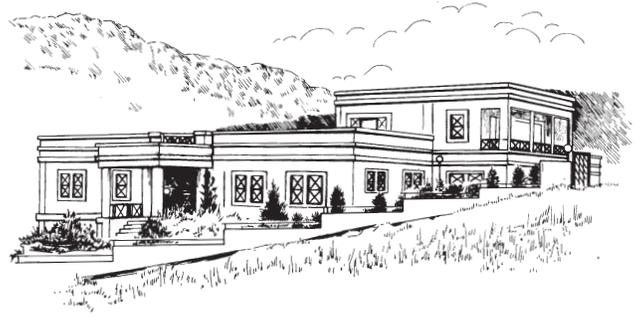


KENTRO

The Newsletter of the INSTAP Study Center for East Crete

Volume 22 (Fall 2019)



MESSAGE FROM THE DIRECTOR

Thomas M. Brogan

Several milestones were reached during the 23rd year of operation at the Study Center. Four affiliated projects of the American School of Classical Studies at Athens—Azoria, Gournia, Kavousi, and Mochlos—packed the facility from May to August. Without a doubt our most active member is Prof. Gerry Gesell with more than 4,500 days in residence since 1997 while completing her study of the Late Minoan IIIC shrine at Vronda (Fig. 1). (Even a broken arm failed to slow this year's progress toward the final publication.)

Perhaps less known but certainly no less important are the many Greek and foreign excavation projects supported by the Publication Team members on Crete and elsewhere in the Aegean. Last fall and winter, our team of artists (Doug Faulmann, Gabriella Lazoura, and Lily Bonga) and our photographer (Chronis Papanikolopoulos) drew and photographed thousands of figurines for Giorgos Rethemiotakis from the peak sanctuary of Mamaloukos Koriphi, which overlooks the Cretan Pediada. During the same period, faunal expert Demetra Mylona examined assemblages from sites on Crete and Cyprus and co-edited with Rebecca Nicholson a special issue of the *Journal of Maritime Archaeology* entitled *Bountiful Sea: Fish Processing and Consumption in Mediterranean Antiquity*. On a slightly dirtier level, the four members of our water-sieving team—Matina Papadaki, Vasilis Grammatikakis, Evangelia Pangelou, and Carly Henkel—processed 5,500 soil samples from seven projects. Finally, in the conservation lab Kathy Hall and Matina Tzari mended objects from the recent excavations at Petras by Metaxia Tsiopoulou, on

Chryssi Island by Chrysa Sofianou (Fig. 2), and in Ierapetra by Vili Apostolakou. They also prepared material for the new displays in the museum of Hagios Nikolaos (Fig. 3).

The Study Center takes great pride in stimulating individual scholarly research and discourse within the wider archaeological community. This year we hosted eight doctoral students, three Erasmus fellows, and several interns, including three in conservation and two in petrography.

The summer lecture series was our busiest since inception with three talks in Mochlos, two at the Study Center, and one at the Customs House in Pacheia Ammos. Topics included Neolithic pottery from different sites in Greece, Protopalatial metal from Petras, Neopalatial frescoes from Chania, Iron Age Anavlochos (located southeast of Malia), and the ancient city-state of Dreros. Things moved off-island later this year when the Study Center co-organized a workshop on the production

of purple dye in the Eastern Mediterranean with Prof. Maria Iakovou at the Archaeological Research Unit of the University of Cyprus (1–2 November).

The summer also brought renovation and innovation to the Study Center. After 350,000 km on some of Crete's toughest roads, we replaced the Skoda station wagon with a new model from Dacia. The kitchen also received an important upgrade in the form of a water filtration machine for filling reusable bottles, thus ending our annual consumption of more than 20,000 single-use plastic bottles!



Figure 1. Gerry Gesell with shrine accoutrement and published reports from the excavation of Vronda, Kavousi. Photo courtesy INSTAP SCEC archives.



Figure 2. Late Minoan I piriform jar (CHR 1795) from Chryssi Building B.2. The fabric and decoration of the vessel suggest that it was manufactured by potters based at Gournia and then imported to Chryssi (cf. Hawes et al. 1908, pl. K). Photo C. Papanikolopoulos.



Figure 3. Corinthian oenochoe (P1613) from Mochlos of the Transitional period (625–610 BC): conserved in 2010 (left) for publication (Vogeikoff-Brogan 2012) and again in 2019 (right) for museum display. Photos C. Papanikolopoulos.

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HORNS OF CONSECRATION FROM THE PETRAS CEMETERY

Ariel Pearce-Chalikias

During the summer of 2018, as part of my study of the plaster remains from the Petras Cemetery, which are in storage at the Study Center, I came across a plaster object excavated in 2005 that had been identified as two of the legs of an offering table. With the help of Senior Conservator Kathy Hall and the conservation team at SCEC, the piece was cleaned, and joins were mended (Fig. 1). When completed, it became evident that the object was, in actuality, a set of hollow horns of consecration. This realization led to a deeper inquiry into the horns of consecration from the cemetery, and I was graciously granted permission to study this class of objects by the director of the excavation, Metaxia Tsiopoulou.

The term “horns of consecration” (HC) was coined by Evans first in 1901 to describe a number of representations of what

appeared to be abstract bucranium horns. Although Evans was quite sure that “in all these cases we have to do with a more or less conventionalised article of ritual furniture derived from the actual horns of the sacrificial oxen” (Evans 1901, 137), others have been more skeptical of their exact meaning and function (Petrovito 2007). Still, horns of consecration are one of the most recognizable religious symbols from the Minoan world. And while the exact meaning of the horns has been debated, the iconography and archaeological evidence suggest that HC often demarcate a sacred space from the profane (Nilsson 1927; Evans 1930; Marinatos 1993; Petrovito 2007). Although the majority of these objects are found in Late Minoan contexts, abstract horned objects appear as early as the Final Neolithic or Early Minoan periods (Petrovito 2007). The familiar HC, with its horizontal



Figure 1. Conservation in progress of plaster from the horns of consecration (HC 4; max. dim. 11.39 cm). Photo by author.

base and two rising horns (usually flat on their exterior), appears more securely in Middle Minoan contexts. D'Agata summarized that the occurrence of HC from this period "are almost exclusively limited to applique ornaments on clay models and vases" (D'Agata 1992, 248). It was surprising, therefore, that the site of Petras in East Crete should yield not one, but several HC from Protopalatial contexts. One clay example has been published from the West Court of the Petras settlement, and it is believed to have been an applique or attachment from a ceramic vessel (Tsipopoulou 1986; Tsipopoulou and Papacostopoulou 1997; Simandiraki-Grimshaw 2016).

