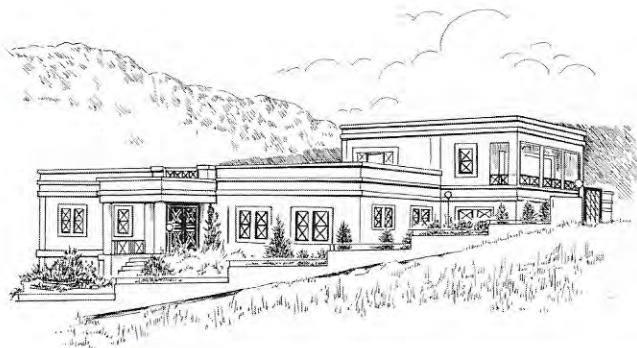


# KENTRO

The Newsletter of the INSTAP Study Center for East Crete

Volume 6 (Fall 2003)



## MESSAGE FROM THE DIRECTOR

**A**t the heart of the INSTAP Study Center's mission is a desire to support the preservation, study, and publication of Cretan and Aegean material culture, and this year's work included auspicious starts in promising new areas.

The successful summer excavations at Azoria and Hagios Charalambos are covered separately by directors' reports. I would also highlight the work done by the staff of the Study Center between September and May, including the conservation of a magnificent series of decorated Archaic pithoi from Azoria, a group of LM I ceramics from Houses C.3 and C.6 at Mochlos, and the well-preserved human skeletal remains from the burial cave at Hagios Charalambos. The other major winter project was Metaxia Tsipopoulou's study and conservation of pottery from House 1 at Petras, which offered scholars in residence an extensive LM I assemblage for comparison with those found at sites in the Mirabello area.

Among this year's individual members, Angus Smith spent the fall of 2002 studying the LM III pottery from Mochlos, and reported finding a significant number of LM II and LM IIIA:1 objects from the reoccupation of the town. During the fall and spring, Gerry Gesell continued her study of the shrine at Vronda Kavousi, noting many parallels with finds from the contemporary LM IIIC shrine excavated by Metaxia Tsipopoulou at Halasmenos, which was being conserved at the Study Center last winter.

Site conservation is an important component of all our fieldwork. The conservation staff of the Study Center worked closely with the members of the 24th Ephoreia of Prehistoric and Classical Antiquities and the Conservation Department of the Ministry of Culture to develop programs to protect the architecture uncovered by projects based at the Study Center.

The staff of the Study Center also is actively involved in analytical research. Stefi Chlouveraki, head of the Study Center's Coulson Conservation Laboratory, oversaw new applications of the LIBS laser on metal artifacts from Chrysokamino and Mochlos, and supported a wider study of Minoan faience by Marina Panagiotaki and colleagues (see her article in this issue). In March

2003, the Study Center welcomed Eleni Nodarou as the first director of the McDonald Petrography Laboratory. Scholars wishing to learn more about these research initiatives are encouraged to contact the Study Center. The equipment of the Study Center also is available to members of the INSTAP Publication Team, who provide a range of illustration, conservation, and photographic services to excavators throughout the Aegean.

The Study Center again took an active role in promoting the results of fieldwork within the wider scholarly and local communities. The 2003 summer lecture series included two complementary windows into the Geometric and Archaic worlds of Asia Minor and Crete: the first by Yasar Ersoy on recent excavations of Geometric and



Gerry Gesell and the Study Center's resident feline Fred relax in the Cretan sun.

Archaic levels at Clazomenai, and the second by Donald Haggis and Peggy Mook on the Archaic levels at Azoria, Kavousi. Our attempts to reach the wider public included new information signs at Mochlos and Vrokastro, articles submitted to local newspapers and Cretan journals, and lectures by staff members to the association of Greek Guides, various local communities, and several local schools. Finally, the Study Center's Eleanor Huffman assisted members of the 24th Ephoreia of Prehistoric and Classical Antiquities in the production of a wonderful exhibit on Minoan and Greek religion in East Crete.

