The Study of Ancient Territories
Chersonesos & South Italy

2005 Annual Report

Institute of Classical Archaeology
The University of Texas at Austin

Front Cover: Top and front views of a Medieval padlock with Arabic inscriptions.
2005 excavation, Chersonesos south region.
Length: 10.2 cm. [Photo: C. Williams]

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The Institute of Classical Archaeology
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Contents

The Institute of Classical Archaeology

Mission

The Institute of Classical Archaeology (ICA) is an Organized Research Unit of The University of Texas at Austin. In order to study, document, and preserve sites, monuments, and artifacts of past cultures for present and future generations, we conduct archaeological fieldwork and training in ancient Greek rural territories on the Black Sea and the Mediterranean. We engage in interdisciplinary research and publication and provide technical assistance and expertise for cultural heritage management.

Research Focus

ICA's research focuses primarily on the *chorai*, or agricultural territories, that surrounded and supported ancient Greek colonial cities. Our two primary sites of research are the chora of Metaponto on the southern coast of Italy and the chora of Chersonesos on the northern coast of the Black Sea in Crimea, Ukraine. Both settings offer remarkably well-preserved ancient rural landscapes, once densely occupied by farmers and still containing abundant evidence of their homes, burial grounds, and places of worship. Because their locations were strategically important, they also contain archaeological remains from the Roman through Byzantine eras.

Through its research, ICA seeks to contribute a fuller understanding of the settlement, economy, and culture of this previously neglected rural dimension of early western civilization. Metaponto and Chersonesos provide a unique chance to compare rural chorai at opposite ends of the colonial Greek world, as well as the opportunity to train students, foster exchange, and promote international collaboration and good will.

Adjunct organizations

The Center for the Study of Ancient Territories (U.S.A.), *Pidtrymka Chersonesu* (Ukraine), and the *Centro di Agroarcheologia Pantanello* (Italy) are nonprofit organizations founded to support the mission and goals of ICA. Their special focus is expanding international cooperation for ICA's projects and ensuring cultural awareness and compliance with local laws.

2005: A Year of Fundamental Change

Joseph Coleman Carter
Director, ICA

This report begins, as it should, with grateful acknowledgement of the Packard Humanities Institute for the exceptional support it has given ICA in 2005 and in the preceding half-dozen years. The constancy and generosity of the PHI grants have allowed ICA to develop a wide range of projects that go beyond archaeological field research to include vitally important conservation projects (of sites, objects, and documents) and large-scale cultural resource management and preservation endeavors. In Ukraine, the momentum and scale of these projects have brought national attention and appreciation. PHI's support has also allowed ICA to employ outstanding staff and consultants to carry out these many and varied projects. (The range of their accomplishments should be evident in this report.) As in every dynamic organization, there is growth and change, and 2005 was a year in which such changes were especially noteworthy.

Glenn Mack and Asele Surina, whose contributions to ICA since 2000 have been many and valuable, realized a career dream when Glenn accepted a job as education director for a prestigious culinary school. We shall miss them.

ICA's commitment to staying in the forefront of developments in archaeological research, documentation and data management was reinforced as Dr. Adam Rabinowitz settled into his role as Field Director for Chersonesos and Dr. Albert Prieto took on new responsibilities as full-time Field Director for Metaponto. We were also able to reward the outstanding talents of Marina Krotova—who has worked with ICA in Sevastopol for several years as translator, interpreter and, above all, manager—by promoting her to full-time administrator for ICA's projects at Chersonesos. Marina's subsequent work quickly proved this promotion to have been both correct and timely.

2005 was a year of dramatic change not only for ICA. It also brought political developments that overshadowed our own transitions, while thrusting our work in Ukraine into the spotlight. It is not very often that current political events have a sudden and marked effect on the progress of archaeological research and the future of archaeological sites. The two came together recently, with disastrous results for the archaeological record, in the historic "cradle of civilization" that is modern day Iraq. In stark contrast to that tragedy, the political events known as the "Orange Revolution" in Ukraine in late 2004 and early 2005 have had an immediate and palpable impact on archaeology in that country. The repercussions for Chersonesos, where ICA has been engaged in research, conservation, and preservation since 1992 (the first year of Ukrainian independence), have been particularly fortunate. The newly elected president not only is an antiquarian and would-be archaeologist, but also has a particular fondness for Chersonesos. President Yushchenko visited the site twice in late summer of 2005 (Fig. 1). In October he

Figure 1. Ukrainian President Victor Yushchenko (right) examines coins from the Preserve collection. With him is Conservation Laboratory Director Inga Shvedova (center) and Director of the Perserve, Leonid Marchenko (left).

decreed that the ancient city and all the protected lands comprising the chora should become an archaeological park. His subsequent actions, for example, in appointing his Prime Minister Yuri Yekhanurov as responsible for Chersonesos, show that these were not mere words.

The theme of my reflection on 2004 was, as these reflections usually are, essentially a report on the achievements of that year. Its tone was perhaps more retrospective than usual, as the events of that year were viewed in the light of the goals of ICA since its beginning thirty years earlier. Having passed that milestone, 2005 opened with new possibilities and perspectives inspired by the changes—not only political but also generational—in Ukraine and Italy. To a large degree these changes are proving to be positive. The direction of this report therefore will be more forward-looking than that of the previous year.

The preservation of the unique cultural heritage of the ancient city and chora and countryside around Chersonesos has been a major goal of ICA from the beginning. In 2000 our efforts were given a tremendous boost and far greater credibility by the generous support of PHI for a broad array of initiatives directed toward that goal. Research projects, conservation of sites and objects, new study and storage facilities, the participation of international experts in cultural resource management are all directed to the goals of preserving the site and empowering the National Preserve of Tauric Chersonesos and its staff to do what is necessary for Chersonesos to realize its potential as one of the world's great archaeological sites.

Even with support from the President and key advisors this has not been, nor will it ever be, an easy task. Yet it pales in comparison with the one the Orange Revolution took on: the reformation of Ukrainian politics and the realization of a stable, democratic government. Both are idealistic goals, and both justify hope. The Archaeological Park of Chersonesos (Fig. 2) and its chora are now a topic of national concern, discussed in the halls of Parliament and meetings of the Cabinet of Ministers. The Packard Humanities Institute has shown a continued commitment to the development of the plan, and, we hope, will lend its strength to the realization of this park in the coming years. The chora is the particular focus of PHI's and ICA's interest. Area 10, the largest tract, consists of approximately 400 acres of land with eight ancient

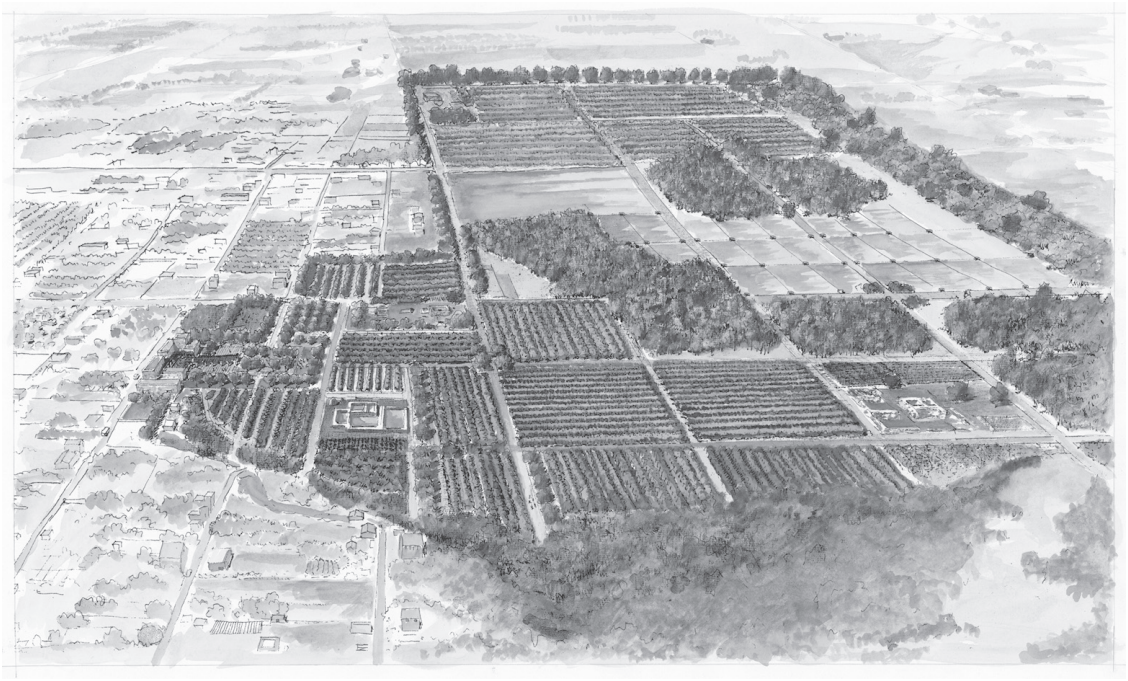

Figure 2. Architect Giora Solar's rendering of the proposed Archaeological Park of Chersonesos.

"country estates," country lanes, field divisions, tombs, and other archaeological features. There are no surviving pieces of the ancient Greek countryside of this size or importance anywhere else in the Greek world.

Archaeological parks, like revolutions, are not made only in the halls of power. They must be broad-based to succeed. That is why the ICA team devotes a good portion of its time and energy to involving local authorities, cultural workers and organizations, students from Ukrainian universities, and experts from the Academy of Sciences in Kyiv. In the spring and early summer of 2005, ICA's conservators and consultants took part in a major conference in Kyiv and organized another in Chersonesos devoted to archival conservation and library preservation. Later in the summer, a third conference on site and object conservation, held at Chersonesos itself, brought in the top experts in these fields in Ukraine. Our staff and international consultants regularly engage their counterparts in the Ministry of Culture and the Ukrainian UNESCO mission in the Ministry of Foreign Affairs.

No relationship is closer or more important for the realization of our shared dream than that with the National Preserve. All involved have grown with this experience and, although there were moments of incomprehension, there has always been an underlying trust and understanding that insures problems become occassion for learning and growth. The most impressive example of this has been the construction of the Packard Laboratory, a work and storage building which was completed in the fall of 2005, almost four years after ground-breaking (Fig. 3). There was much in this long process to test the patience and ingenuity of all involved. This greatly needed building replaces the former monastic bath, a collapsing structure of Czarist times that served as a storage building for the polychrome Greek stelai and other treasures. (See Taissa Bushnell's report, p. 51.)

The new building was finished not a moment too soon. The ceiling and roof structure of the Ancient Hall (the former monastery's refectory) housing the Preserve's stellar collection of Greek and Roman antiques (and temporarily, while this Laboratory was under construction, the polychrome stelai) had been showing signs of weakening for several years. The rains of October 2005 were particularly heavy. A visit to that building that month in the company of Ambassador William Miller and wife, Suzanne, was interrupted by the assistant to the Director of the Preserve, begging for help. She had just been informed by

Figure 3. The Packard Laboratory under construction, January, 2005. (Photo: A. Surina)

engineers that the roof of the Ancient Hall was in danger of imminent collapse. I offered shelter for the collection in the Packard Lab. The rains held off and the transfer went smoothly.

Safely in the laboratory—the site of their former repository—the stelai began, in November 2005, to be arranged in a temporary display in anticipation of the inauguration of this splendid new building in summer 2006.

The Laboratory (replacing temporary quarters in dachas scattered over the grounds of the Preserve) was much needed by the ICA team as a study and work space. It is equipped with state-of-the-art environmental monitoring equipment and a modern alarm system. The new building is a model storage for ancient marble sculpture and architecture, as well as for the very sizable corpus of Greek and Latin inscriptions from Chersonesos. It is, as Yuri Yekhanurov, the current Prime Minister and a recent visitor to Chersonesos, said, "a model for all Ukraine."