To date, there are now three sets of stone HC and one fine plaster example that come from the cemetery. Three examples are associated with House Tomb (HT) 10, which is located at the eastern edge of the excavated area of the cemetery at Petras, which is defined by a small circuit wall that runs along the eastern portion of the excavated area (Fig. 2). It is a two-room house tomb dated to the MM IIA period (Tsipopoulou 2017). HC 1 was found inside Room 1 of HT 10, while the other two sets (HC 2 and HC 3) were found among the rubble and plaster remains that had fallen from the northern facade of the building (Figs. 3, 4). With the help of Heidi Dierckx, the lithics specialist of the cemetery excavations, we determined that all three HC

are made of calcareous limestone and have tool marks visible on the surface. It is believed that all three examples were originally plastered, which would explain their rough and unfinished appearance. Plaster is still visible on HC 3. Given the context of the horns, it is even possible to reconstruct a roofline on HT 10 that was accentuated with HC.

A fourth HC was found in the southern part of the cemetery in Ceremonial Area 1 (Fig. 2), and it is the plaster object mentioned first (Fig. 1). What remains of the original object are two non-joining pointed elements, which are straight on three sides of each point and slightly curved on the interior. It shows the remains of red paint, and it is hollow on the interior. The cavity

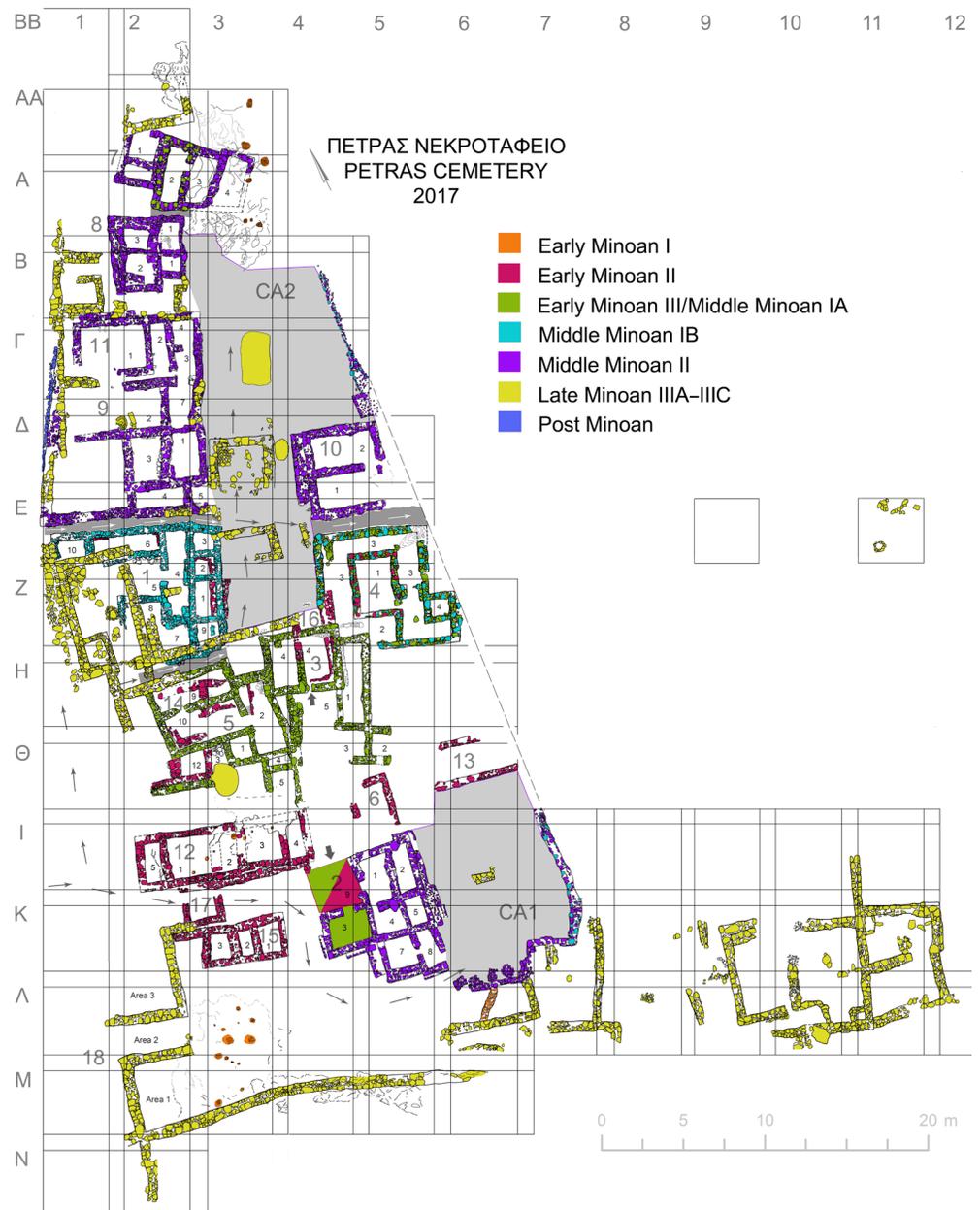


Figure 2. Plan of Petras Cemetery showing the locations of House Tomb 10 and Ceremonial Areas (CA) 1 and 2. Image courtesy Petras Excavation Archives.



Figure 3. Limestone HC 2 from Room 1 of HT 10. Photo by author.

was found empty except for a pottery sherd in the tip of one of the horns. This pottery sherd was likely added to help aid in the shaping of the object. There are no marks on the interior of the plaster object that indicate that its core was originally made of organic material. It is proposed that the plaster was shaped around a stone HC (not unlike the above examples), but that there was no attempt at scoring the original stone core, resulting in a smooth interior and a clean separation from the core.

Although this object was not found associated with the other HC from HT 10, it was observed that the interior space of the plaster object was consistent with the approximate size of the stone examples (HC 1–3). And while these plaster HC pieces cannot be joined to one another, they do change our perception of the size of the original objects because the plaster would have encased the stone, thereby adding quite a few centimeters to the overall size.

It has been observed that HC are often associated with funerary contexts, and it seems that the examples from Petras only serve to strengthen this observation (Petrovito 2007). Moreover, as markers of sacred spaces and indicators of places of power and importance, HC would have been entirely appropriate in the context of the Petras Cemetery where the importance of the inhabitants of each house tomb was likely well known. The study of HC at the site of Petras is ongoing as more material is recovered, but these objects give us interesting insight into the production and use of this iconic and elusive symbol of Minoan culture.

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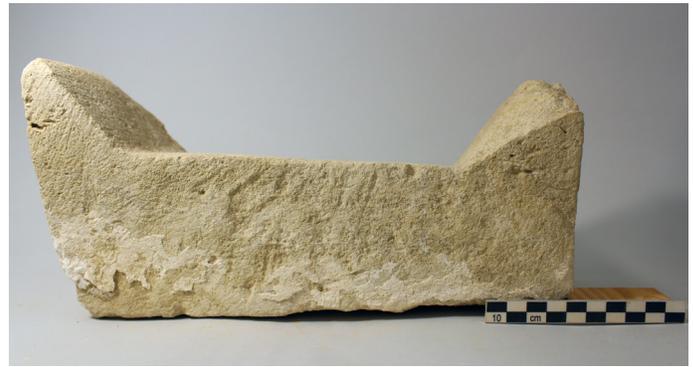


Figure 4. Limestone HC 3 from northern facade of HT 10 with plaster still adhering to the surface. Photo by author.