Thomas Brogan

# PETROGRAPHY AT THE W.A. McDONALD LABORATORY, INSTAP STUDY CENTER FOR EAST CRETE

by Eleni Nodarou



*Fabric with fossils, magnification x25, Field of view: 4mm*

Petrographic analysis in Aegean studies has been an established analytical technique for the investigation of pottery provenance since the 1960s. Part of this research includes concentrating on the way pottery is manufactured, clay recipes, and firing technology—in other words, pottery traditions. Petrography offers the possibility of an integrated approach to the provenance and technology of ceramics, and brings archaeologists one step closer to understanding past behaviors.

It is in this spirit that the W.A. McDonald Petrography Laboratory was founded last year, thanks to the vision and financial support of Jennifer Moody. The laboratory, which began its operations in March of 2003, is fully equipped with a cut-off and trim saw, an impregnation machine, and a lapping machine for the manufacture of ceramic thin sections.

The projects undertaken by the W.A. McDonald Laboratory concentrate on the island of Crete, and extend chronologically from earliest prehistory to the most recent ceramic material. Although pottery constitutes the most well-studied expression of material culture in the Aegean, the size and

complexity of the ceramic corpus influence the way that each assemblage is viewed.

The essence of petrographic work lies in the design of each project and the archaeological questions raised by its ceramic material. Petrography can proceed when the relevant archaeological questions and sampling strategy are decided. Therefore, a good knowledge of the material prior to sampling, in terms of typology, context, and dating, enhances the results of petrographic analysis.

Every petrographic inquiry is shaped by a different set of questions. A project may be concerned with characterizing an assemblage derived from a single-phase site, to allow comparison with other sites of similar date and the discussion of issues such as pottery procurement from different production centers. In more complex cases, there are multi-phase sites where the different phases of occupation are examined comparatively. With surveys, the analysis concerns a broader, regional level.

When analyzing pottery, one is confronted with a complex material that involves not only natural resources, but also human choices and traditions. Interdisciplinary pro-

jects provide a more integrated approach to the ceramic material than does a single technique. For this reason, the W.A. McDonald Laboratory has established contacts with other institutions to meet its needs for mineralogical and chemical analysis.

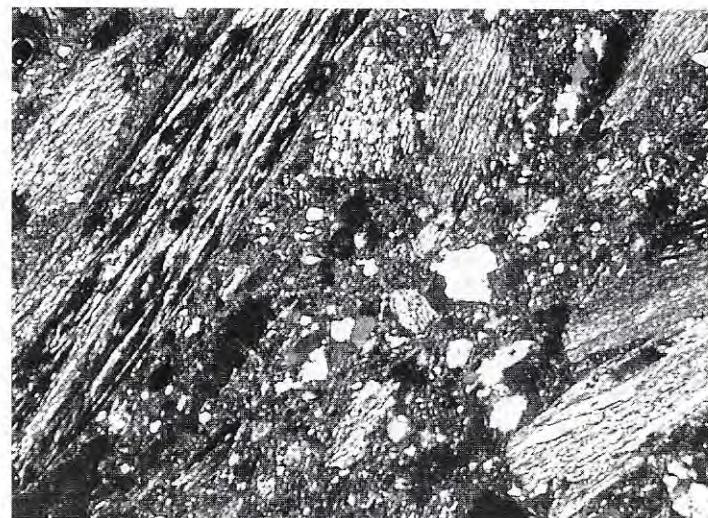
The success of any analysis depends greatly on both the nature of the archaeological questions that lead to specific types of analysis and the careful choice of samples. The old-fashioned attitude of analyzing the weird and exotic to find out their provenance has been a dead end. The analyst should discuss the nature of the material with the archaeologist, and should be allowed to look over the ceramic assemblage before selecting, with the archaeologist, the samples to be analyzed.

After the samples have been selected and the relevant permits have come through, the analyst carries out the sampling in the presence of the conservator of the local Ephoreia. The analyst manufactures the thin sections and brings them to the petrographic microscope for analysis. The W.A. McDonald Laboratory is equipped with a Leica polarizing microscope and a Nikon camera coupled to the microscope. The thin sections are grouped according to their fabric, based on their plastic and non-plastic components (clay features and rocks/minerals, respectively). The analyst describes the groups and is concerned primarily with characterizing the pottery. If the material allows, the provenance of the raw material and technology of manufacture (clay mixing, tempering) also are discussed.