The ground floor has been outfitted with equipment for use by specialists in ceramics and other materials and subjects, including physical anthropology. On the mezzanine are eight desks equipped with computers and a nearby storage area for finds from recent joint excavations by ICA and the Preserve. An elevator for finds links all four floors of the building, which is air conditioned and heated for year-round operation.

The project of the Archaeological Park of the Ancient Chora also reached an important new level. While the desirability of an archaeological park conforming to the requirements of World Heritage status was being discussed in the higher political and bureaucratic circles in Kyiv, significant, real progress was being made on the ground in Sevastopol. Preservation architect Giora Solar worked with the city architect of Sevastopol, the mayor, representatives of the city council, and the official planning entity, Krimnioproekt, to arrive at an official estimate for the cost of construction. A brief publication, the *Archaeological Park Concept Plan*, grew out of discussions with the Deputy Director of the Preserve, Galina Nikolaenko, and the Director of ICA, as well as with other interested parties and potential participants in the design and management of the Park. The ideas expressed in the *Concept Plan* are deliberately broad and intended to provoke discussion among all stakeholders, including potential visitors. Detailed planning of the grounds and visitors' center is the next stage, due to begin in 2006.

A completely new opportunity for research arose in 2005 with the collaboration between the deep water explorations for sunken ships off the coast of Crimea, directed by Dr. Robert Ballard of the University of Rhode Island. ICA's Dan Davis will be a part of the scientific staff of the research vessel, the *Endeavor,* on its first campaign along the north coast of the Black Sea off Sevastopol and Yalta. This research, bringing together the knowledge and resources of both land- and sea–based investigations, could lead to insights into the trade connections between Chersonesos and the poleis and kingdoms of the Black Sea region and farther abroad over a long arc of time.

Figure 4. The ground floor of the Packard Laboratory nearing completion, spring 2005. (Photo: J. Carter)

Those readers who have followed the activities of ICA over the

years know how closely linked are its two principal study areas (Chersonesos on the southwest coast of Crimea, Ukraine, and Metaponto in the south of Italy) and the related projects that go on in those places. The multidisciplinary approach to the chora was developed first at Metaponto, in Basilicata, beginning in 1974, and then, in 1983, was pursued at Croton in Calabria. Metaponto and Croton were two of the foremost colonies of Magna Grecia (Greek occupied southern Italy). At Chersonesos (1994) it was possible for the first time to try the techniques and methods developed in south Italy on a Greek chora at the opposite side of the Greek world in a quite different geographic and climatic setting, and to compare the results.

Though much of ICA's attention in recent years has been directed eastward, and a disproportionately large amount of time in the field has been spent there, the western Greek world continues to occupy a central place in ICA's research agenda, whether it is in the ongoing chora surveys, or the study for publication of over three decades of field work. The primary research on excavated materials, principally the pottery, essential for these publications goes on year round in Metaponto. Our long-time collaborators Drs. Eloisa Vittoria, Cesare Raho, and Erminia Lapadula completed the documentation for the first volume of the Metaponto survey, in preparation since 2000. The diversity and the sheer amount of the material recovered in the survey have kept a rather large group of collaborators occupied for the better part of five years. At last these databases are complete, but the work of these three fine specialists is not finished. They are now busily cataloguing and documenting the material for two future volumes of the *Chora of Metaponto* series, the *Farmhouses* and the *Pantanello Sanctuary*.

Most of the research and writing on the Metaponto and Croton projects, as with Chersonesos, has taken place in Austin. 2005 was no exception. Research on Metaponto in 2005 focused primarily on preparing the first comprehensive publication of the *Archaeological Survey I* (the second in the *The Chora of Metaponto* series). This is the most detailed survey of a Greek territory made to date. The only comparable one in the Greek west is the ICA survey at Croton (see below). Fieldwork began in 1980 and has gone with few interruptions ever since. Extensive use has been made throughout of the computer–based method of analysis known as Geographical Information Systems or GIS. Making the extensive database that is at its core available on the web for use by colleagues and students is one of several ways that will make this a truly significant contribution. In 2005, ICA staff and consultants in Austin and elsewhere made progress on another volume in the publication series, on the pottery, terra-cotta figurines, and faunal remains from the Pantanello sanctuary.

In late 2005, Albert Prieto successfully defended an outstanding Ph. D. dissertation on Greek landscape organization at Metaponto, which he managed to research and write while working to create the groundwork for the Metaponto survey volumes.

Field work at Metaponto began its fourth decade by striking out in new directions. The Metaponto survey will focus for the first time on the still unexplored territory between the chora (agricultural territory) of the Greek colony and the settlements of the indigenous populations of the interior. Apart from a few early forays beyond the divided chora of Metaponto (extending 14 kilometers inland from the coast), the Metaponto survey has concentrated exclusively on the near chora, where the fields that made Metaponto a synonym for agricultural prosperity and the densely scattered farms of Metapontine citizens were located. In 2005, the survey team led by Albert Prieto,

Figure 5. Alberto Prieto (left) and Cesare D'Annibale, at the Crotone Archaeological Museum, study a map in connection with ICA's re-survey in the chora. (Photo: J. Carter)

who has played a key role since 1999, and Cesare D'Annibale, who began the Metaponto survey in the early 1980s, began investigation of this new area. (See Prieto's report, p. 57)

The season's Metaponto survey was followed by a fresh initiative in the chora of Croton, three hours to the south, in Calabria (Fig. 5). At the time of our first survey here (1983–1988), it rivaled that of Metaponto in scope and importance. The findings there proved beyond doubt that a densely settled chora, like that of Metaponto, was part of a wider pattern of life in the Greek countryside of Magna Grecia. Our return after an absence of nearly 15 years was successful. The conditions that made it an ideal place for field survey are remarkably unchanged.

2005 also saw the completion of the *Discovery of the Greek Countryside at Metaponto*, which originated as the 2000–2001 Thomas Spencer Jerome Lectures delivered at the University of Michigan and later at the American Academy in Rome (Fig. 6). The book went to press late in the year.

This report on the year's activities is far from complete. Given the number and variety of projects that ICA is currently engaged in, a comprehensive report would have been impractically long and unwieldy. As has been the practice in recent years, the report contains detailed updates on the major ongoing projects and a representative selection of the others. In the following pages, the reader will find both very specific details and large-scale syntheses of the results of some aspects of our research program in 2005.

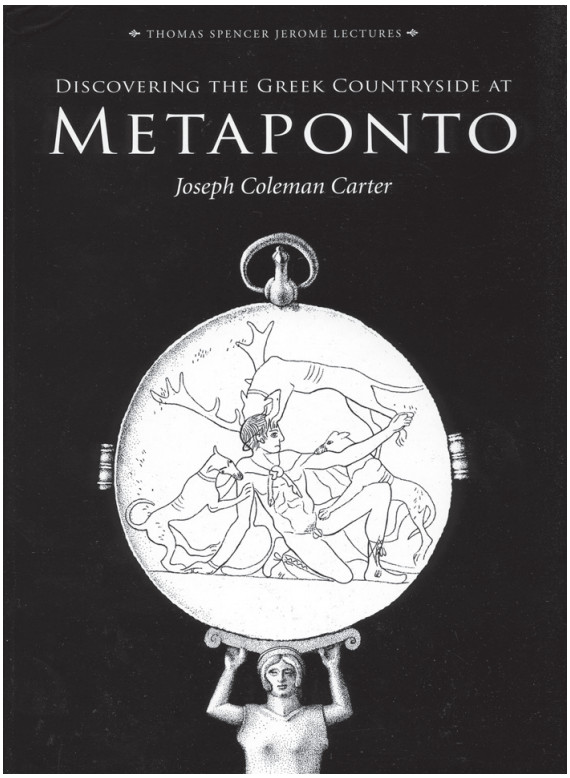

Figure 6. The collection of Thomas Spenser Jerome Lectures given by Joseph Carter in 2000–2001 went to press in late 2005.

Excavations in the South Region of Chersonesos, 2005

Adam Rabinowitz and Larissa Sedikova
ICA and NPTC

The summer of 2005 saw the fourth season of joint ICA-National Preserve excavations in the South Region of the urban center of Chersonesos. These excavations continued to explore the eastern end of a single city block laid out during the Hellenistic period and occupied until the violent destruction of much of the urban area in the later part of the 13th century AD. The results of previous seasons had already revealed the remains of three separate Late Byzantine residential, commercial, and industrial complexes arranged around a central courtyard with a small chapel. In 2004, we discovered that the rooms facing the side street along the east side of the block had been destroyed in an intense conflagration. This catastrophic event had carbonized and thus preserved much of the organic content of these rooms, leaving us with extraordinarily detailed evidence for the diet and daily lives of the 13th century residents of this part of Chersonesos. This evidence, reported briefly in our Annual Report for 2004, included the charred remains of fish sauce, the base of a wooden bucket, and a large quantity of grain. This year, we completed our investigation of the destruction levels of the remaining unexcavated rooms along the side street. The main focus of our work, however, involved the excavation of the floors of the exposed rooms and the surface of the courtyard, in order to further our understanding of the city in its earlier phases.

To pursue this goal, we brought together the same eminent specialists who have participated in our excavations for the last several years, including paleobotanist Galina Pashkevich, archaeozoologist Oleg Zhuravliov, and physical anthropologist Renata Henneberg. A new member also joined this group: Chris Salter, an archaeometallurgist, who is helping us understand the remains of metalworking we had identified in the courtyard and in complex 3. The quantitative research of these various scientific specialists was integrated into an improved version of our recording system, based on GIS technology and an extensive relational database, ably administered by Jessica Trelogan and Stuart Eve. Architect Allyson McDavid worked both with pen and paper and with this system to expand our digital plan of the site, and carried out further experiments with the use of georeferenced digital photographs for the recording of individual contexts. In the field, a cohesive international team carried out the excavation work. Under the supervision of experienced archaeologists from Serbia, Italy, Ukraine, and Texas, a group of students from the University of Texas, Kyiv-Mohyla Academy, Tavrida National University, and other Ukrainian institutions learned excavation methodology and engaged in hands-on research. It is their work that produced the results reported in preliminary form here, and it is their enthusiastic collaboration and participation that will help to shape the future of archaeology at Chersonesos.

At the end of the 2004 season, we were left with two mysteries, one relating to the beginning of the life of the city and the other to its last days. The first came in the form of several large slabs visible at the bottom of a Late Byzantine pit; the other was represented by what appeared to be the headless body of an elderly woman lying unburied in the street. Both mysteries were resolved in the course of this year's work – but, as is often the case in archaeology, they gave way to new puzzles that we hope to solve in the coming summer. These new puzzles are even more complicated since the 2005 excavations descended below the last, and best preserved, phase of the city to investigate the tenuous and ambiguous remains of earlier periods below (Fig. 1).

Figure 1. General plan of the excavation; grayed areas indicate 2005 activity.

Observations on the block's development

The results of our research in 2005 allow us to make more specific statements about the history of the block than were possible last year. When the overlying deposits had been excavated, it became clear that the slabs in the area of room 37 formed part of a monumental stone pavement similar to that of the *temenos* at the north end of the main street of Chersonesos. The lifting of one of these slabs provided further important information: the stones seem to have been cut specifically as pavers, since they were finished only on one side and the rough underside of the stone we moved showed notches perhaps meant for levers to move it into place. These stones rested directly on a thin clay makeup over leveled bedrock; and a single tiny piece of imported *terra sigillata* recovered from within this makeup allowed us to date the pavement to a point after the turn of the era, probably between the 1st and the 3rd centuries AD. The existence of this pavement is most plausibly linked to the construction of the massive cistern, but its location suggests that further public facilities—perhaps even a temple—also occupied this general area during the Roman period (Fig. 2).