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NEW EVIDENCE FOR MINOAN METALLURGY AT NEOPALATIAL GOURNIA

John Tristan Barnes, Doniert Evely, Scott Gallimore, and Moritz Jansen

The recent excavation campaign at Gournia from 2010–2014 (directed by L. Vance Watrous, University of Buffalo) was fortunate in uncovering a number of craft locations, including ones involved in ceramic production and metallurgy. It is the latter set that is the focus of this brief report. The map in Figure 1 shows the two main foci of this activity. The first location is a large amount of debris and tools from the processing of copper and copper alloys in the northwestern corner of the town, associated with Building Em, including a furnace and working surfaces; the second focal area constitutes a storage area within the southwestern sector of the palace. Both spots are dated to the Neopalatial era, but they should not be contemporary, according to the current understanding of the stratigraphy. Finds of metal made elsewhere in the recent excavations are relatively few.

Building Em

John Tristan Barnes

A small metal workshop was excavated during the 2013 and 2014 field seasons. The site sits on the slope overlooking the valley and coast to the northwest and takes advantage of the unobstructed prevailing winds from the north, which are naturally funnelled to this point by the topography. The area consists of a series of structures that were in use between the Protopalatial period and Late Minoan (LM) IB, but the metal workshop dates more narrowly to LM IA, during the third phase of the building's existence. In this configuration, the building consisted of three rooms in a north–south alignment (Rooms 81, 84/86, and 87 in Fig. 2), with an additional exterior space (Room 82) in the southwest.



Figure 1. Plan of Gournia with the areas discussed in the text in boxes. Image D.M. Buell and J.C. McEnroe.

Primary evidence for metalworking comes from two contexts: the foundry pit and debris pile in Room 82 and the storage bin

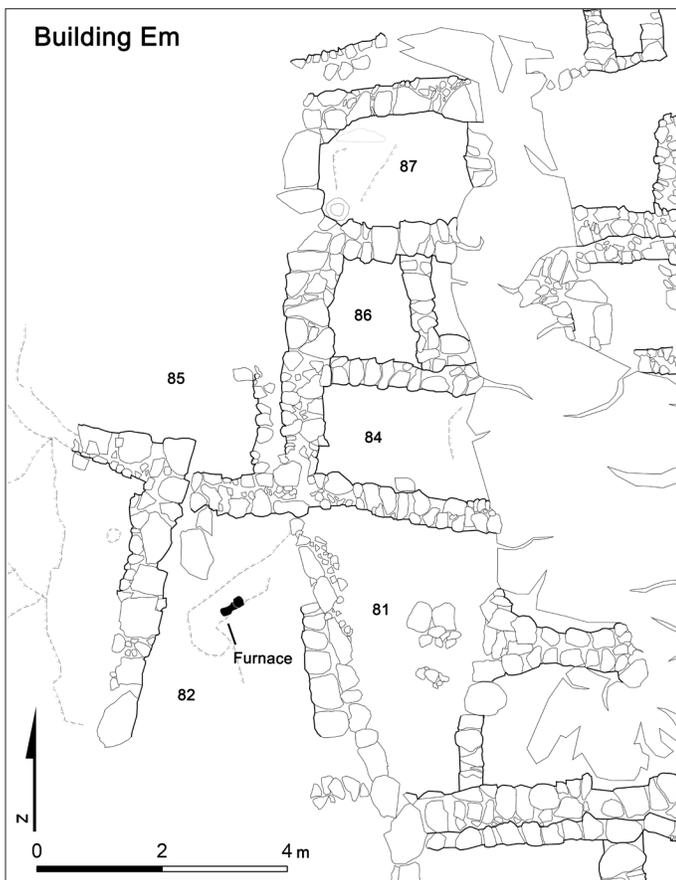


Figure 2. Plan of Building Em with Rooms 82 and 84/86 discussed in the text. Image D.M. Buell and J.C. McEnroe.

and working surface in Room 84/86. Secondary evidence comes from a thick layer of dumped material that covered the building during LM IB renovations of the area.

In Room 82, a bowl-shaped depression in the bedrock functioned as the pit for a furnace. The extreme heat produced by this activity calcined the surface of the bedrock and effectively fired the clay of the working surface around the pit. Above this was found a pile of dark ashy soil and charcoal that contained 13 metal fragments, at least 12 crucible fragments, and more than 100 other fragments of burned and vitrified workshop debris. Also during this phase, Rooms 84 and 86 were combined into a single space, and a storage bin was installed against the room's northeast side. A number of hammerstones and stone weights found inside the storage bin suggest that Room 84/86 probably functioned as an interior workspace associated with the foundry. These secure contexts in Rooms 82 and 84/86 were constructed during the LM IA period and were covered by destruction and collapsed levels that also date to LM IA, which suggests that the workshop was only active for a short period of time—perhaps not more than two or three generations. After the destruction and abandonment of the workshop the area was renovated in preparation for the construction of a large LM IB building; this

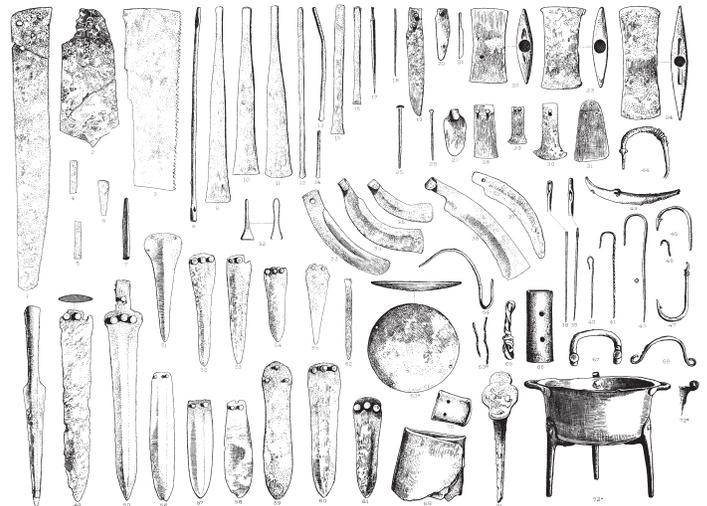


Figure 3. Metal finds from the early excavations of Gournia (Boyd Hawes et al. 2014, pl. IV). Courtesy INSTAP Academic Press, Philadelphia, PA.

operation included clearing out the old workshop and burying it under a deep layer of dumped levelling fill. This fill contains the overwhelming majority of metal objects and metallurgical ceramics found in the area, and it probably came at least in part from the metal workshop's own dump. The homogeneity of the fill indicates that it was deposited in a single event and that the workshop materials contained within it were moved altogether to this location. In total, this deposit produced more than 800 fragments of workshop debris and vitrified materials, including at least 64 metal fragments and scraps, 97 fragments of crucibles and furnace pieces, and 53 mold fragments.