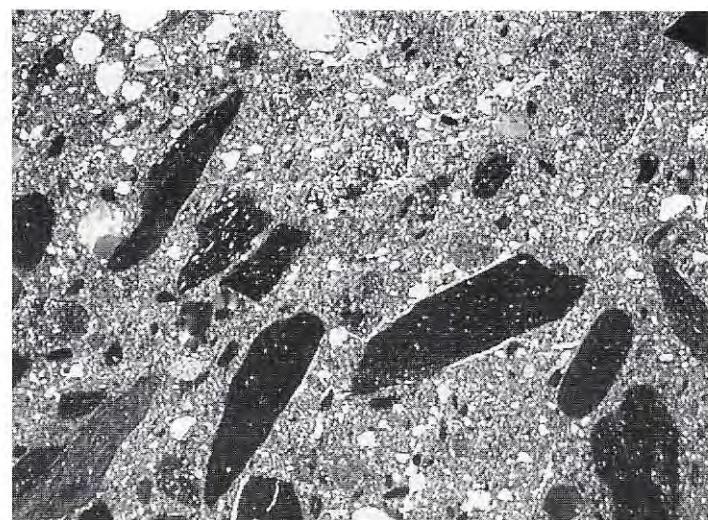
Petrography is a powerful analytical technique that can explore pottery production and distribution, clay recipes, and pottery traditions through space and time. At another level, issues such as organization of production, specialization, and standardization can be explored. Petrographic analysis also informs discussions about control over production, the relationship between fabric, vessel shape, and function, and the connection between technological style and identity.

The petrographic work at the Study Center aims to build a database of pottery fabrics from different sites and time periods in Crete. Further experimental work with clay prospection on the island will assist in the establishment of a reference collection for raw materials.

*Eleni Nodarou*



*Phyllite fabric, magnification x25, Field of view: 4mm*



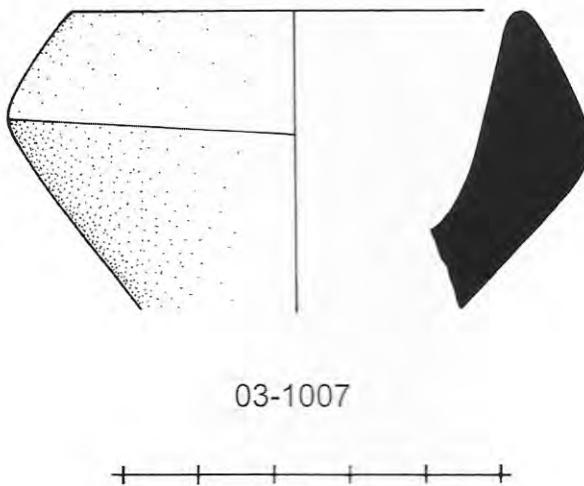
*Fabric with siltstones, magnification x25, Field of view: 4mm*

## CONGRATULATIONS!

*The staff of the INSTAP Study Center for East Crete wishes to congratulate Eleni Nodarou on the completion of her Ph.D. at the University of Sheffield in July 2003. Her dissertation is titled "Pottery production, distribution and consumption in Early Minoan West Crete: an analytical perspective."*

# EXCAVATIONS AT AZORIA IN 2003

by Donald C. Haggis and Margaret S. Mook



**Figure 1.**  
*Late Prepalatial stone bowl.*

**E**xcavations at Azoria continued in 2003, concentrating efforts around the peak of the South Acropolis. This year, the team was made up of some 72 students, excavators, and specialists representing 14 universities and research institutions. Lynn Snyder (Smithsonian Institution) continued her work on the rich faunal assemblages from the site, while Margaret Scarry (UNC Department of Anthropology and the Research Laboratories of Archaeology) was joined by her graduate student, Amanda Tickner, to run the flotation and study of the plant remains. Maria Ntinou, former Research Associate at the Wiener Laboratory and Visiting Lecturer in Environmental Archaeology and Prehistory at the Department of Archaeology, University of Cyprus, joined the team this year to conduct charcoal analysis, focusing on the wood and plant fiber preserved in the clay matrix of floor and ceiling material.