After this activity there is a long lacuna in the archaeological evidence. Although a series of small pits and bedrock cuts observed in the area of the slabs and partially excavated in the courtyard might belong to the period between the 3rd and the 6th centuries AD, we do not possess any certain information for occupation or use until the 6th or 7th century AD. At that time, a circular cut in the bedrock near the chapel was filled in and covered with a rough pavement of small slabs bounded

by an insubstantial wall. The pavement and the bounding wall were only partially preserved, but it was clear that a large stone in the center of the wall had a circular channel cut through it. This channel aligned with a bedrock cut on the side of the wall away from the pavement, and its opening on the side of the pavement was blocked with a cylindrical stone plug that appeared to have been cut to fit. We do not yet have enough information to understand the phasing and function of this feature, but the channel suggests that its function was water-related.

At a later date, part of the paving seems to have been removed during the construction of a well-built tomb lying under one of the walls of the later chapel. We will discuss this tomb below, in the context of the church; here we note only that its phasing and relation to the church are frustratingly murky. This statement, unfortunately, characterizes much of the next identifiable phase of occupation, which appears to date to some point between the 9th and the 11th centuries AD. As with the period after the 3rd century, the period between the 6th or 7th century and the 9th century lacks any architectural remains. Coin evidence, however, indicates that at some point between the middle of the 9th century and the early 11th century AD, a series of cuts were made in the bedrock across the area of the block. As far as we can tell, all of them respected the street grid and the general alignment of the later structures in the block, but their shape and location in many cases have little to do with the rooms and complexes of the final 12th–13th century building. Their function and their relation to each other are unclear; we have tentatively identified them as sunken-floored houses and outbuildings, but it is possible that these cuts represent the basement levels of more elaborate constructions. The area seems to have had an exclusively residential character in this period. Despite the presence in the street of reused architectural elements belonging to an early ecclesiastical building, and despite the well-built tomb mentioned above, which may belong to this phase, there was no direct evidence for a church predating the chapel in the courtyard.

The courtyard

The courtyard, in general, presented us with the most enigmatic evidence for earlier periods of occupation. Although we are reasonably confident that we have established both the function (pavement) and the date (Roman) of the slabs, the subsequent use of that area is less clear. At some more recent date, perhaps around the 6th or 7th century on the basis of ceramic evidence, two thick, parallel walls were built on top of a thin layer of abandonment that lay on top of the slabs. Between these walls was a deposit of yellowish soil

Figure 2. The lifted paving slab, seen from the side: its irregular lower surface and three rough notches for positioning levers are visible.

containing substantial lenses of ash and covering what appeared to be a small structure made of unbaked mud bricks, on the upper surface of which there were further traces of burning. These developments appear to be contemporary with a series of circular pits cut down into bedrock around the area covered by the slabs, although, in the absence of clear ceramic evidence, it is also possible that the pits predate the pavement. The yellowish soil over and around the mud brick structure was in turn covered by a midden deposit of the Late Byzantine period. That deposit was separated from the rest of the courtyard by a late wall that used as its foundation one of the parallel walls built over the pavement. The destruction caused by a modern drainage ditch in that area, however, makes it difficult to fully understand the relation between these spaces.

Just to the south of the pavement was a large circle of stones visible just above the level of the last surface of the courtyard. As we had suspected, when these stones were removed they were found to fill a deep, roughly square well cut down into the bedrock. Several things about this well were obvious: one, it had stood open for some time after falling out of use, since below the rocky fill and above a layer of sediment we found the complete skeleton of a dog, the presence of which would certainly have fouled the well if it were still in use; and two, it had been filled in deliberately with building debris rather than refuse, probably in a single moment. Unfortunately, the nature of the fill left us with little evidence for dating, and we will not be able to assign it a phase until we finish excavation. We had descended to almost five meters by the end of the 2005 campaign, but the well is deeper still.

Further to the south we uncovered the remains of the irregular pavement mentioned above. This pavement sat partially on leveled bedrock and partially on the deliberate fill of a large, apparently circular pit cut into that bedrock. We could only excavate a part of that fill, but the ceramic assemblage from the excavated portion could be dated quite clearly to the 6th or 7th century AD. Just to the north was another cistern or well, partially excavated in 2002; although its fill was found to contain pottery of the 10th and 11th centuries, the structure itself was presumably older. The cistern, some ambiguous cuts in the bedrock in this area, and the blocked channel through the wall at the edge of the pavement may all be connected. Perhaps they represent washing or water-drawing facilities in an area already associated with public water-related activities since the Roman period (across the main street were both the monumen-

Figure 3. The 6th–7th c. structures in the courtyard. Visible, from left to right, are the fill below the paving slabs, the slabs themselves, and the bounding wall, with the blocked channel in the center. The masonry edge of tomb 5 is visible in the foreground.

tal cistern and a bath complex). The function of these structures, however, was further obscured by their partial removal during the construction of the well-built tomb 5, probably in the 10th century (Fig. 3).

The area around the chapel has a complicated relation to the other activity in the courtyard and will be discussed below. The situation in the rest of the excavated area of the courtyard is somewhat clearer, although it still presents several unanswered questions. The earliest fill and surfaces over bedrock in this area seem to belong to the 10th century, but they present a confusing pattern of circular, oval, and irregular pits and cuts, some of them extending into the bedrock itself. The fills of these pits are often very distinct, and although some of them contain midden material (broken tile, large quantities of animal bone), the pits do not seem deep enough to have served for waste disposal, and their specific functions remain uncertain. The evidence is only clear for the last phase, when foundation trenches along the walls of rooms 34, 29, and 32 accompany the construction of the existing residential structures in the (late?) 12th century, and extensive metalworking remains mark the contemporary use of the courtyard. Although the final 13th century surface was ashy and littered with slag, the work of our archaeometallurgist strongly suggests that metalworking activity had already ceased by this time, and the courtyard served other purposes in the final years of the life of the block (Fig. 4).

The chapel

One of the courtyard's purposes was burial, although this seems to have been true in earlier periods as well. In previous seasons, multiple depositions and disarticulated human bones were excavated in two rock-cut tombs under the floor of the church. In 2005, we investigated a series of tombs that lay outside the church. Dr. Henneberg reports elsewhere in this publication on the analysis of the skeletal remains, and we will limit ourselves here to questions of dating and phasing. The tombs in question are three. One, a shallow grave cut into the earth of the courtyard and partially lined with stones, lay near the corner between the apse and the nave of the church (tomb 3). The second consisted of the reuse of the 6th–7th century paved area for the deposition of skulls and disarticulated bone (tomb 4). The third was a well-built construction consisting of a bedrock trench lined with small cut blocks, mortared, dressed *in situ* to create smooth surfaces, and covered with a fine plaster (tomb 5). Tomb 3 contained only two skel-

Figure 4. Supervisor Shawn Marceaux and volunteer Karissa Basse take samples for metallurgical analysis from the surface of the courtyard.

etons, both intact, of a man and a woman of advanced age. Although its position in the courtyard and its shallow and irregular structure suggested to us that tomb 3 was a later addition, radiocarbon dates indicate that its occupants were buried no later than the middle of the 12th century. The calibrated C14 results, in fact, give a higher probability that the remains date to the late 10th or 11th centuries.

These and other C14 dates have complicated our understanding of the chapel. One of the disarticulated bones from tomb 1, excavated in 2002, gave a calibrated date range between 777 and 986 AD, at a 100% confidence level. It is not difficult to imagine that some of the bones in these multiple graves had been moved from elsewhere, nor is it impossible that the chapel itself was built as early as the 10th century, although its apparent structural relationships with the rest of the 12th century structures make this problematic. Tomb 5, however, further muddies the waters. Its construction is unlike that of the other tombs, the chapel, or any of the surrounding architecture, and its alignment is slightly different from the chapel and tomb 2, which is built against one of its walls. Furthermore, it lies under one of the walls of the church, and contained a fill including large rocks and construction material, disarticulated human bone, and the complete skeleton of a dog. The simplest explanation seems to be that it was a preexisting tomb that was emptied of burials and filled in with stone to provide support for the foundations of the chapel. The skulls in tomb 4, in this hypothesis, could be material moved from tomb 5 during construction. Only one partially articulated skeleton was present in tomb 5, and this was just below the surface of the court and along the side of the tomb not covered by the chapel wall. The C14 date for a sample of bone taken from this tomb, however, gave a date range between the middle of the 12th and the end of the 13th century. This is the latest date of all, and clearly contemporary with the final use period of the chapel.

We hope to be able to clarify these uncertainties in the summer of 2006. In the meantime, we have added substantially to our demographic sample of Middle and Late Byzantine Chersonesos, and the sealed context provided by tomb 3 is proving particularly useful for the study of vitamin deficiency and other pathologies. Coincidentally, the sieving of material from tomb 5 also provided one of our earliest and most exciting finds this season, albeit from a residual context: an agate intaglio signet, of Hellenistic or early Roman date, depicting a seated male figure holding what appear to be ears of wheat (see Fig. 5 and Plate 2D, p. 18).

Complex 2

This complex, at the north corner of the excavated area, included the only room not excavated in 2005. Room 38 is a large, rectangular room that opens onto the side street. Given its size, the presence of a staircase, and the burning we found in the other rooms along the street, we had hoped to find in it extensive carbonized remains from second-floor living quarters. Instead, we found very little evidence for the superstructure of the room, and the ground floor seems to have served in part for storage (we found most of at least one *pithos*) and in part, perhaps, for waste disposal or animal husbandry. A deep pit partially filled with moist soil containing charcoal and animal bone occupied one end of the room. It was accessed by rudimentary stairs and may have been lined with a wickerwork or plank retaining wall, to judge from

Figure 5. Polymer cast from a Hellenistic or early Roman agate signet.

deep, narrow cuts in the soil at the base of its sides and some small fragments of carbonized wood or cane. Although the fill of this pit contained some animal bone and some paleobotanical remains, it does not seem to have held normal household refuse, and it is perhaps more likely that it was used as a pen for a domestic animal like a pig.

The construction of this room had been made more difficult by the presence of deep cuts in bedrock below its final surface. The lower parts of the wall between room 38 and the street had been stepped out into the room, presumably in an attempt to strengthen its foundations and allow it to bear an upper floor. A similar attempt on the opposite side of the room seems to have been unsuccessful: there, the wall showed significant buckling, and the blocking of a door leading to the rear court (room 31) and the reinforcement of the wall itself with a crude buttress represent attempts to keep it in place.

The bedrock cuts may be related to the sort of sunken-floor structure identified underneath other rooms in this block. In the area of room 30, a somewhat shallower cut contained a beaten-earth surface that should probably be associated with residential space. This identification is nuanced by a small pit in one corner, which contained the bones of a 6–7 month-old fetus. The floor seems to belong to the 10th century, and it may be that here, as in other parts of the medieval world, stillborn fetuses were buried under house floors rather than in consecrated ground.

In other areas, however, bedrock cuts indicate significantly earlier activity. In room 31, for example, it is our initial impression that deep bedrock cuts below the final surfaces date to the Hellenistic period and not the 10th century (Fig. 6). This area also produced elusive traces of the working of precious metal, including a fragment of a cupel or crucible encrusted with a tiny fragment of gold. Rooms 38, 31, and 31a will be among the major objects of our work next season, and we hope to develop a clearer understanding of these early remains in the summer of 2006.