The absence of ore fragments suggests that the workshop was not concerned with primary smelting as is normal during this period on Crete. The number of small bronze scraps and broken metal objects suggests that it was concerned instead with reusing and recasting existing metal objects. This source of metal would most likely have been supplemented by the issuing of raw material in ingot form, although no such fragments were recovered. Mold fragments attest the casting of tools—small blades and rods for awls, chisels, or pins—many of which could have been attached to handles of other materials (e.g., wood and bone) with the many studs and rivets that were also found. Bronze sheets, hammered with stone tools like the ones in Room 84/86, could have been fashioned into metal vessels, as suggested by the rivets and molds for curving handle-like shapes. The variety of primarily utilitarian objects is well attested in the earlier excavations of Harriet Boyd Hawes (see Fig. 3), and this demonstrates continuity with other metal workshops at Gournia. Because the workshop in Building Em was only in use for a short period of time, and because of its small size, it is unlikely that it was the only such workshop in operation at the site during the LM IA period.

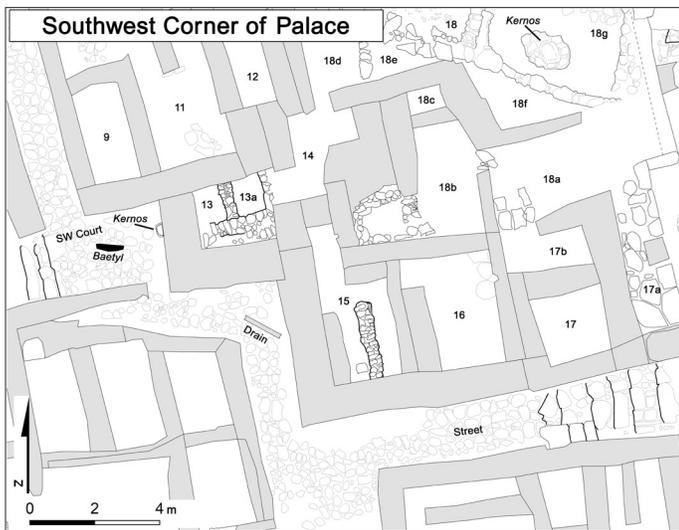


Figure 4. Plan of the southwestern corner of the palace with Rooms 15 and 16 discussed in the text. Image D.M. Buell and J.C. McEnroe.

Room 15 in the Southwestern Wing of the Palace

Scott Gallimore

Evidence for metal production at Gournia is also present in the palace, specifically the southwestern wing, which sits adjacent to the northwestern corner of the public court (Fig. 4). Here, the evidence is not associated with the melting or manufacture of metal products but instead the storage and possible distribution of raw materials for use by workshops. Excavation in Room 15 in 2012 uncovered more than half of the metal found during the five years of digging at Gournia. Almost all of these objects were recovered from a destruction deposit dating to LM IB. This destruction, evidence for which was documented in rooms across the southwestern wing, pre-dates the final LM IB destruction that impacted the entire site. The first event may have been localized, and there is clear indication of repair and renovation in its aftermath. Among the metal finds recovered from the destruction deposit in Room 15 were two tools, 16 objects primarily comprising fragments of studs, 25 pieces of workshop debris, and 44 ingot fragments. Most of the metal is copper, although a small number of iron-rich finds were noted, which are likely to be natural concretions, and some of the copper did show traces of tin when analyzed with a spectrometer. A small quantity of metal was also found in the contemporary destruction deposit in the neighboring Room 16, including part of a tin ingot (Watrous et al. 2015, 435–436, fig. 26). Some additional finds from the destruction deposit in Room 15 point to this room, and perhaps this part of the southwestern wing in general, serving as a storage area for products under the control of the central administration at the site. The only Linear A tablet ever recovered from Gournia came from this deposit (Watrous et al. 2015, 443–446, no. 1,

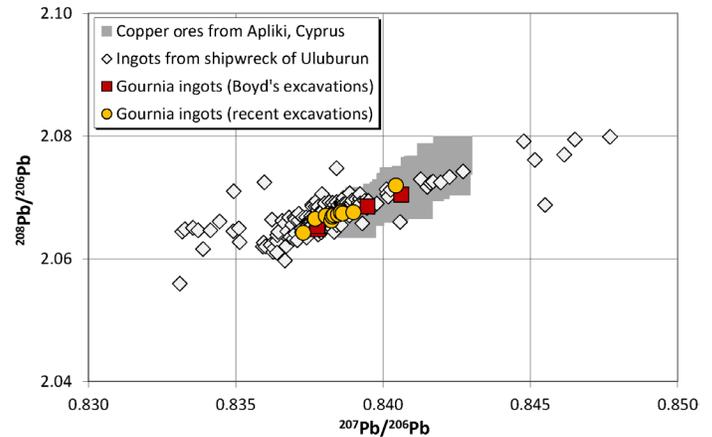


Figure 5. Lead isotope composition of 12 ingot fragments from the recent excavations in comparison to four fragments from Boyd's earlier excavations (data: Jansen, Hauptmann, and Klein 2018), ores from the deposit of Apliki in Cyprus, and ingots from the shipwreck of Uluburun off the southern coast of Turkey (OXALID database by Stos-Gale and Gale).

fig. 32), as did two disk roundels with Linear A script. The vast majority of the metal finds from Room 15, including the ingot fragments, are small, suggesting that specific quantities could be measured and distributed to workshops as needed, and then retrieved from them after an order was fulfilled. This points to a centralized control of the raw materials used for metal production at Gournia. The small size and modest number of all these pieces (both copper and tin) also make it possible that what was retrieved was of secondary value within the economy of Gournia, perhaps collected in a small chest or perishable receptacle and overlooked: larger ingots would have been the primary target of anyone rescuing or looting material from such storerooms.

Geological Origin of the Copper Ingots

Moritz Jansen

Twelve copper ingot fragments were sampled in 2018 for an archaeometallurgical characterization in Germany, funded through an INSTAP Research Grant. The lead isotope composition is consistent with a geological origin from Cyprus, more specifically with the deposit of Apliki at the northwestern foot of the Troodos Mountains (Fig. 5). This connection was found previously by Stos-Gale et al. (1997) for the four ingot fragments of the early Harriet Boyd excavations that are stored in the collection of the University of Pennsylvania Museum of Archaeology and Anthropology today. Besides a minor content of arsenic (0.1 and 0.3 weight percent), the copper of the 12 fragments is almost pure. This is a typical feature of the early ingots made of Cypriot copper, including the four fragments from the old excavations (Muhly, Maddin, and Stech 1988), as demonstrated by the study of ingots from the shipwreck of Uluburun (Hauptmann, Maddin, and Prange 2002).