Our research design addresses questions surrounding the transformation of the political economy of the settlement at Azoria from the Early Iron Age to the Archaic period. We are examining changes in land use and the agropastoral economy during the formation of an urban center in the eighth and seventh centuries b.c. The intensity of sampling at the site, as well as the wide chronological range of cultural deposition,

have allowed us to consider not only the sociopolitical conditions of Azoria in its urban phase, but also details of human-environment interaction in several poorly documented periods of Cretan history and prehistory (i.e., Final Neolithic, Late Prepalatial, Early Iron Age, Archaic, and Hellenistic periods). This diachronic and comparative perspective on human settlement and land use provides a picture of culture change that complements recent intensive archaeological surveys in the broader region. Focusing on a number of phases of occupation at the site affords potentially vivid and detailed views of short term events (such as the fifth century b.c. destruction and abandonment of the site and region), as well as medium range trends (such as changes in economy and social structure in the Early Iron Age and early Archaic period). Finally, the examination of Final Neolithic and Late Prepalatial contexts can begin to inform our understanding of the longue durée—the reconstruction of varied patterns of human interaction with the landscape over a period of four thousand years.

This year, we were able to explore the Northeast Slope of the peak and further define the Archaic buildings that had been partially exposed there in 2002. Food processing and storage areas—including an intact kitchen—were uncovered,



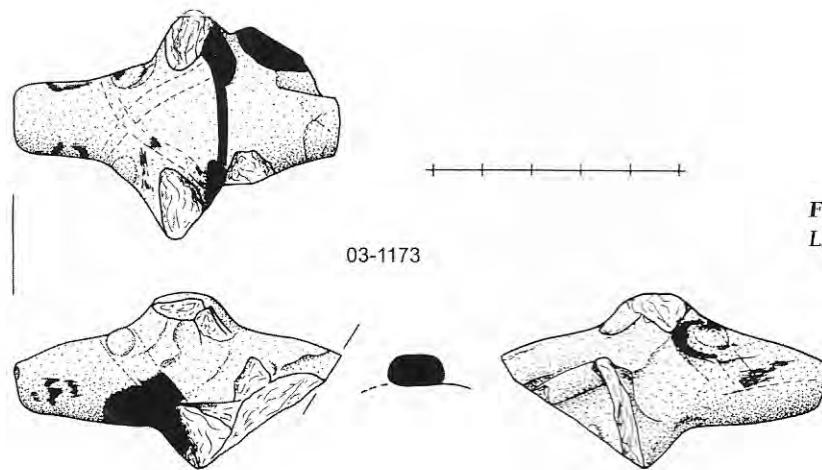
**Figure 2.** Archaic building on southwest terrace.

along with a street running north-south on the east side of the peak. The street, supported by a massive megalithic retaining wall, connected the buildings on the Northeast Slope with the houses recovered last year on the South Slope. Work in 2003 also clarified the plan and function of the andreion complex and associated structures on the West Slope. We were able to expose another room of the building—a large elongated hall with megalithic walls on the east and south. However, work in this area moved slowly because of the depth of fill and the density of the destruction debris from the building itself, which consisted of large boulders from collapsed walls, some exceeding one meter in length. The discovery of a terracotta krater-stand in this room, similar to those found in A800 last year, is a further indication of ceremonial dining within the complex. A third room in the building was left unexcavated and will form the focus of work in this area in 2004. On the terrace below and to the west of the andreion, the tops of walls came to light, indicating a row of possible service rooms or kitchens. These, too, await excavation in 2004.

The principal objective of work in 2003 was to begin examining the deep stratigraphy of the lower western terraces of the southwest slopes of the South Acropolis, which provide evidence of the earlier pre-Archaic phases of the site. Our focus

on the transition from the Early Iron Age to early seventh century seeks to characterize the development of the site's urban phases, and to understand the extent and nature of the rebuilding of the settlement and the establishment of its Archaic plan. In 2003, we recovered indications of the Late Prepalatial and Early Iron Age occupation on the West Slope, where material from these periods was mixed into the deep fill behind the Archaic walls and supporting the hilltop structures. One example is the diorite carinated bowl (03-1007) from A1900, a typical Warren type 6, with parallels from EM III-MM I contexts across the island (Figure 1). Evidence of Late Prepalatial occupation also had been found on the Northeast Slope in 2002, a possible indication that several houses originally occupied the peak of the South Acropolis.