Complex 3

This group of rooms produced our most spectacular finds in 2004. Room 33, in particular, was full of storage jars and their carbonized contents, and it was in room 32 that we collected some of our first samples of the hammerscale produced by metalworking. We reported last year on the study of the paleobotanical remains from the last phase of room 33, and the same room produced our best evidence for the grains, fruits, and legumes con-

Figure 6. Various cuts below the final floors of room 31; two deep, straight cuts running parallel from the lower left to the upper right of the photo are visible, though the upper is disrupted by two small later pits, and the lower by two large later pits

sumed in an earlier Byzantine period. It was also particularly useful for our understanding of the phasing and development of the block.

Before the 12th century block was built, this area was occupied by a roughly rectangular cut, sunk about 75 centimeters below the surface of the bedrock (Fig. 7). Over the irregular bedrock floor of this cut had been laid a beaten-earth floor, on the surface of which were two patches of burnt earth that may represent hearths. One of these patches contained charred grains of barley, millet, rye, and bread wheat, as well as fragments of hazelnut and walnut shells, an olive pit and a fig seed. The date of the structure is uncertain, but a coin from the lowest levels of the beaten-earth floor dates to the late 9th century AD, while other coins found closer to its surface give dates as late as the end of the 11th century. The presence of the hearths suggests that this was the main floor of the building, rather than a cellar, and our working hypothesis is that these remains represent a modest sunken-floor house of a type common elsewhere in Europe and the Mediterranean in the early middle ages.

This interpretation is complicated, however, by the absence of any evidence for the elevation of the building. Any existing structures seem to have been thoroughly removed at the start of the next major construction phase in the 12th century. Room 33 again provided us with the clearest vision of these processes: after the stripping away of existing structures, the entire area was filled and raised through the dumping of enormous quantities of soil, apparently taken from a long-lived midden deposit elsewhere on the site. This fill contained pottery from the 3rd to the 12th centuries and an enormous quantity of animal bones. The paleobotanical record, too, seems to bear out the idea that this fill was procured from a midden heap: although grains and seeds of cultivated plants were largely absent, there was a noticeable quantity of elderberry and weed seeds.

After the fill had been deposited and a beaten-earth surface laid down above it, the area seems to have been used for metalworking. Extensive remains of small, temporary hearths and large quantities of slag and metal debris were found in the east corner of the room, by the door to the side street (later blocked). This activity had ceased, however, by the time the space was converted into a storeroom. The concentration of metalworking activity in the first phase following the 12th century reconstruction is confirmed by the evidence from the courtyard and also by the stratigraphy in room 32. The latter showed a similar pattern to room 33: early, deep cuts in the bedrock had been filled in with soil containing bones, sherds, and nails, and on top of and into this fill had been cut

Figure 7. A sunken-floor structure (indicated with broken line) underneath room 33.

what appear to be further metalworking hearths. Chris Salter's careful study of the remains from this room again show that active metalworking was confined to the first phase of its life, and that, at the time of the destruction of the block, room 32 was no longer being used for such purposes.

The results of the archaeometallurgical study were very interesting in their own right. In complex 3, as in the courtyard, the traces of metalworking recovered from an extensive set of samples all pointed to the same conclusion: this block did not house substantial blacksmithing, tool manufacture, or welding, but a low-grade metalworking operation probably concerned with such tasks as nail-making and horse-shoeing. This may testify to the socioeconomic status of the block's inhabitants. A marked reluctance to waste any available metal, visible in the near-total absence of off-cuts and other smithing waste, might indicate uncertainty about the availability of iron – either as a result of the economic conditions in this block or in connection with disruption of broader trade routes in the period of the Fourth Crusade.

Figure 8. The skeleton of an elderly woman found lying unburied in the street, under a tile collapse.

The streets

As we have noted before, the general turmoil of the 1200s found a particularly violent and direct expression at Chersonesos shortly before the end of the century. It has generally been assumed that the city experienced a devastating sack at the hands of a branch of the Golden Horde under the leadership of Nogay Khan, and that this event at the end of the 13th century left much of the urban area abandoned and in ruins. Our findings in 2005 tend to support this view: this summer, we uncovered the rest of the woman we found lying unburied in the side street in 2004. Although in the end she was in possession of her head—the front of her skull had been badly crushed post-mortem and was therefore only identified after further excavation—she had clearly been left lying on her back on the surface of the street, where tiles and flaming beams had fallen on her while the buildings of the block burned (for analysis, see R. Henneberg's article elsewhere in this report). One of her legs was bent, the other extended, and her right arm was bent at the elbow and drawn up against her chest. The fact that no one returned to bury the body, which must still have been visible through the debris, speaks for the severity of the sack (Fig. 8).

Another group of finds from the intersection of the side and main streets may tell a similar story of pillage and destruction. In the main street, under the collapse outside the wall of room 33, we found a well-preserved copper-alloy bucket with

Figure 9. Copper-alloy bucket as it appeared *in situ*, under a wall collapse.

a rounded base and an iron handle, together with another iron object of uncertain function (Fig. 9). A few feet away was an intricate padlock decorated with lion finials and elaborate Arabic cursive inscriptions (see cover and Plate 2a, p. 18). An inscription in legible Arabic on the upper surface seems to provide the name of the maker, while a second inscription may offer a standard blessing. The lock itself may have been made around Mosul, in what is now Iraq (for this provenience and the interpretation of the inscriptions, we thank Stephennie Mulder). It was found in two pieces, with the locking bar and hasp broken away from the main body. Given the proximity of a well-stocked commercial establishment and the elaborate nature of the lock itself, it is very tempting to reconstruct its attachment to a strongbox and its subsequent breakage in the course of looting by Tatar fighters.

Conclusions

The 2005 excavation season, if somewhat less dramatic than that of 2004, has added enormously to our understanding of the early development of the South Region of Chersonesos. The area seems to have been occupied already in the Hellenistic period, and we hope that our work in the summer of 2006 will clarify the extent and nature of this use. By the Roman period, the monumental cistern indicates that the area had come to play an important role in the urban fabric, and the slab paving we uncovered this year strongly suggests the presence of more elaborate civic facilities in the vicinity.

The obscurity of the period between the 3rd and the 6th centuries AD reflects a similarly low archaeological profile throughout this part of Crimea, and it is probably no coincidence that the next clear evidence for construction coincides with the Justinianic revival of Chersonesos and its environs. The absence of evidence between the 6th and the 9th–11th centuries AD is somewhat more puzzling, especially given the large quantities of Dark Age pottery recovered from the monumental cistern, but it is clear that somewhere between the late 9th and the early 11th centuries the area saw renewed activity and the construction of a number of (apparently) residential buildings. This period of construction was modest by comparison with the renovation of the 12th century, however, when the entire block seems to have been razed, filled, and reconstructed from the ground up in a single, coordinated action. The changes to the block over the following century are more simple and reflect natural shifts in household economy and the use of space across several generations: the farrier's workshop is converted into a grocer's establishment, houses are divided or rented, walls begin to subside and must be reinforced. It is one of the great strengths of our research program that our continued efforts to improve and integrate our documentation, through digital technology like relational databases and GIS, now allow us to examine the elements of daily life in this block in all their minute, contextual detail. The 2006 season will, we hope, put the final foundations in place for the publication of this fascinating material.

Chersonesos

Top: Cathy Daly, Objects Conservator for the excavation, working in the NPTC Conservation Laboratory.

Middle left: Physical anthropologist Renata Henneberg cleaning a group of skulls excavated in tomb 4.

Middle right: In the Packard Laboratory, Chris Cleere (left) shows William Miller preparations for the stelai exhibit. December, 2005.

Bottom: 2005 excavation in progress; view to the south.

A

B

C

D

E

F

A. Lion covering padlock keyhole [2:1]
B. Helmeted head in ivory [2:1]
C. (L) Bone game piece ; (R) bone token or inlay [1:1]
D. Agate intaglio signet [4:1]
E. Copper alloy bucket [1:4]
F. Restored amphora from room 33 [1:4]

Preliminary Report of Anthropological Research at Chersonesos

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Archaeological plans for the 2005 season in Chersonesos included the opening and excavation of remaining tombs and human remains within the area of a small church in the medieval part of the city. In addition, the skeleton of a woman discovered on one of the streets during the 2004 season (context SR 560) was due to be fully excavated.

In the course of meeting these major anthropological goals, several sets of human skeletal remains were excavated from various contexts during the course of excavations and their examination followed. The opening of tomb 3, located at the site opposite tombs 1 and 2, launched our human skeletal studies at the beginning of July 2005. Because this tomb contained only two skeletons, we also had time to excavate an additional two tombs during the season.

Figure 1. Tomb 3 with two well-preserved skeletons partially uncovered.

Aims of the 2005 anthropological studies were:

1) To excavate and describe the entire skeletal material from the three tombs investigated this season within the church and provide photographic documentation and X-ray examination of important findings. The investigations included the determination of the total number of individuals in each tomb, the estimation of individual sex and age, the description of pathological changes on bones and teeth, and the measurement of bones and teeth. In order to study kinship among individuals in this skeletal sample, data on discontinuous (epigenetic) morphological traits on entire skeletons, including dental traits, were also collected.
2) To re-examine all human bones from all tombs found within the church since 2001, using newly established criteria for differential diagnosis of certain diseases such as various vitamin deficiencies (e.g., scurvy, rickets), anaemiae and some genetic disorders. The signs of these diseases were observed in this skeletal material, but further detailed and quantitative studies with an epidemiological approach were necessary.
3) To prepare the material for the presentation of biological studies and, in particular, pathological findings, at professional scientific conferences.
4) To select samples for radiocarbon dating.
5) To revise the data already collected and make plans for further studies of the human skeletal material.

Because of the excellent organization of the archaeological fieldwork and the great amount of help from the students in excavating the tombs and in transporting, collecting and washing the bones, all aims were successfully achieved, despite the fact that only one anthropologist was working in the field this season.

Description of Skeletal Material

Tomb 3

Rather smaller than the other tombs, tomb 3 was located outside the church in the courtyard, unlike tombs 1 and 2. Only two individuals were buried in it (Fig. 1). The skeletons of both individuals were well-preserved and the majority of bones of each individual were recovered.

The individual buried first occupied the entire length of the tomb (skeleton No. 1). This individual was a 40–50 year-old woman with a height of about 154-159 cm. Her bones appeared rather delicate and to reflect low physical activity. She suffered from osteoarthritis, particularly in the neck, but changes were found also in the rest of the spine, ribs, and clavicles. She had degenerative intervertebral disc disease (large Schmörl nodes on lower thoracic vertebrae) (Fig. 2), *osteochondritis dissecans* (degeneration of cartilage) in both knees (Fig. 3), and had a fractured healed acromial end of the clavicle. The degenerative diseases affecting her neck, vertebral discs and knees likely caused her great pain. She may have been partially immobile at the end of her life, but considering her ailments and the relatively long life span for this period, she was probably well looked-after. *Cribra orbitalia* (pitting on the orbital roof of both her eye sockets, usually associated with anaemia) also suggested long illness. Her teeth were affected by extensive caries. The presence of a moderate *sulcus preauricularis* suggested she gave birth only a few times.

The second individual, a 50–60 year-old male (skeleton No. 2), was buried on top of the woman's remains. The stature of the male was either 169 cm or 173 cm, according to two different formulae used in reconstruction. Pathological changes included the presence of extensive osteoarthritis of the vertebrae and of the right temporomandibular joint, degenerative vertebral disc disease, a benign tumor (osteoma) on the frontal bone, extensive dental caries, periodontitis and periapical abscess. The incisors of the male had serrated cutting edges (best seen on the lower incisors), perhaps due to their use as holding tools.