In conclusion, the metal workshop at Gournia received copper shipped from Cyprus, either in the shape of oxhide ingots or planoconvex ingots that were broken into smaller portions as needed for alloying, casting, and processing. The eastern connections made manifest in the use of Cypriot metal (and also tin from possible eastern sources) are further underlined by finds from the original excavations, such as a polished red ware spindle bottle (Boyd Hawes et al. 2014, 42) and the fluted silver kantharos that is often seen as an import from Anatolia.

Observations on the Wasted Metallurgical Ceramics

Doniert Evely

From the Building Em locales comes all the ceramic material to do with actual metal processing. They are all fragmentary, so much so that almost no idea as to original shapes and forms is now retrievable. There is however still much scope for analyzing the fabrics of the various classes—which would allow this set to be compared with traditions operating in contemporary and later Palaikastro that have been published (Evely, Hein, and Nodarou 2012; Doherty 2019).

Crucibles are the largest group: they were probably hemispherical in basic form, but their undersides seem missing—or at least unidentified, which may mean they lacked any keel or pierced stem. A lug handle and simple pulled spouts embellish the basic shape. In size they certainly were larger in rim diameter than 10–11 cm, but no more can be assumed. Stone inclusions and hairs or organic chaff assist a fabric in withstanding thermal shock. Only copper or copper-alloy prills have been located trapped in the vitrified clay slag on the interiors of the crucibles.

The mold fragments are mostly 2–3 cm in maximum length (Fig. 6). They seem to be overwhelmingly pieces of the envelopes of items being produced by the lost-wax method. As such, they comprise a series of clay layers, added sequentially to the wax model. The first is of a finer quality that molded tightly to the model, to pick up all the small details. Later layers may have increased amounts of stone and perishable inclusions. Macroscopically, they all seem to belong to the same broad family as the crucible fabrics. On some fragments the layers have pulled apart, on others they have been more effectively added and distinctions really cannot be observed among them. Pouring devices (funnel shaped) have survived to show how the molten metal was run into the molds (once the wax had been heated to its melting point and poured out). The innermost surface of the molds has a distinctive grayish color, which may be in part due to remnants of wax left on the inner surface that was burned away when the metal made contact.

What was being produced is difficult to assess. Rod-like items of no special size are produced: straight and cylindrical (often with sections 1 cm across; at times up to 2.5 cm in size), though stepped and curved profiles are also known. Provision



Figure 6. Mold fragments from Building Em. Photo C. Papanikolopoulos.

for leaving a hole in the cast (for a rivet perhaps) are observed. Several examples show even more complex forms—perhaps some sort of blade, S-shaped handles (?), and ones with a hexagonal section. A pair may have been used for small pick-like tools. Larger items, perhaps up to the size of a double-axe, are hinted. Located to the north of Building Em, and probably deriving from that workshop, was part of a two-piece mold of clay for a double axe, 6.8 cm in length. The only other piece of metal-smithing apparatus of clay that can be identified are a number of pieces with a D-shaped section (with the I of the D rotated to the base). These should belong to the spouts of pot bellows.

In addition to this clay-based corpus, Building Em provides plentiful evidence for metalworking in the form of debris: accidental spills and splashes (droplets, runs/dribbles, and spills) from the melting and pouring stages. Small “sheet” off-cuts (often removed by blows of a chisel, the scars of which can still be detected) were produced when trimming and shaping objects. Also, ribbons of sheet were wrapped around two-piece molds to hold them close together for the cast (Gournia provides textbook examples from Hawes’ excavations). Cast blanks, always of modest size and generally cylindrical, and two lead disk weights exemplify items that were made and those that were used to weigh materials (which help to provide rough percentages for alloying purposes).

From the southwestern wing of the palace, as mentioned above, the material has nothing to do with actual working practices in the smithy. It does, however, indicate that scrap was considered worthwhile to collect for reworking, and that even quite humble pieces of broken ingots and mangled items no longer capable of use were by no means spurned. The implication might be drawn that the palace really did not like its artisans (at least those it could control by proximity) to be holding materials capable of being utilized. Take care of the pennies...

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Congratulations

Congratulations are due to Dr. Georgios Doudalis, recipient of the 2015 Richard Seager Fellowship from the INSTAP Study Center, for completing a Ph.D. dissertation at the Institute of Classical Archaeology of Ruprecht-Karls-Universität Heidelberg in June 2019. The dissertation, titled *Mochlos in the Protopalatial Period: Ceramic Analysis and Social Perspectives in the Middle Bronze Age*, was awarded *magna cum laude* in recognition of its importance and originality, and the defense was awarded *summa cum laude* in recognition of Doudalis' vigorous and convincing response to questions during his oral examination in Heidelberg.

Doudalis, who holds his B.A. degree from the University of Crete and an M.A. from the University of Sheffield, has been a member of the Mochlos Archaeological Project since 2004 and has excavated himself many of the Protopalatial deposits discussed in his dissertation. The most important of these revealed three strata that show three different ceramic phases of the Protopalatial period: the MM IB, MM IIA, and MM IIB phases. It is the first deposit that presents all three phases of the period in East Crete in a complete stratigraphic sequence and the first one that clearly defines the character of MM IIA pottery in eastern Crete. His study of these deposits, which is planned to be included in the Mochlos Publication Series, has revealed interesting results concerning ceramic production, distribution, and consumption



The doctoral examination committee and the graduate (from left to right): Prof. Jeffrey S. Soles, Dr. Georgios Doudalis, Prof. Diamantis Panagiotopoulos, and Prof. Caterina Maderna, president of the committee. Photo courtesy J.S. Soles.

in the Protopalatial period. Doudalis has become one of the foremost scholars studying the Protopalatial period in Crete, and his research also includes Malia where he studies the Protopalatial material from Area Pi, a subject he will present at the 2020 annual meeting of the Archaeological Institute of America.

CRETE UNDER THE MICROSCOPE

Evgenia Dammer

In April 2019 I worked as the Petrography Intern under the direction of Dr. Eleni Nodarou in the William MacDonald Laboratory of Petrography at the INSTAP Study Center for East Crete. I am a Ph.D. student in the Science Department of the British Museum and the School of Archaeology at the University of Oxford, and I study prehistoric Chinese pottery. My Ph.D. project focuses on the transfer of manufacturing technologies of Majiayao-style pottery during the Neolithic Period in northwestern China. Majiayao is one of the archaeological cultures (3300–2000 BC) that was found in the territory of the modern Chinese provinces of Gansu and Qinghai. Unique painted and impressed ornaments and shapes of pottery distinguish this culture from numerous others in that vast area. I compare the Majiayao-style pottery found in different river valleys at very distant sites to determine whether the used raw material, clay mixing, and firing are also similar in addition to the visible characteristics.