The most fruitful area for exploring the pre-Archaic occupation proved to be the lower southwestern terrace of Area B. Excavation in four trenches uncovered a series of three rooms that formed part of two adjoining Archaic structures (Figure 2). The buildings appear to have been constructed in the seventh century, remodeled in the sixth, and abandoned at the end of the Archaic period. The largest northern room, B1500, is about 22 square meters in area (ca. 4.30 x 5.00 m), with a built stone bench in the southwest corner and a built hearth off-center in



**Figure 3.**  
LM IIIC terracotta figurine fragment.

the middle of the room (Figure 2). The room's function as a kitchen and pantry is indicated by the built features, the dense ceramic assemblage, and the botanical remains, which included olives, grapes, wheat, and possibly barley. While a doorway through the north wall leads into yet another room (left unexcavated in 2003), a doorway in the east end of the south wall leads into a room in B700. This proved to be a storeroom of smaller dimensions (ca. 2.50 x 4.50 m.) that contained no less than seven pithoi, four amphorae, three hydrias, a lamp, two high-necked cups, one plate, one spouted cooking pot, one bowl, and two large stone mortars.

The stratigraphy of the area suggests that the Archaic walls were built into the slope and stabilized on the west by a megalithic spine wall that runs along the western edge of the terrace. The renovation of the terrace in the seventh century appears to have altered the topography of the area significantly. The presence of considerable amounts of Early Iron Age pottery (LM IIIC, PG, and LG) in slope wash and upper levels across the terrace suggests that the renovation destroyed earlier LM IIIC–Geometric buildings. One interesting find in B1200 was a fragment of a LM IIIC terracotta bull figurine (03-1173) (Figure 3). The east wall of the Archaic building seems to have been built up against an LM IIIC wall, which is partially preserved on the terrace above and to the east, where it retains an LM IIIC surface. Excavation in this area will continue in 2004, with the aim of recovering more of the LM IIIC building.

A sondage dug through the floor of the southernmost room (B1200) of the Archaic building revealed that it had been constructed on top of a Late Minoan IIIC surface—an indication of the extensive rebuilding and alteration of the

Early Iron Age terrace. Below the LM IIIC surface, a sequence of four Final Neolithic surfaces came to light. These occupational levels are associated with at least two architectural phases (Figure 4). The architecture consists of two walls which run at oblique angles, roughly east-west. They apparently converge in the east side of the terrace, creating a rather narrow triangular exterior space between two separate buildings (Figure 4). The north wall, which belongs to the earliest phase, has one course preserved. It is built of small and medium-sized boulders and large cobbles of dolomite.

This small sondage yielded some 613 sherds of Final Neolithic date, weighing 3.167 kg, which represents all the FN pottery recovered from this trench. Four basic fabric types were apparent in the assemblage: (1) phyllite-quartzite based fabrics, composing 76.7% of the FN assemblage by numbers of sherds, (2) granitic-dioritic fabric, 22%, (3) silver-mica fabric, 1%, and (4) calcite or marble-tempered fabric, only 0.3%. Some of the phyllite-quartzite based fabrics have burnished surfaces, although more pots with highly burnished, glossy surfaces belong to the granitic-dioritic fabric group. Such burnishing obscures the inclusions and creates rather hard surfaces. While the shapes remain to be studied in detail, the majority of the sherds belong to bowls with incurving or everted rims, and some jars and jugs are present. Both flat and slightly concave bases, strap handles, small lugs, and incised decoration also are represented. In addition to pottery, many dark gray, black, and red chert blades, flakes, and production materials were recovered, as well as a bone awl and seven tiny beads made of an igneous rock, probably basalt. Six of the beads are four millimeters in diameter, with a two-mil-



*Figure 4. Excavation of Final Neolithic levels (B1200).*

limeter hole in the center (Figure 5); one bead is only three millimeters in diameter. A total of 105 unused flakes, nodule fragments, and other pieces of debitage, as well as 19 tools (blades, scrapers, and cutting tools), were found throughout the Neolithic levels, with most materials concentrated in habitation levels representing the primary occupation surfaces between these two buildings.