The most interesting of all pathological changes were those of the surface of long bones. All the bones of this individual were rather heavy. The diaphyses of major long bones, such as tibiae, fibulae, ulnae, radii, and femora were covered by a brittle, dense subperiosteal new bone growth (Fig. 4 a–c). The other bones of the skeleton were less affected, but changes were still observable on the humeri, vertebrae and the bones of the hands and feet. A candle-like bony deposition on the pleural side of the ribs was also noted. This set of pathological signs, affecting bones symmetrically, suggested that the individual had hypertrophic osteoarthropathy. Radiological examination of the tibiae, femora, and skull confirmed the preliminary diagnosis. Fragments of both the tibiae and fibulae of a male with periosteal changes characteristic of hypertrophic osteoarthropathy, and similar to those observed in the occupant of tomb 3, were also found among the multiple burials in tomb 1 (see Ponomarev, *Annual Report* 2002).

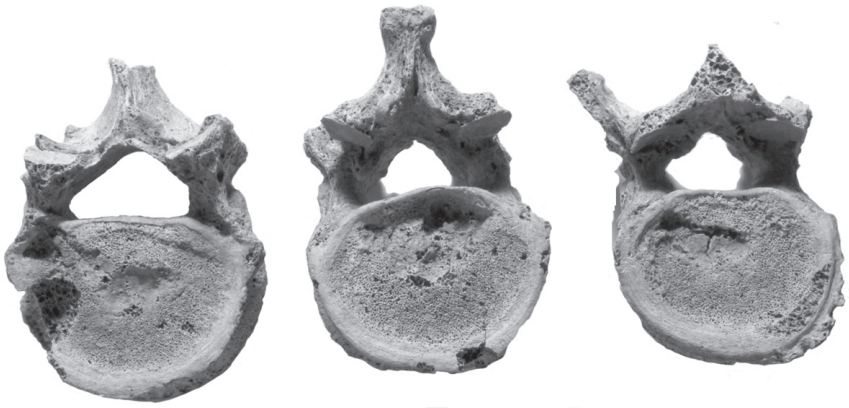

Figure 2. Degenerative intervertebral disc disease and Schmörl's nodes of vertebrae of a 40–50 year old woman (tomb 3, individual No.1).

Figure 3. *Osteochondritis dissecans* (degenerative cartilage disease) of knees. (Tomb 3, individual No.1)

There are two types of hypertrophic osteoarthropathy, and the aetiology of the disorder is still unclear. The primary type is a genetic disease mainly affecting males. This type—whether of a dominant or recessive inheritance—produces severe pathological changes on bones as well as the skin. The secondary type, Marie-Bamberger's syndrome—also known as pulmonary hypertrophic osteoarthropathy—has been most commonly associated with lung cancer. However, other pulmonary diseases and non-pulmonary causes can produce similar bony changes. Both these disease are rare, and only a few cases have been recovered from human skeletal material in archeological contexts. Differential diagnosis between primary and secondary types is difficult, especially in the case of incomplete skeletons.

This is an important finding for our general knowledge about the disease, its historical frequency, and its evidence in human skeletal material. The well preserved skeletal remains of the second individual in tomb 3 allow us more detailed study of the evidence and should provide better description and differentiation between the two types of the disorder.

Because this rare pathology has been observed in two individuals—both males—in the skeletal sample from a small church, it is possible the individuals were related. (This would be true whether the pathological changes were of a primary or a secondary type.)

The study of tomb 3, which will continue in 2006, has an important social aspect. The presence of a small, separate tomb for two individuals—a male

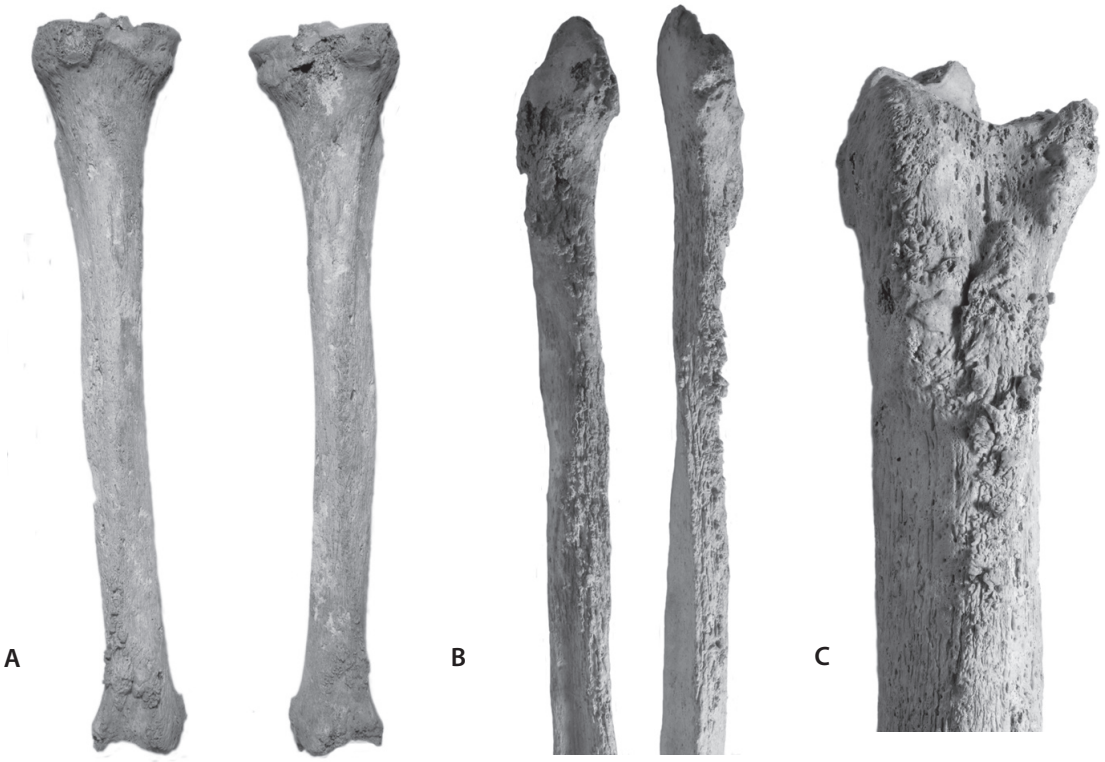

Figure 4. Tibiae (A) and fibulae (B) of a 50–60 year-old male with changes attributed to hypertrophic osteoarthropathy (Marie-Bamberger's disease); (C) detail of changes. (Tomb 3, individual No.2)

and a female of advanced age—among tombs with multiple burials of adults and children mixed together, suggests a burial of special significance for high-status individuals.

Tombs 4 and 5: Preservation of human skeletal material and general tomb description

All tombs excavated within the church (except tomb 3) contained multiple burials. The occupants of tomb 4 and 5 were probably buried elsewhere and placed in these tombs later, some of them perhaps long after death. The predominance of major bones in the tomb and the absence of smaller bones, such of the hands and feet, would suggest this, as does the total count of bones from each tomb. Similar observations were also made by Ponomarev and Smirnov (2002), who initially studied the skeletal material from tomb 1. Some of the individuals in the tombs 1 and 2 were well preserved, with all major bones present, and the vertebrae and ribs in anatomical order . Many of small bones were also present. This suggests that the some of the bodies were placed in the tombs soon after death or at least when not yet fully decomposed. Some individuals were represented only by large long bones and skulls, or, sometimes only by a single bone. Because the remains in the tombs had been disturbed, by movement on the earth above, burrowing animals, or military ordinance, many bones could not be matched with certainty and were classified as disarticulated.

Figure 5. Tomb 4 with a double row of skulls at the western wall.

Tombs 4 and 5 contained the most clearly disturbed skeletal remains among all five tombs. Tomb 4 was shallower than the previously excavated tombs 1 and 2 and also shallower than tomb 5, with which it shared its longer wall. It contained the skulls of ten individuals in ages ranging from sub-adult to adult placed in two rows against the western wall (Fig. 5). The rest of human remains were placed in a disorderly manner, with some of the large long bones projecting vertically from the soil.

The skeletal material in tombs 4 and 5 had been mixed during their use in the late Byzantine period. Several bones from the same individuals were divided between these tombs. For example, parts of one individual pelvis, showing a unique injury around the pubic symphysis, were found in both tombs (Fig. 6). The preservation of individual skeletons in these two tombs was the poorest of all the tombs within the church.

In preliminary studies of a subsample consisting of the remains from tombs 4 and 5, the minimum number of individuals in both tombs was estimated to be twenty-eight, 57% of whom were children of varying ages. Most of the children (14 out of 16 individuals, or 88%) died before the age of 6 years. There were probably equal numbers of male and female burials here, though the sex of some individuals was often difficult to assess due to the lack of reliable sex characteristics on bone fragments. The majority of adults were of mature age. Only one adult skeleton excavated in tomb 4—a 20 to 25 year old female—could be counted as articulated. She was represented by a skull, long bones from the left side of the body, left scapula, sternum, sacrum, and a few metatarsals. The stature of the female, depending on the formula used

for calculation, was either 153 or 159 cm. Some of the sub-adults were also represented by a skull (or its fragments), a few long bones, and other parts of a postcranial skeleton. The rest of the bones had to be treated as disarticulated.

Among the frequent pathological findings in this subsample were osteoarthritis, degenerative vertebral disc disease, *cribra orbitalia* in adults and children, dental caries, and abscesses. Other pathological conditions included osteochondritis of the knee, *spina bifida occulta* (posterior part of lumbar L5 and sacral S1 open in two male sacra), DISH (diffuse idiopathic skeletal hyperostosis) of the spine, broken nasal bones in a 50-x year old male, ossified superior pubic ligaments of a 20-35 year old male (probably injury due to repeated lifting of heavy objects), and signs of vitamin deficiencies among children (rickets, scurvy, anaemia).

One of the individuals, a 35-40 year old male (skull No. 6), had maxillary first incisors with serrated cutting edges (Fig. 7). This condition (sawteeth) is frequently seen among people who held metal nails with their teeth. Markings of heavy manual labor were observed on many bones in this sample. This subject suggests a systematic study of all the bones found in the church.

Woman on the street, Context SR 560

Skeletal remains of a woman more than 50 years old were found on the side street next to the excavated block. After her death during the fire that destroyed this area, the bones of her face and a part of her skull were damaged. The rest of the skeleton was well preserved, despite the fact that the remains had not been buried. The woman's height was estimated at 150–153 cm. There were signs of extensive osteoarthritis on various parts of her skeleton. Probably years before her death she fractured two lumbar vertebrae on the right side of the body (compression fracture). The fracture healed and the result of that healing produced "slipping disc" fusion and scoliosis of the spine (Fig. 8). Her right ulna had healed after a fracture to the distal end, perhaps the result of fending off an attack. The thinning and ivory-like surface in the middle of the left ilium is probably evidence of a form of cancer (Fig. 9). Further studies will include a X-ray examination and, ideally, a histological examination.

This woman certainly lived with severe pain and, because of her age and the injury to the spine, probably had limited mobility at the time of death. Yet she reached considerable age and gave birth many times, as evidenced by the deep and long *sulcus preauricularis*.

Figure 6. (Left) *Os coxae* of a young male (20–25 years). One *os coxa* was found in tomb 4 and the other in tomb 5. (Right) Ossified superior pubic ligament on both sides of pubic symphysis *(osteitis pubis)* are probably due to repeated injury from lifting heavy objects.