One of the main methods I use in my research is ceramic petrography, which was a new analytical tool for me when I began my Ph.D. research, and it is a new method in Chinese archaeology in general. I was very excited to learn about this internship as it was a rare opportunity to develop my skills in this type of analysis because the archaeology of the Aegean has a tradition of applying thin-section petrography to the study of ancient ceramics and the interconnection of ancient communities. I was also particularly interested in studying at INSTAP SCEC because of its research emphasis on prehistoric ceramics (Fig. 1). I was curious to examine the prehistoric pottery from this region under the microscope in comparison to the Chinese Neolithic material (Fig. 2). Coming from a Classical Archaeology background (I received my B.A. and M.A. from the University of Hamburg, Germany), I was also looking forward to again diving into the archaeology of ancient Greece. Last year I participated in a course about ancient pottery at Knossos, taught by the British School at Athens, and practised techniques in macroscopic analysis of pottery sherds and vessels. This internship felt like a sequel to the study of Cretan pottery with an emphasis on manufacturing technology.

I would like to thank Dr. Eleni Nodarou for her patience with me as I bombarded her with all kinds of questions about pottery production for the four weeks of my petrographic internship at INSTAP SCEC. She motivated me to think about different approaches in the petrographic analysis of archaeological ceramics and what is essential for conducting consistent analysis from selecting sherds for sampling to processing gained data and the final interpretation of that data. During these four weeks I was



Figure 1. Portrait of the author by C. Papanikolopoulos.

trusted with hundreds of ceramic thin sections from five archaeological ceramic assemblages: Petras, Kephala Petras, Mochlos, Gournes Pyrgos, and Malia. Usually, in the beginning of analysis, fabrics are divided into groups by similarities in their overall composition and coarseness. During the training I attempted to group fabrics by myself and then discussed my findings with Dr. Nodarou in order to refine my results. This was not an easy task, as many fabrics seemed almost identical, or none of them matched, but I enjoyed observing them under the microscope and finding similarities.

I was also particularly interested in learning more about the study of raw material in pottery analysis. After my internship I planned to travel to China for research and to collect geological samples for experimental firing and for the study of stones. I specifically asked Dr. Nodarou to discuss her experience with raw material studies. We then looked at geological maps, which included the areas of the sites from where the teaching material came. I learned what benefits and limitations geological maps can have when used in petrography. Learning about the geology of East Crete helped me to better understand the five assemblages I was analyzing at SCEC. Further, I looked at the Study Center's collection of rock samples from the island and Dr. Nodarou's rock collection from other places in Greece. From our interesting discussions I gained insights into ways of geological sampling and learned about the important things to consider and how to prepare when researching in the field.

In addition to the educational aspect of my time at the Study Center, I spent weekends and holidays exploring this region of

the island. It was my first time in the eastern part of Crete, and I especially enjoyed the tranquillity of small Pacheia Ammos as a contrast to very busy London and overcrowded Oxford. I even enjoyed my daily walks up the steep hill to the Study Center. From the top of the hill where the Study Center sits, there is a great view of the massive Cha Gorge in the mountains by the village of Monastiraki (Fig. 3) and the beautiful blue Aegean Sea.

The team at the Study Center was very welcoming, and I had a lot of fun learning about everyone's work. From trips with colleagues I have learned about the archaeological sites in the area but also about the local life in the cities and villages. I got a glimpse of the Greek Easter celebration and other local festivities during the spring. It was nice to learn that public archaeology is active and well received here.

Now, being back in London and working on my own material, I often think back to what I learned during this internship. Having a large number of samples really helped me learn how to estimate the time and energy required for this kind of work and trained me not to get stuck on the little details. At this point in my project, I have already completed my fieldwork in China and collected many geological samples: clay, sand, and stones. When I designed the sampling trip for my study area, I reviewed my notes from the discussions with Dr. Nodarou and my study of maps and rocks. The training made the task much easier, as I knew quite well what I needed to find in the field by then.

Altogether, the content of the internship exceeded my expectations, and the experience I had during this internship was multifaceted. It is a great opportunity to have during the course of a busy Ph.D. because you can ask specifically for the aspects of analysis you would like to learn. The duration of my month-long

Figure 2. Pottery sherd retrieved from the Neolithic site of Majiayao in Gansu Province, China: granitic rock inclusions under cross-polarized light (x40 magnification), which shows the distinctive colors of minerals like quartz, feldspar, and biotite that are all components of granite.

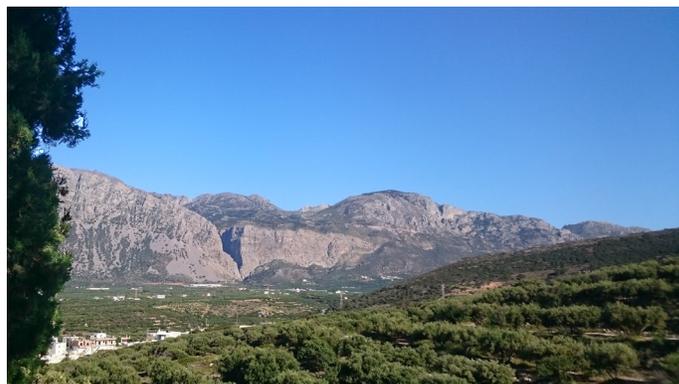
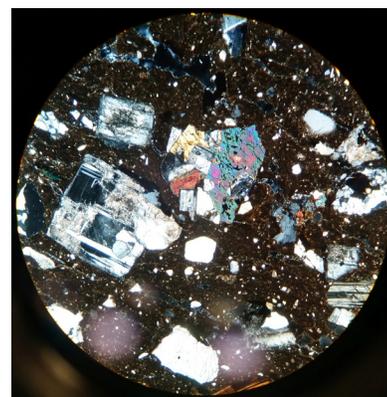


Figure 3. View of the Cha Gorge from the author's favorite spot for lunch at the Study Center. Photo by author.

internship at the Center felt just right, not to mention the encouragement to explore the island and spend time with people.

Meet the New Librarian

Vassiliki Papadopoulou is the 2019–2020 Library Fellow at the INSTAP Study Center for East Crete. She studied Archaeology and History of Art at the Aristotle University of Thessaloniki. Her M.A. was about shell ornaments from the regions of the Black Sea and the eastern Mediterranean, and she received it from the International Hellenic University.

She has worked as an archaeologist for the Greek Archaeological Service and for private construction companies. Vassiliki

has participated in many archaeological tasks as a volunteer for Greek universities. She began her work at the INSTAP SCEC in the drafting room assisting Doug Faulmann. She drew many finds from different archaeological projects.

During her term as librarian, she has enriched the physical book collection, expanded the digital library, and helped with other projects at the Center. She enjoys her work at the SCEC, and she looks forward to the remainder of her term in 2020.



Vassiliki Papadopoulou in the library of the Study Center. Photo Ch. Papanikolopoulos.

Announcing Two Fellowships in 2020 from the Study Center

Guideline and application documents can be found online by following the link on the homepage of www.instapstudycenter.net. Consideration for the fellowships is open to all candidates meeting the stated requirements. Awards are made irrespective of race, gender, religion, national origin, age, disability, marital status, sexual orientation, and actual or perceived medical conditions. It is possible that in the absence of qualified candidates with appropriate projects, a fellowship will not be awarded.