The Final Neolithic levels in B700 indicate that we may expect remains of buildings from this period both north and south of the exposed area between the lines of the Archaic walls excavated in 2003. Our discovery of the back walls of two separate buildings presents the opportunity to explore



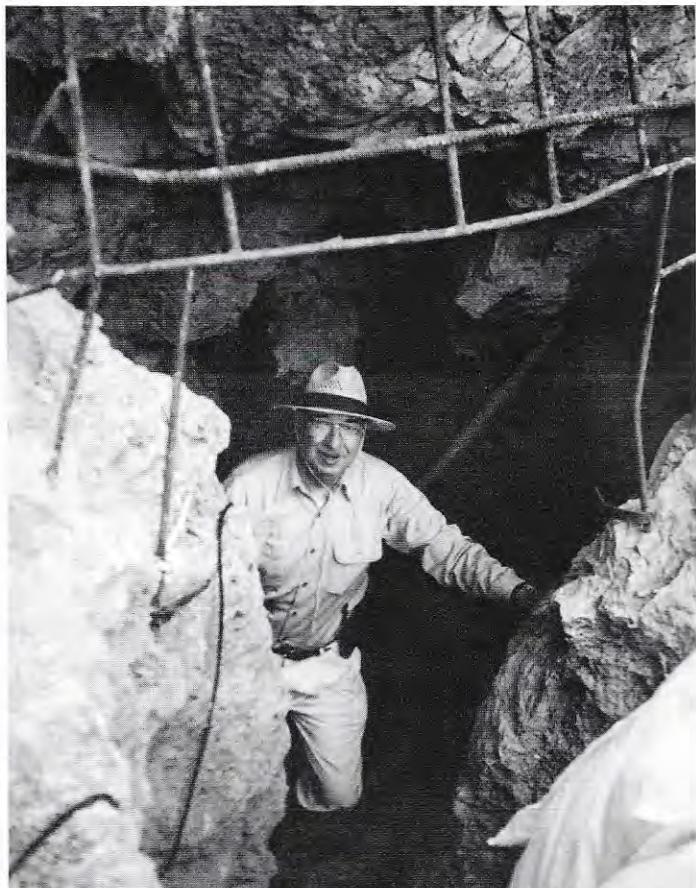
*Figure 5. Final Neolithic stone beads.*

not only the rest of these buildings, but also large contiguous areas of the Neolithic settlement. Furthermore, the unearthing of Final Neolithic pottery in other trenches, such as A400 on the opposite side of the hill (northeast terrace), indicates that the settlement may have been quite substantial, with houses distributed over much of the hilltop. Evidence of local chert tool production provides an interesting contrast with settlements in western Crete, such as Nerokourou, which make primary use of imported Melian obsidian. The FN pottery from Azoria demonstrates a wide range of fabrics such as local phyllite and micaceous wares, but also marble and granodiorite-tempered fabrics which are most likely derived from outside the Kavousi region. The granodiorite wares originate in the area of Gournia to Kalo Khorio across the isthmus of Ierapetra, suggesting economic integration, and possibly even long distance exchange of ceramics or their contents.

*Funding for the season's work was provided by the National Endowment for the Humanities; the Loeb Classical Library Foundation; the College of Arts and Sciences, the Office of the Vice Chancellor for Research, and the Department of Classics of the University of North Carolina at Chapel Hill; and the Institute for Aegean Prehistory.*

# EXCAVATIONS AT HAGIOS CHARALAMBOS, 2003

by Philip Betancourt



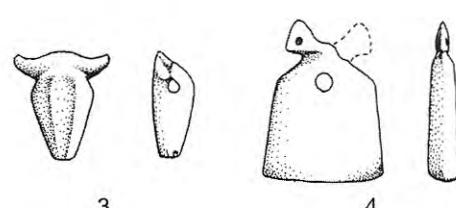
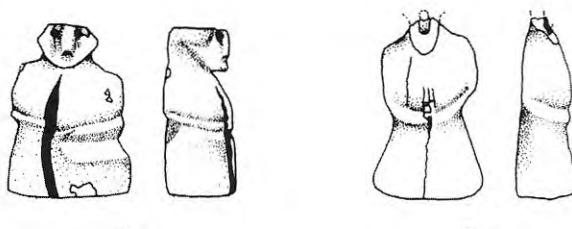
Philip Betancourt at the modern entrance to the Hagios Charalambos Cave.