Re-examination of bones for differential diagnosis of scurvy, rickets and anaemiae

It has been noted that the human skeletal samples from tombs 1 and 2 contained a large number of children in proportion to adults. A similarly high ratio of children to adults (57%) was found in newly excavated human skeletal material from tomb 4 and 5. The exception was tomb 3, which contained only two adult individuals. In general, the mortality pattern was consistent throughout the use of the church as a burial ground. In the four tombs with multiple burials, the varying proportions of children's bones were affected by changes associated with various metabolic disorders. Signs attributed to severe nutritional deficiencies, such as rickets (vitamin D deficiency), anaemia, and scurvy (vitamin C deficiency), were particularly common among children at Chersonesos, though they also occurred in adults. These findings (except perhaps for iron deficiency anaemia and thalassemia, common at Metaponto), are rather rare in archaeological skeletal samples.

Rickets became common in the middle ages in urban areas of Northern Europe, and most of the archaeological evidence of its presence has been reported from this area as well as from Siberia. According to ancient written sources, rickets and scurvy were unknown in Greece and in the Mediterranean region. The simple explanation is that abundant sunlight (needed for vitamin D synthesis) and ample sources of fresh fruit and vegetables (sources of vitamin C) occur in the Mediterranean. Here, these deficiencies may indicate long periods during which access to fruit and vegetables was limited, such as during conditions of famine or siege.

Thus, the high frequency of individuals, especially children, in Chersonesos with bony changes that suggest the presence of various nutritional deficiencies requires special attention.

Until recently, the main obstacle to the study of these disorders has been shortage of large and well preserved skeletal samples of sub-adults. In addition, there has been a lack of clear criteria for a differential diagnosis of these diseases applicable to skeletal material. Fairly recently, descriptions of pathological evidence of adult scurvy have begun to appear. A 1997 study appeared which allows differentiation between juvenile rickets and scurvy.

Ortner (2003) logically suggested that in situations of lengthy and severe nutritional problems, the child could have several types of vitamin deficiencies at the same time. The changes in the bones could also display mixed signs of several metabolic disorders affecting the individual. Probably the first and the most convincing case of rickets and scurvy present in the same individual comes from Byzantine Chersonesos, where both these metabolic disorders (along with the possibility of iron deficiency anaemia) plagued the population. The reasons for such high frequency of metabolic disorders related to nutritional deficiencies still have to be investigated.

This study should provide answers to questions about the health of Chersonesos' late Byzantine population. Together with a demographic account and analysis, the frequency and the type of diseases should give us a general view of the population's well-being and also may affect the interpretation of historical events.

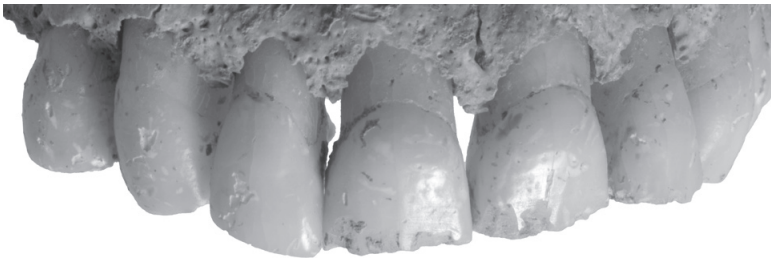

Figure 7. Tomb 4, skull No. 6. Male, 35–40 years old, with serrated upper first incisors (sawteeth), possibly the result of holding metal pins or nails in the mouth.

Children's skeletons are rarely preserved in archaeological skeletal samples in quantity and quality large enough for meaningful explanation of the causes of death. Thus, the skeletal material from Chersonesos, with a large number of preserved sub-adult skeletons, presents a unique opportunity.

Samples for radiocarbon dating

Most of the tombs contained few artifacts, and most of these could be dated to the 12th or 13th century AD. Because the tombs contained a large number of individuals (over sixty in tomb 1, over thirty in tomb 2, and nearly thirty in tombs 4 and 5 combined), the immediate question was whether the bodies of individuals in all tombs were placed there within a short time period or, rather, spanned generations and centuries. This question could not be answered without a method of dating, such as C14, independent of archaeological dating from artifacts.

To start, six samples of bones were carefully selected to accommodate the need for dating at least one individual in each tomb and to analyze the skeletal material with two methods used by two independent laboratories. Three of the samples were sent to one of the most reliable laboratories for dating archaeological materials, the Institute of Particle Physics in Zurich.

Figure 8. Context SR 560. Healed injury (compression fracture) to the lumbar vertebrae.

The complexity of the burials also suggests the need for this direct method of dating, at least for a better explanation of the more interesting biological (single family burials?) or palaeopathological findings (presence of specific diseases at a particular time in history in general or in the history of Chersonesos in particular).

Further studies

The pathological findings of this and previous campaigns require detailed radiological examination and the use of modern techniques not currently available in Chersonesos (e.g. scanning electron microscopy for differentiation of various cancer histology). But an issue of great interest to anthropologists and archaeologists can be studied using basic macroscopic observations on bones: the evidence for physical workload and specific activities of the people from Chersonesos. Much is known about the city functioning as a trading post, and there is ample evidence of fishing, wine making, fish and food storage, as well as artifacts related to food preparation. Less is known about individual occupations and the workload of the city's inhabitants.

Intensive, long term physical effort or specific types of physical activity may leave particular marks on bones and teeth or change the frequency of certain pathological conditions within a population, such as fractures, injuries, onset and severity of osteoarthritis, and many others. An effort is planned for 2006 to investigate this topic by collecting, in a systematic manner, data on bony changes related to physical activities. This study, together with the epidemiological analysis of all pathologies and demographic dynamics, should provide insight into the everyday life and activities of both individuals and the population of Chersonesos as a whole.

[Illustrations continue on following page.]

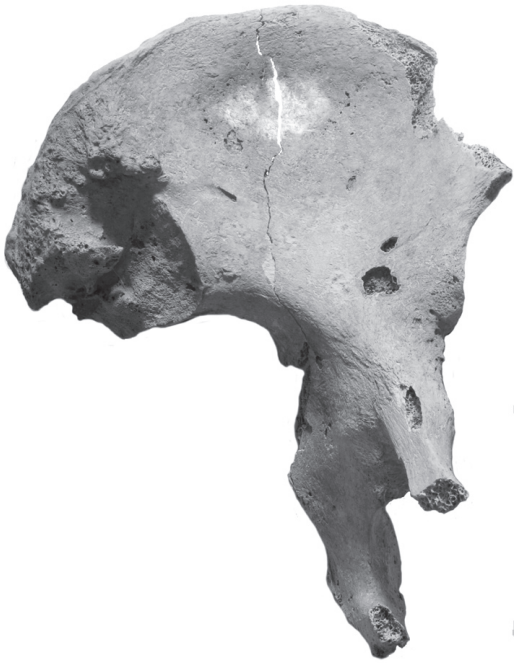

Figure 9. Context SR 560. Left *os coxa* with ivory-like thinning in the middle of the body of ilium (possible cancer).

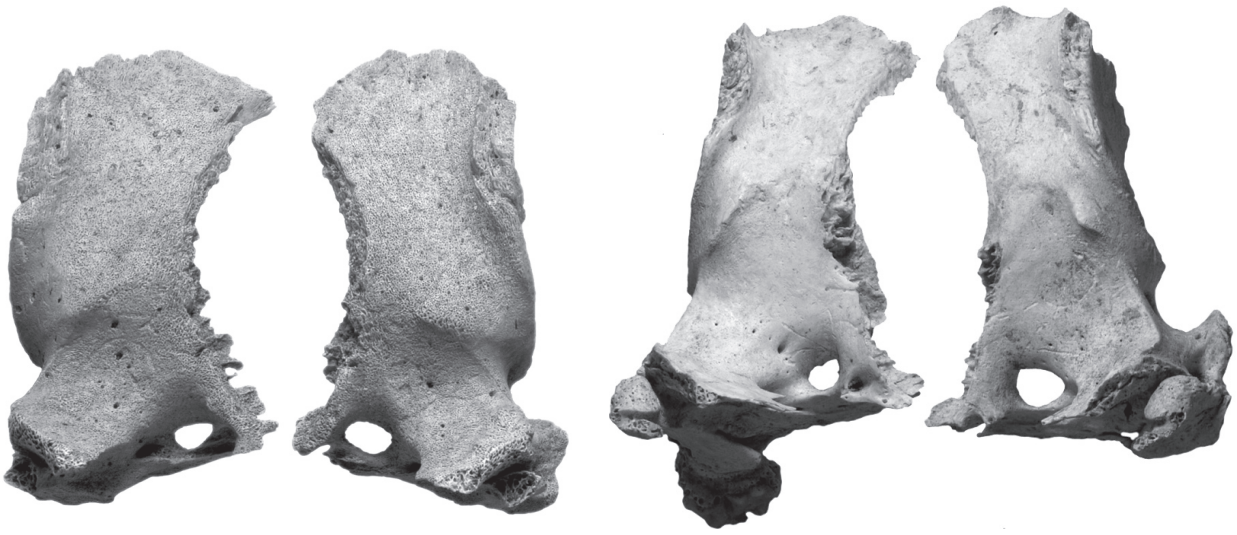

Figure 10. Differential diagnosis of infantile scurvy in human skeletal material.

Left: Greater wing of sphenoid with characteristic fine pitting diagnostic for scurvy. (Tomb 2, parts of the skull of a 6–9 month old child.)

Right: The same part of a skull without pathological changes. (Tomb 2, a 1.5–2 year old child.)

The Stelai Project 2005

Richard Posamentir
DAI, Istanbul

The Stelai Project in Chersonesos during the summer of 2005 consisted of three parts:

1) planning and preparing an exhibition of the painted gravestones and architectural elements of Tauric Chersonesos;
2) visiting various archaeological sites east and west of Sevastopol to search for comparable objects; and
3) continuing the recording and documentation of the architectural elements from the Chersonesos Museum collection (see report by C. Lippert).

The Exhibit

The first project focused on the preparation of a temporary exhibit (in the newly constructed Packard Lab) of the famous painted gravestones and architectural elements. Since the Chersonesos Museum's Ancient Hall was closed to visitors in 2005 because of serious roof damage, this small exhibition will offer the only opportunity, for the foreseeable future, to display these unique pieces. Moreover, the main intent of this project is to demonstrate to the interested visitor different possible archaeological interpretations of a certain group of antique objects, in this case parts of the ancient necropolis of the 4th–3rd centuries BC. The idea is not a solemn display of the gravestones, as was the case in the old museum; it is more about the different angles from which these stones can be seen and the stories they can tell us about the life and death of people living in ancient Chersonesos.

Visitors are offered a single path through the exhibition (which includes about 45 objects) indicated by a black line on the floor which guides them in accordance with the exhibit's aims. The visitors walk past ten stations, each dedicated to a certain topic. Panels immediately next to the objects explain (in Russian, Ukrainian, and English) the meaning and message of particular group of stones.

Visitors enter the hall and find themselves facing two gravestones standing on their bases, combined with the typical anthropomorphic objects. Text and a photograph of the tower of Zeno explain why these stones, with their well-preserved paint remains, are of such outstanding importance for Greek art, exactly where and how they were found, and why their pairing with the aforementioned anthropomorphic objects is unique in the Greek world.

At the second stop visitors see seven stelai, three belonging to deceased males and four to deceased females. Adjoining each stele are interpretations showing the different objects that could be depicted (in relief or paint), basic explanations of these objects and their meaning, and various rules concerning their application and the shape of the stones. These stelai are followed immediately afterwards by the Oath of Chersonesos, the citizens' declaration of democracy written on a stone slab very similar to those of the gravestones. Since all objects previously mentioned are highly characteristic of funerary rites of the Greek world—more specifically, in democratic Athens—there is a natural connection with the oath sworn to the demos of Chersonesos.