Harriet Boyd Hawes Fellowship

The INSTAP Study Center for East Crete is pleased to announce the availability of one fellowship to be awarded on a competitive basis to an eligible candidate for work to be done at the Study Center in Pacheia Ammos, Crete in 2020. This fellowship aims at the investigation of the role of women or gender studies in Bronze Age Crete. It is intended to highlight spheres and aspects of ancient life that have not yet received sufficient attention in Aegean Bronze Age studies. The fellowship is intended for scholars in the field of the Aegean Bronze Age/Early Iron Age who are completing or have completed their PhD dissertations. The fellowship will be awarded in the amount of \$3,000. Applications must be received by e-mail no later than **February 1, 2020**. Please send your application and required information as attachments to instaphawes@gmail.com. The recipient of the fellowship will be announced on March 1, 2020. If you have any questions, please contact Elizabeth Shank at elizabethshank@hotmail.com.

In addition to the completed application form, proposals should include a *curriculum vitae* of the applicant, a page summarizing the title and intent of your intended project, an outline of the project, relevant bibliography, copies of appropriate permits, and two letters of support for the project by two colleagues. If you are a PhD candidate, your letters of support should come from two members of your dissertation committee.

The fellowship is open to those completing a PhD dissertation or holding a PhD in Archaeology, Anthropology, Art History, Ancient History, or Classics. The recipient must be prepared to present an overview of his or her work and findings in the *KENTRO* newsletter and/

or a public lecture at the INSTAP Study Center for East Crete. The research should be carried out on Crete, and the grant includes membership fees to the INSTAP Study Center. Desirable methods of inquiry include: ethnography or experimental archaeology; exploration of written archives and collections from various periods; library research; and examination of archaeological materials, including artifacts, bones, and other organic remains.

This fellowship is intended to provide supplementary income for researchers who are either exploring new fields of study or finishing extended research. The amount of the award is US \$3,000, which can be applied to travel or living expenses, but should not be used as salary or for the purchase of equipment (e.g., cameras or computers). The primary aim of the funding is to stimulate new forms of research, which will broaden the scope of Minoan studies.

Richard Seager Fellowship

The INSTAP Study Center for East Crete is pleased to announce the availability of one doctoral fellowship to be awarded on a competitive basis to an eligible candidate for work to be done at the Study Center in Pacheia Ammos, Crete during the year that the fellowship is awarded. A minimum of four weeks should be spent working at the center. The fellowship is intended for scholars in the field of the Aegean Bronze Age/Early Iron Age who are working to complete their PhD dissertations. The fellowship will be awarded in the amount of \$4,000, which can be applied to travel or living expenses, but it should not be used as salary or for the purchase of equipment (e.g., cameras or computers). Applications and the required enclosures must be sent to elizabethshank@hotmail.com no later than **February 1, 2020**. The recipient of the fellowship will be announced by March 1, 2020.

In addition to the completed application form, proposals should include a *curriculum vitae* of the applicant, a copy of their dissertation proposal, an outline of the dissertation, and two letters of support, one from the head of your dissertation committee, and another from an additional member of your committee. It is assumed that the applicant will have passed his or her doctoral examinations, and s/he will have a dissertation proposal that has been approved by his or her department.

RECENT EXCAVATIONS AT THE SMALL THEATER IN ANCIENT HIERAPYTNA

Chrysa Sofianou and Scott Gallimore

During the Roman period, ancient Hierapytna (now the modern town of Ierapetra) was a cosmopolitan city adorned with magnificent buildings. Onorio Belli and Thomas Spratt, who visited the area in the 16th and 19th centuries, respectively, say that the ancient city had two theaters—one small and one large—an amphitheater, a lagoon for hosting *nau-machia* (mock sea battles), baths, other impressive edifices, and sculptures (Spratt 1865, 262). Belli, in a series of letters dating to 1586, describes the two theaters of Hierapytna (Falkener 1854, 12–13). He writes that the small theater (Fig. 1) was decorated with Ionic columns of white marble and compares it to a similar theater at Gortyn (located in the Mesara Plain of south-central Crete) based on its luxury and the quality of its marble. Belli notes also that he dug within the ruins of the small theater and attempted to remove some of the statues, which he describes as being made of stucco, but they disintegrated during the attempt (Spanakis 1968, 153).

The British naval captain, Spratt (1852), left us an important map documenting the location of the small theater to the west of the modern town in a district now known as Viglia (see also Mourtzas and Kolaiti 2017, 3, fig. 2). During excavation of a plot of land between the old and new roads to Viannos (heading west out of Ierapetra) in the area described by Spratt, architectural members and fragments of sculpture dating to the Roman period were recovered (Apostolakou 1980, 31–36). A subsequent geophysical survey of the plot confirmed the presence of a circular building (Sarris 2011, 15; Papadopoulos et al. 2012). Excavations of the small theater that began in 2013 continue until the present and have revealed the auditorium and the orchestra (Sofianou 2019, forthcoming a, forthcoming b). The theater was constructed using the technique of *opus caementicium*, which is characteristic of Roman architecture of the second century A.D. (Fig. 2). A few monolithic seats are preserved in place with two or three letters from the Greek alphabet inscribed on them. Spectators were led to their seats through the orchestra by four narrow staircases that divided the auditorium into five sections. Along the perimeter of the theater, a drainpipe was found that helped to remove water from the structure, possibly directing it to a cistern. The orchestra is paved with large rectangular slabs laid on packed earth. The radius of the orchestra is 6 m, the radius of the auditorium is 32 m, the overall length of the structure is 36 m, and its capacity is estimated at 1,500 seats. Due to its small size,

we interpret the structure as an *odeion* rather than a small theater. The Roman *odeion* had the typical features of a Roman theater but with smaller dimensions.

A brief study of the finds shows that most of the pottery and coins date from the first and second century A.D., while a bronze coin known as a *follis* dates after the fifth century. We assume that the structure was built

in the early second century A.D., probably during the reign of Hadrian (A.D. 117–138), as one of the many cultural works of this philhellene emperor. This aligns with an earlier study—based almost exclusively on an analysis of Belli’s plan of the small theater—that suggested a date in the second century (Sear 2006, 297–298).

