facilities, staff, and resources to archaeological projects in Crete. Yearly membership benefits include free admission to use the Study Center's facilities, the Kentro newsletter, annual updates on the contributions of members toward the Center's fundraising goals, and special discounts on Aegean Bronze Age talks and dinners sponsored by the Friends of the INSTAP Study Center for East Crete.

All donations are tax deductible.

Please make checks payable to:

Friends of the INSTAP Study Center for East Crete

Student	\$45	Household	\$250	Patron	\$1,000
Associate	\$125	Sustaining	\$500	Fellows	\$1,000 and up

Support a Doctoral Student Fellowship!

The Friends of the INSTAP Study Center for East Crete are soliciting donations for two fellowships for doctoral candidates to work at the Study Center. The aim of these fellowships will be to help the students bring their dissertations to completion by using the resources available at the Study Center. The two doctoral candidates will each be given \$4,000 for travel and living expenses for research in 2009–2010. If a donor would like to fund a fellowship in full, then that fellowship will be named for the donor. Please make your check payable to the Friends of the INSTAP Study Center.

All checks should be mailed to:

**Friends of the INSTAP Study Center
3550 Market Street Suite 100
Philadelphia, PA 19104 USA**

If you have any questions please contact Elizabeth Shank:
(215)387-4911 or elizabethshank@hotmail.com

INSTAP STUDY CENTER FOR EAST CRETE

United States:

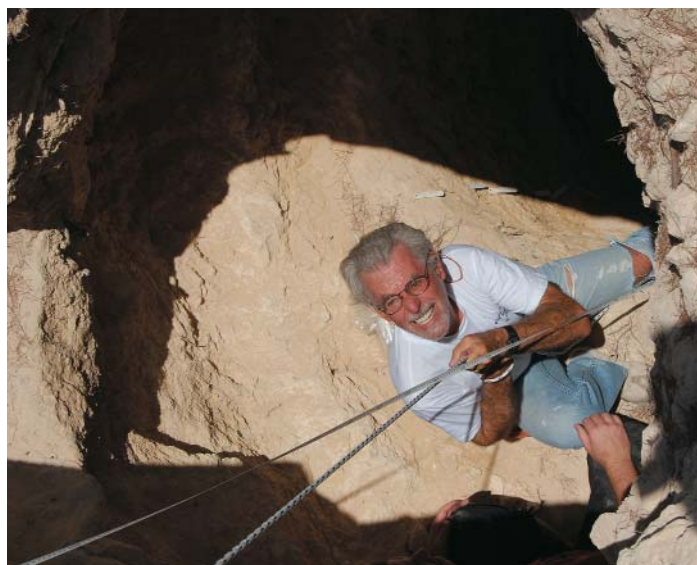
INSTAP Study Center for East Crete
3550 Market Street, Suite 100
Philadelphia, PA 19104
Phone: 215-470-6970 or 215-387-4911
Fax: 215-387-4950
E-mail: elizabethshank@hotmail.com

At the U.S. Academic Office

Philip P. Betancourt,
Executive Director of INSTAP-SCEC
Elizabeth Shank,
Research and Administrative Coordinator

Kentro Staff

Elizabeth Shank, *Editor*
David Branch, *Production*



Floyd McCoy descends into the well at Pefka to collect samples.

Photograph by N. Raines.

Crete

Thomas Brogan, Director
INSTAP Study Center for East Crete
Pacheia Ammos
Ierapetra 72200
Crete, GREECE
Phone: 30-28420-93027
Fax: 30-28420-93017
e-mail: instapec@otenet.gr
www.instapstudycenter.net

At the Center

Thomas M. Brogan, *Director*
Eleanor J. Huffman, *Assistant to the Director*
Stephanie N. Chlouveraki, *Chief Conservator*
Kathy Hall, *Senior Conservator*
Chronis Papanikolopoulos, *Chief Photographer*
Doug Faulmann, *Chief Artist*
Eleni Nodarou, *Ceramic Petrographer*
Michalis Solidakis, *Maintenance Personnel*
Maria R. Koinakis, *Custodian*

Members of the Managing Committee

Kellee Barnard	Jennifer Moody
Philip P. Betancourt	Margaret S. Mook
Thomas M. Brogan	James D. Muhly
Jack Davis	Irene Bald Romano
Leslie P. Day	Elizabeth Shank
Susan Ferrence	Jeffery S. Soles
Sherry Fox	Catherine Vanderpool
Geraldine C. Gesell	L. Vance Watrous
Donald C. Haggis	