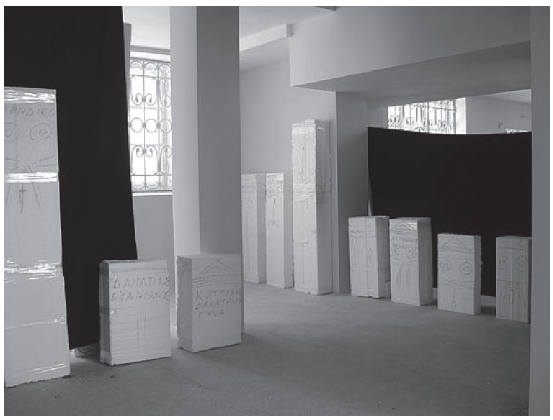

Figure 1. Model stelai were used in a mockup of the exhibit to determine layout as well as overall feasability and cost. (Photo: R. Posamentir)

At the following two stops, methods of archaeological investigation are explained. Four objects represent the craftsmanship of two different workshops, which can be differentiated by their tool marks (most surprising, the craftsmen worked for the two different families one is able to identify in Chersonesos). This study of tool marks, revealed under strong spotlights, represents a unique opportunity to identify particular workshops. The next stop consists of four gravestones without any remains of paint. Here visitors will learn how researchers are able to tell (with the aid of ultraviolet, infrared, or raking light) what once was depicted and how it is possible to reconstruct these stones in full color.

Next, a group of four stones comes under the heading "exceptional pieces," including the only stone in Chersonesos with painted figures, and another depicting medical instruments. This stop serves as a transition to the area dedicated to related objects and architectural elements. On display here are different smaller objects such as parts of exceptional gravestones, various shapes of anthropomorphic objects, and a group of small *naiskoi,* with or without these anthropomorphic objects. The special combination of gravestones with these smaller objects and the meaning of the combination will be discussed at this stop.

Finally, a display concerning the application of paint is shown. Included are painted panels, parts of the so-called *sarcophagai,* and imported and locally-produced gravestone crownings *(anthemia).* These objects belonged to different structures; however all the present reconstructions are subject to serious misinterpretation. Nevertheless, pieces like the panel with the painted head of the youth are without parallel in the Greek world and are of outstanding value. This stop is followed by a small assemblage of architectural elements which also once belonged to grave monuments and were found in the tower of Zeno.

Figure 2. Anthropomorphic figure common along the northern Black Sea coast. (Photo: Cherson Museum)

The last stop before the exit consists of still unrestored, uncleaned, and partly reassembled stelai with their bases. This will show work in progress and demonstrate the effort still needed to accomplish our goals, which are the conservation and comprehensive study of the entire collection.

In order to provide a visualization of this exhibit, and to convince museum staff of its practicality, light synthetic copies of all the antique pieces were produced and set up in the exhibit room. Informative talks with restorers assured that the suggested concept would be feasible and that cost, time, effort, and necessary materials had been either determined or estimated (Fig. 1).

Research in Crimea

The second part of this summer's work consisted of visits to several sites and museums along the Ukrainian and Russian Black Sea coast. A first trip to the west of Chersonesos led to the museums of Cherson and Odessa. Both museums hold gravestones of the Greek type, as well as so-called anthropomorphic objects, which are common all along the northern Black Sea coast (Fig. 2). Visits were also made to the museum at Ochakiv and to the sites of Tyras, Nikonion and Berezan.

A second trip concentrated on the closer surroundings of Chersonesos and recent excavation sites such as "Strabo's Old Chersonesos," the fortified farm house of Balka Bermana. A third trip was dedicated to the cities east of Chersonesos and also east of the "Kimmerian Bosporus." Since most sites and museums of the Ukrainian side had already been covered in former trips, the main emphasis was placed on Hermonassa, Gorgippia or Phanagoria, and, further to the north, Tanais and Taganrok.

The collections of the Taman and Anapa Museums deserve special mention for the valuable material found there. The Taman Museum holds a fine collection of *anthemia* of Greek and local origin, the latter being similar to those found in Tauric Chersonesos. Comparable material in the Anapa Museum (ancient Gorgippia), on the other hand, consisted of various anthropomorphic objects (originating partly from prehistoric contexts), reliefs cut into anthropomorphically shaped stones (similar to those found in Pantikapaion), and, surprisingly, clear parallels to the so-called sarcophagai from Chersonesos (Fig. 3).

The rich lapidarium is filled with gravestones of the so-called Greek type and with the well-known anthropomorphic objects (but in this case there are no bases at hand which would indicate a similar combination as in Chersonesos). Only some rough *naiskoi* seem to prove something similar. Even though the gravestones kept in Anapa show completely different features with regard to shape and decoration, the large number of stelai and anthropomorphic objects is more than remarkable, even though it is almost impossible to reliably date these objects (Fig. 4).

Again, imported and locally-produced anthemia of minor artistic value are present and prove the highly developed interest in Attic funerary art, without the unique application of such objects as seen in Chersonesos.

Surprisingly, even at later sites such as Tanais at the northeastern tip of the Sea of Azov, anthropomorphic objects are always present, obviously serving as grave markers. It is even possible to find small *naiskoi* there, but they more resemble simple Boeotian stones which would once have had a painted figural image inside (Fig. 5).

Research and reconstruction

The third part of the Stelai project focused on the architectural elements, the possible reconstruction of the funerary monuments of Chersonesos and the completion of the gravestone-database. The results of this part of the project are reported in the following article.

Figure 3. This monument fragment from the Anapa Museum is similar to the *sarcophagi* at Chersonesos.

Figure 4. Three grave monument elements from the Anapa Museum collection include (left) the so-called Greek type, similar to that found at Chersonesos; (center) design of more unusual type; (right) locally-produced *anthemea*.

Figure 5. Small *naiskoi* from the Tanais site. (Photos: Anapa Museum)

Research on the Grave Monuments from Chersonesos

Dipl.-Ing. C. Lippert
Architectural Historian, Dresden

The identification and re-assembly of the architectural elements from the early Hellenistic necropolis of Chersonesos is another of ICA's ambitious projects at the National Preserve of Tauric Chersonesos. This research intends to achieve a more comprehensive understanding of the forming of necropoleis in general, and the shape of grave monuments in particular during this period of Chersonesos history.

In 2004, work was limited to documenting architectural elements stored in the Preserve Museum. This year the project was extended to include the collections of stone sarcophagi and miniature versions of funerary monuments as well as a survey of a portion of the defensive wall adjacent to the Tower of Zeno. All information was compiled in a digital catalogue. A second part of the project started analyzing documentation and material in the NPTC Archive. This report presents some of the results.

The research was again carried out by a team of architects led by Dipl.-Ing. C. Lippert and including I. Engelmann, A. Schanze, and M. Boeber, all of the University of Dresden. The continuity of the team insured the experience and knowledge gained from the previous year was carried over to this year's project. Working methods developed during the 2004 campaign—drawings (at 1:5 scale), photography, and verbal description—were refined in 2005, proving well-suited to describing the elements' peculiar features and outstanding painted surfaces. At the end of the season, all material had been recorded and the documentation had been finished. The second part of the 2005 summer campaign was dedicated to the analysis of all drawings and information collected in the catalogue (Fig. 1).

An important element from the early necropolis of Chersonesos is found in the stone sarcophagi whose forms imitate *klinai* and benches, adding the dimension of burial furniture to the research on Hellenistic grave monuments.

The sarcophagi vary in form, dimensions, and quality of preservation; most of them do not show any paint. There are, however, three fragments with much of the original paint preserved to an outstanding degree: a siren on the depiction area on the vertical frame at the end, a horizontal frieze with fighting animals of the mythological and real worlds, and an upper cornice showing a painted dentil frieze above a perspectively rendered meander frieze (Fig. 2).

Figure 1. Documenting the stone sarcophagi. (Photo: I. Engelmann)

Figure 2. Stone sarcophagus, Inv. no. 15. (Photo: C. Williams)

Early ideas of the original appearance of the sarcophagi varied considerably. In one instance they were seen as connected with other architectural elements, e.g. as part of a *naiskos* framing a stelai. Elsewhere the image of a monolithic casket with a flat deck slab was suggested (Fig. 3). The recent approach shall provide new indications for a reconstruction.

In the course of the recording the slabs, six recurring types of blocks were identified, ranging from simple front pieces and front pieces with side framing to more elaborate pieces with an integrated deck slab. From these types of elements some principles of tectonics can be deduced. The decisive element is the position of the joint related to the decoration (i.e. the frieze).

The first construction design consists of a front piece including the lateral edge of the frieze, and a lateral corner piece. The fascia of the lateral corner piece is not subdivided above the recessed lower edge. In the second , this principle is reversed. The boundary of the frieze can be found on the corner piece, whereas the front piece only shows a plain fasciae. Neither the front piece nor the corner piece represents the lateral edge of the frieze in the third construction type; it is the joint between them that limits the frieze. Finally, the fourth construction principle is illustrated by the yet another, rare type of sarcophagus. The very wide corner piece with the lateral edge of the frieze is provided with a U-clamp towards the center. As a result of this analysis it is clear that the monolithic appearance of the stone sarcophagi suggested in the earlier literature is no longer valid.

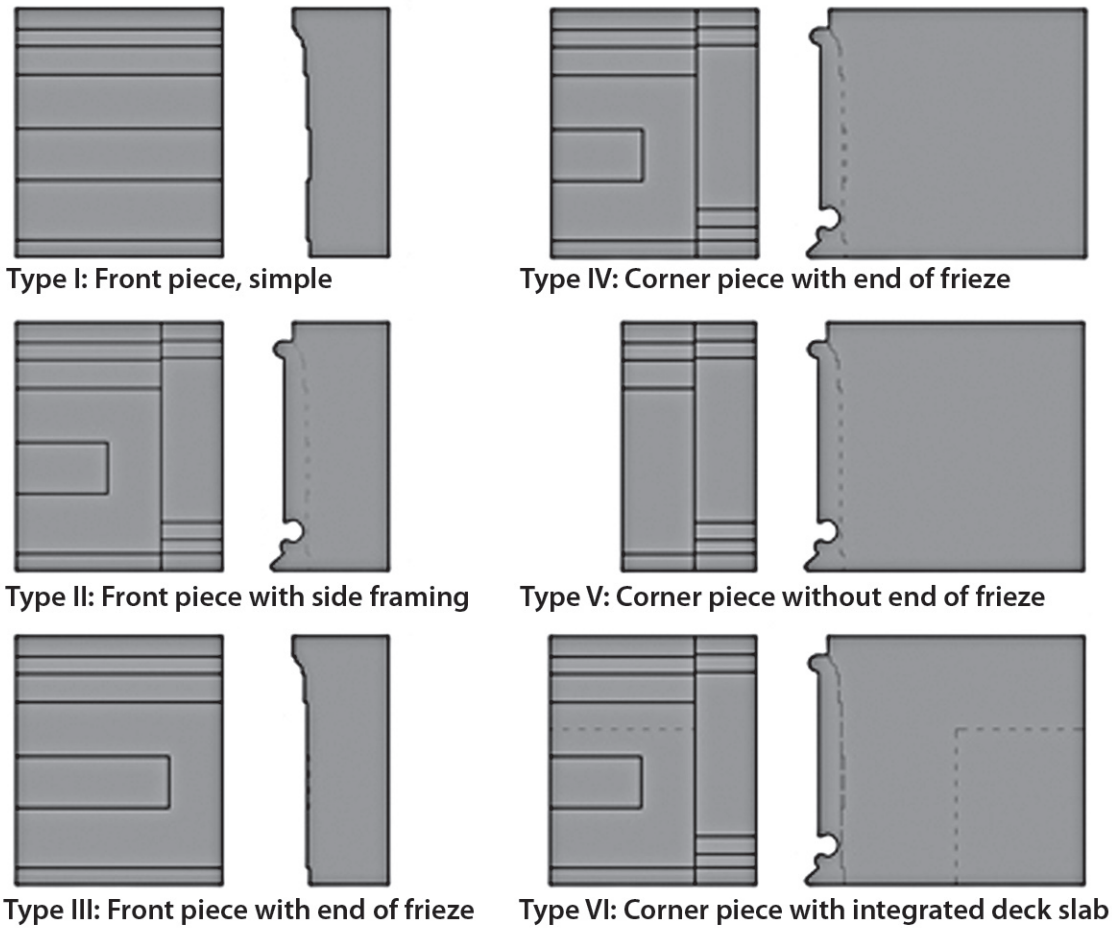

Figure 3. Sarcophagi: Types of Stones, Schematic Drawing. (C. Lippert)