Finds from the theater excavations can help to provide a comprehensive picture not just of the history of the theater but of the site of Hierapytna as a whole. The INSTAP Study Center for East Crete greatly facilitated this study by hosting the conservation and analysis of finds for six months this year. Their work provides an important foundation for the overview of the pottery that follows. Along with vast quantities of Roman pottery, excavations in the small theater have produced a moderate quantity of Classical, Iron Age, and Bronze Age ceramics. This material will be studied by Kostas Chalkias, and it will hopefully shed new light on the early history of the site and contribute to the discussion about the pre-Roman history of this region (e.g., Chalikias 2009–2010). As noted above, the majority of the pottery recovered from the excavations dates between the first and second centuries A.D., with moderate quantities of Late Hellenistic finds. This includes numerous examples of locally made East Cretan Cream Ware of Late Hellenistic date and a robust assemblage of Early Roman imported wares. The latter includes the earliest piece of Italian Sigillata attested on the south coast

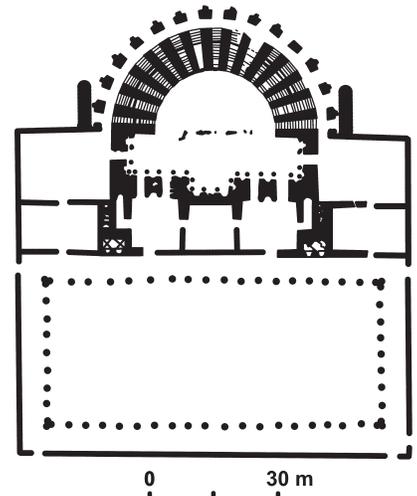


Figure 1. Plan of the Small Theater drawn by Onorio Belli. After Falkener 1854, 13.



Figure 2. Aerial view of the excavations in the Small Theatre. Photo by M. Katapotis.

of Crete—dated 15–1 B.C. based on a maker’s stamp of Lucius Gellius Quadratus (Fig. 3)—and the second largest quantity of Cypriot Sigillata vessels attested on the island after finds from the Unexplored Mansion at Knossos (Sackett 1992, 152). Pottery from the Early Roman period, however, mainly comprises an overwhelming number of fragments of locally manufactured amphoras. The sheer quantity suggests that kilns must have been located in close proximity. Three types, the Amphore Crétoise (AC) 1, AC2, and AC4, appear to have been produced at Hierapytna based on these finds.

For pottery dating to the second century A.D., one point of interest is that very few pieces date after the first half of that century. In fact, pottery datable between the mid second and mid fourth century A.D. is almost unattested. This includes the latest forms of Eastern Sigillata B, late varieties of Eastern Sigillata C/Çandarli Ware, and amphora types characteristic of this period. This could support a construction date for the small theater during the reign of Hadrian in the first half of the second century A.D.. If the main period of use for the theater comprises the mid second to mid fourth centuries, this suggests that there was limited accumulation of finds due to regular cleaning and deposition of trash elsewhere.

Pottery dating from the second half of the fourth century to the fifth century A.D. is more common. This includes various forms of African Red Slip dishes, imported amphoras from Greece, Cyprus, and Egypt, and various shapes of cooking and utilitarian wares. Perhaps the theater was no longer in use by this point, with debris accumulating in and around the structure. It is tempting to associate this with a devastating earthquake that struck Crete in A.D. 365, resulting in the destruction of and damage to numerous buildings across the island (Stiros 2010). There is no way to confirm that, however, and it could be that the priorities of the local population had shifted. A small amount of pottery from

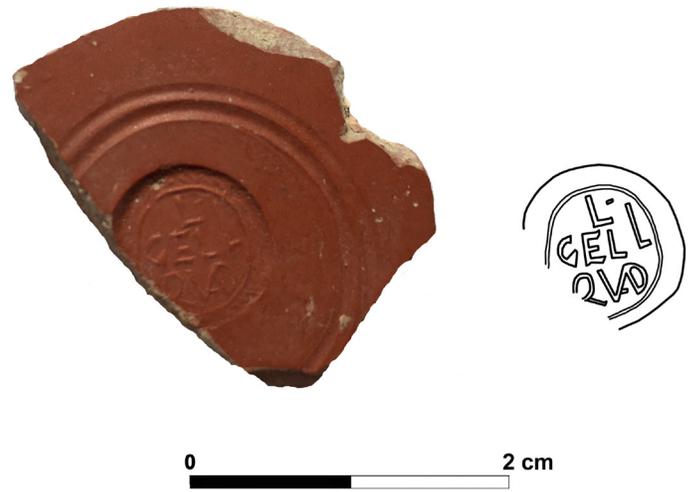


Figure 3. Fragment of an Italian Sigillata cup with stamp of Lucius Gellius Quadratus. Photo and drawing S. Gallimore.

later centuries is also present among the assemblages, including sixth–seventh century A.D. shapes of African Red Slip, Phocaeen Red Slip, and Egyptian Red Slip and a few fragments of Byzantine and Venetian glazed wares. Work continues on the small theater of Hierapytna and its finds that will help to shed light on the history of this structure and on a city that remains underappreciated in discussions of the archaeology of Crete.

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Library News

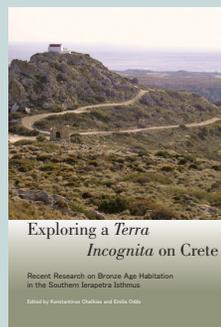
In April, while Tom Brogan and Niki Saridaki visited the Ephorate of Antiquities of Rethymnon to donate a complete collection of volumes published by INSTAP Academic Press, they also attended a simulation exercise at the Venetian fortress with Anastasia Tzigounaki, director of the ephoreia. The project is about the impact of climate change on monuments, and it is part of Safeguarding Cultural Heritage through Technical and Organizational Resources Management (STORM), a research program funded by the European Commission under the HORIZON 2020 Research and Innovation Program in which the Ephorate of Antiquities of Rethymnon is a partner. Photo by Charalampos Kydonakis, architect of the Municipality of Rethymnon.



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

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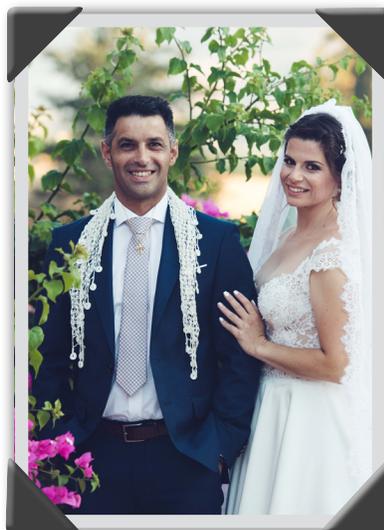
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INSTAP Study Center for East Crete
P.O. Box 364
Pacheia Ammos
Ierapetra 72200
Crete, GREECE
Tel. 30-28420-93027
Fax. 30-28420-93017
tombrogan@instapstudycenter.net
eleanorhuffman@instapstudycenter.net
www.instapstudycenter.net



Friends of the INSTAP Study Center for East Crete

The Foundational Meeting of the Friends of the INSTAP Study Center will take place on January 3, 2020, during the Annual Meeting of the Archaeological Institute of America in Washington, DC. It will be held in the ??? Room at the Marriott Marquis Washington DC from 5:30 until 8:30 pm. Speakers include Thomas M. Brogan, Çemal Pulak, Jeffrey S. Soles, Sheri Stocker, and Jack Davis.



BEST WISHES

Vassilis Netis and Niki Saridakis were married on August 18, 2019, in the Monastery of Panagia Kaliviani in the Mesara. The celebration continued until the morning at their Cretan glendi in the nearby events hall “Φαιστός Palace.” Photo M. Papadakis.