The 2003 season at Hagios Charalambos resulted in several new discoveries at the site. First excavated in 1976, the small burial cave in the Lasithi Plain is now the focus of a new project undertaken as a collaboration between Philip Betancourt and Costis Davaras. For the 2003 season, Eleni Stravopodi joined the collaboration, representing the Ephoreia of Speleology. James D. Muhly and Albert Leonard, Jr. were field directors. The excavation uses the Study Center as its headquarters.

Hagios Charalambos is a secondary burial cave with artifacts ranging in date from the Final Neolithic to Middle Minoan IIB, with a small number of finds from later in the Bronze Age. Its material culture indicates that the community which buried its dead here came from nearby, because a large majority of the pottery is manufactured from the local red clay fabrics used in Lasithi and in the adjoining Pediada. The bones were all moved to the cave during Middle Minoan IIB.

Important new finds came from the 2003 season. Among the most interesting are two ivory female figurines used as pendants, an ivory monkey figurine also pierced for suspension, beads of rock crystal, serpentinite, and other stones, a bull's head pendant, a fragment of ostrich eggshell, stone vases, a prism seal with a design of three human figures, and both whole and fragmentary clay vases.

The ivory figurines are especially important because they help show that the site was receiving either foreign raw materials or the objects made from them. The ivory is all from the teeth of the hippopotamus, a material that is more common than elephant ivory at the beginning of the second millennium b.c. in Crete. It could have originated either in Africa or in Western Asia. The style of the figures is Minoan.



Pendants from the Hagios Charalambos Cave.

1. and 2. Female figures wearing long garments (ivory).
3. Bull's head (white and pale blue soft stone).
4. Object, perhaps a figure with two heads (ivory).



*Three human figures on one of the three faces of a prism seal probably made at Malia, from the Hagios Charalambos Cave.*

The prism seal belongs to a class manufactured at Malia in MM IB-II. Its three sides each have a different motif: a group of three human figures; a horned animal, probably a goat; and an abstract design.

The tiny piece of ostrich eggshell is the first piece known from the Lasithi Plain. It was discovered by sorting the soil retained for water sieving. This excavation saved 100% of its soil because soil from tombs contains many tiny human bones as well as other objects. Sorting it with a water separation machine saves all the bones of pre-natals, infants, and sub-adults, which are difficult to collect by conventional excavation techniques but are essential for conclusions on infant mortality rates and for other studies concerning children. The tiny piece of shell, which gives us proof that such objects were not only imported into the island of Crete but were also distributed to inland sites, is an added bonus that was also collected this way.

Good evidence for ritual feasting came from excavation just outside the mouth of the cave. When the bones were deposited in the Middle Minoan period, a ceremony outside the cave left many bones of food animals with butcher marks on them as well as a considerable number of tiny pieces of charcoal from the cooking fires. Among the animals were cattle and pig as well as sheep or goat, a testament to the stock raising that seems to have been an important part of the economy in this high, fertile plain.



*Jane Hickman studies a partial skull from the Hagios Charalambos Cave.*



*Tina McGeorge is overseeing the study of human bones from Hagios Charalambos.*

# AEGEAN VITREOUS MATERIALS AND LASER-INDUCED BREAKDOWN SPECTROSCOPY

by Marina Panagiotaki

The Aegean Vitreous Materials Project utilized Laser-Induced Breakdown Spectroscopy (LIBS) (see article by S. Ferrence and D. Anglos in KENTRO, vol. 4) to provide information on the elemental composition of vitreous materials in the Herakleion Museum and the Stratigraphical Museum at Knossos (STRAT). We were able to study a large number of objects and assess their material very rapidly, without having to remove samples and cause damage to the objects. Most importantly, all the work was done in the Herakleion Museum, since LIBS is portable. The Aegean Vitreous Materials Project is directed by the author, in collaboration with the Research Laboratory for Archaeology and the History of Art at Oxford (M.S. Tite), the NCSR Demokritos in Athens (Y. Maniatis), and the Chemical Laboratory of the National Museum (E. Andreopoulou-Mangou).

Why did we use LIBS when there are three archaeometric laboratories at our disposal? First, all three labs are outside Crete. Either the objects would have to be transferred to them—a rather unlikely scenario—or samples would have to be removed from the objects. A very limited number of vitreous objects can actually be sampled because they are too fragile, or considered too valuable. Second, any analysis in a laboratory is time-consuming and often very expensive. We were therefore very pleased to have access to an instrument that can be transferred to the museum itself, and can provide results on the nature of the objects in minutes, without causing any damage to them.

I invited both Michael Tite and Yannis Maniatis to be at the STRAT on our first day using LIBS, in order to compare its results with those that we had already obtained from our Scanning Electron Microscopy (SEM)

analyses. Dimitris Anglos, the creator of LIBS, and conservators Stefi Chlouveraki and Alina Melesanaki also were present at the STRAT to demonstrate the technique. We were very happy that our test of LIBS produced data that agreed with those obtained through our analyses using SEM, a destructive method.

We applied LIBS first on the core material of Minoan faience, and were able to obtain spectra for the major elements and identify some trace elements. We used LIBS next on the glaze of Minoan faience, and then on glass. We could identify the metal oxides used in the glaze or glass of even very worn objects. Because it took only about 10 minutes to obtain results for each object, our data accumulated quickly. I submitted a series of small, worn, and fragmentary objects for analysis, and LIBS rapidly confirmed my suspicion that they had been recorded erroneously as faience. In the following days, we took LIBS to the Herakleion Museum. We applied it to

faience and glass objects mainly, but also to Early Minoan stone beads to check if they ever had been glazed.

LIBS has been of enormous help to me, particularly since I have undertaken the macroscopic study of the Aegean Vitreous Materials Project objects. Because it can confirm the nature of the material (faience, glass, plaster, stone, ivory etc.), LIBS eases my task of facing the excavators' doubtful eyes when I say, "Sorry, this is not faience!"

I am grateful to INSTAP and the director of the Study Center, Tom Brogan, for providing the LIBS equipment, and to the Herakleion Museum (especially Eleni Banou) and the Stratigraphical Museum (Eleni Chatzaki), for facilitating this study.



*Application of LIBS for elementary analysis of slags from the Vrokastro survey project.*

# DO YOU REMEMBER...

## CONSTRUCTION OF THE INSTAP STUDY CENTER FOR EAST CRETE



*Grading of the drive in front of the Kntro.*



*View from the side driveway of the Center toward Mirabello Bay.*



*A coat of paint is applied to the Director's apartment.*



*The Center's interior courtyard during construction.*

# THE INSTAP STUDY CENTER FOR EAST CRETE

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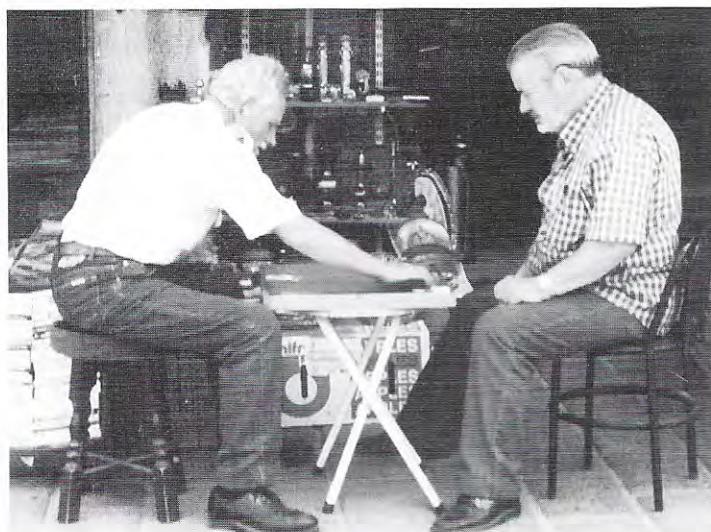
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Eleanor J. Huffman, *Assistant to the Director*  
Stephania N. Chlouveraki, *Chief Conservator*  
Michel Roggenbucke, *Senior Conservator*  
Kathy Hall, *Senior Conservator*  
Chronis Papanikolopoulos, *Chief Photographer*  
Doug Faulmann, *Chief Artist*  
Eleni Nodarou, *Ceramic Petrographer*  
Georgos Serepetsis, *Maintenance Personnel*  
Maria R. Koinakis, *Custodian*

To request an INSTAP-SCEC application form, inquire about library holdings, or find out more about the center, please contact the Director at the above address.



A game of backgammon in Ierapetra.

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