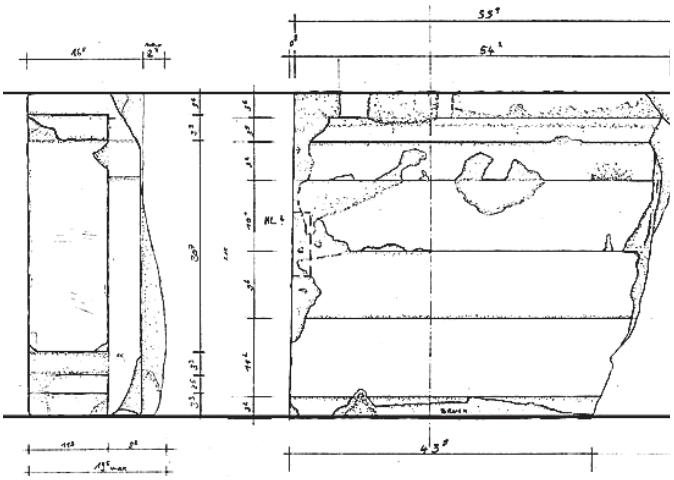

Figure 4. Ascertaining relations between corner piece, Inv. No. 16, and front piece, Inv. No. 18. First criterion: total height; second criterion: position and dimension of frieze. These two fragments are similar not only in dimension but also in features such as tool marks, incisions, and color and consistency of material. (C. Lippert)

The total height of the fragments was the first criterion for classifying and re-assembling the sarcophagi. The collection could be divided in three major groups on the basis of the heights: the first group consists of those fragments of large, slender form; the second includes all those of a small and compact appearance; the third group comprised the remaining stones (Fig. 4).

The height, however, depends on the general state of preservation and is possibly also subject to a modification related to the re-use as building material. Therefore, size and position of the frieze field are of prime importance for identification, all the more as these are the most important element in the decoration. The subject-matter frieze communicates information, beliefs, and values of the owner of the burial container. Seventeen different structures can be ascertained from the collection of 34 elements. This is the minimum number; it should be greater since there are certain tolerances, for instance, in the profile.

Among the structures examined, there are neither compositions of U-shape nor of rectangular shape, as mentioned in previous studies. Likewise the fragments do not show any details of construction that would support the assumption of a connection to other architectural elements, such as a *naiskos* entablature, as one writer supposed. However, there are several structures of L-shape. This suggests that they might have a relation to rooms of hitherto unknown appearance and that they might have been located in the corners of such rooms, a thought that will be investigated in the analysis process.

In the recording process it was possible to identify and reassemble architectural elements that were preserved only in fragments. A considerable part of the ancient material preserved has been modified for re-use, e.g., as *spolia*. Specific features such as clamp holes and other incisions, or finer parts of the profiles on the elements have suffered from environmental conditions and weathering in general. These characteristic elements are nevertheless crucial to understanding the original purpose

Figure 5. Stone sarcophagus in the City Wall, Inv. No. 115. Although the element is broken and heavily weathered, its relation to other stone sarcophagi can be verified.

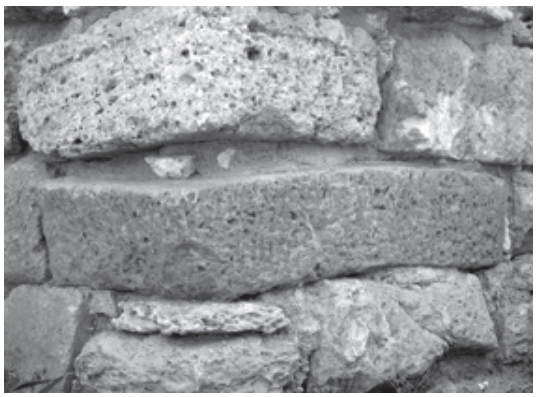

Figure 6. Vaulted stone in the City Wall, Inv. No. 701. (Photos: I. Englemann)

Catalogue No.	ARCH	008	New No.	Museum Nos.	Excav Nos.
Object Name	Architrave, Ionic.		CH No. match	52 37007; part 3	

Photo ◉ CT ○ UV ○ SW ○ Strf

Dimensions (cm)

H:	19.1	W:	29	Th:	16.8

Date of last edit
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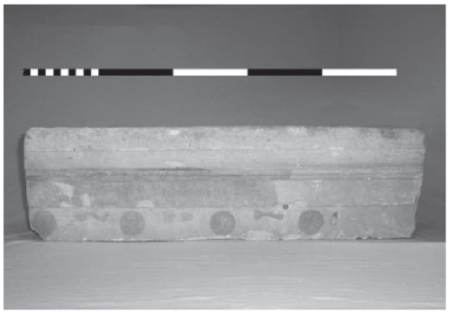

Material	Quality	Provenance
limestone	very good	Tower of Zeno (?)

Location
Fondi 10

Preservation
Fixation of colours.

Drawn
◉ yes ○ no

Scale 1_5

Initials IE

Incisions yes
Colours Y

Object Description

Architrave, Ionic. Painted bucrainion frieze with shields and bull's horns. Material: light yellow limestone, fine pored, homogeneous. Very well preserved, sharp edges, few spallings. Rests of colours, treated by conservatores: fixation of colours. No CH, DH. Incised lines indicating the position of the painted ornament.

FS: Profile (B to T): 1) Fascia 1, h = 5,9 cm, with painted ornament: bucrainion frieze with shields (yellow circles, Ø = 4,2 cm) and bull's horns (waved lines, w = 4,0 cm), no coloured ground, distance of axis between the shields w = 7,3 cm; position indicated by incised lines. 2) Fascia 2, ending in a cavetto, with rests of red colour, h = 4,7 cm. 3) Fascia 3, h = 0,7 cm. 4) Cuboid bead with red CR, h = 0,8 cm. 5) Beginning of a convex bead, severely broken, h not measurable. 6) + 7) Rest of the profile broken, total height until Top: h = 6,9 cm. FS smoothed out very fine with ToC (w = 1,3 cm) applied II to Bottom.

BS: Beginnings of a margin to Top (w = 6,0 - 9,5 cm), smoothed out fine with FC (w not measurable). Rest of the surface moderately smoothed with FC (w = 5,5 cm).
Top: Smoothed out very fine, no work marks (due to weathering), porous surface. No CH, DH.
B: Smoothed out very fine with FC (w = 3,5 cm) and ToC (w = 2,0 cm, width of the "dentils" = 2 mm). Beginnings of a margin to FS (w = 1 cm).

LS: Broken.
RS: Broken

Inscription
none

Notes

	Frieze	**Meander frieze**	**Inscription**	
	Ht Top	Ht	Ht letters max	
	Ht Bot	Wd	Ht letters min	
	total Ht	Axis		
	Ionic Cyma large	**Ionic Cyma small**	**Lesbian Cyma small**	
	Ht	Ht	Ht	
	Wd	Wd	Wd	
	Axis	Axis	Axis	
Incised lines:	**Top: IL II to FS**	**Top: IL at 90° to FS**	**Bottom: IL II to FS**	**Bottom: IL at 90° to FS**
	1	1	1 none	1
	2	2	2	2
	3	3	3	3

Figure 7. Excerpt from the digital database.

of the architectural elements on which they are found (Fig. 5).

The comparison and identification of elements is often more demanding if these elements either come from differing or unrecorded contexts. Different origins or contexts are frequently regarded as a strong argument against connections between blocks. This argument could be invalidated only through careful documentation.

As mentioned before, the research also included a careful review of the Preserve and the City Wall adjacent to the Tower of Zeno. Previously, there were reasons to believe that the stones with a curved surface found in the City Wall were part of a vault and, thus, might be related to the grave monuments. However, closer research suggests that these stones belonged rather to the outer surface of a curved wall. Both the form of the curves and of and clamp holes in the stones argue against their use as vaults (Fig. 6). Since all of them are so similar in form and finishing, it can be assumed that they are part of the same structure (although they have been used as building material on very different parts of the present wall, which might appear to contradict this assumption).

After the 2005 season, all material from the early Hellenistic necropolis of Chersonesos was not only documented in detail but was recorded in a digital database. This database is the counterpart to the existing one for the stelai. Both can be linked with each other easily, giving access to a maximum amount of data regarding the stelai and architectural elements.

In addition, this database can also serve as part of an inventory list for storage of all the finds of Hellenistic stelai and architecture in the new Packard Laboratory. Currently, the architectural elements are stored in various areas around the Preserve, making the study of relationships between typological or constructional aspects difficult. The fragments can now be stored in the Packard Laboratory in a contextual order, with guidance from the newly-developed catalog. The photographs of the elements in the database will allow easy access to fragments of the collection, making unnecessary the intensive search in storerooms required previously (Fig. 7).

The drawings, photographs, and database represent excellent preconditions for the scientific analysis of the material which follows next. Results are meant to be published in Volume II of the forthcoming publication, *Polychrome Grave Monuments from the Early Hellenistic Necropolis of Tauric Chersonesos*.

Excavation Recording System

Jessica Trelogan and Stuart Eve
ICA and L-P Archaeology

Introduction

Work on refining and streamlining the recording system for ICA's excavations at Chersonesos continued throughout the year. The 2005 season was a big success in terms of field-testing, and we have come very close to ironing out all the kinks for a fully integrated field-to-finish system. Several brief synopses of this work have appeared in previous Annual Reports since 2001 (see contributions by Trelogan, Gravili, and Limoncelli in ICA's 2001 *Annual Report*), but we felt this would be an opportune time to synthesize the work and discuss it in a bit more depth for readers who might be interested in knowing more.

Our investigation into the use of GIS as a part of excavation recording began with our collaborators from Lecce University during excavations of the South Region of the city in 2001. Using a Microsoft Access database designed by Giuseppe Gravili to manage the non-spatial data (contexts, finds, and pottery records), and a total station to record spatial locations of finds, spot heights, and to georeference site plans (digitized in AutoCad), we came close to integrating this information in a GIS. We were using ESRI's ArcView 3.2, which had limited abilities to connect to external databases, so moving seamlessly between spatial and non-spatial data was difficult. In 2004 we switched to an MS SQL database (with an Access front-end), and have upgraded our GIS software to ESRI's ArcGIS (now 9.x). This combination has improved our ability to connect the GIS with the database, and has allowed us to streamline the process of digitizing, accessing, manipulating, and displaying the spatial data.

Our main goal in designing the recording system has been to strike a balance between recording as much information as accurately as possible and remaining efficient and productive in and away from the field. Our emphasis has been on gathering enough documentation to aid in our own interpretation and publication of the site while also preserving a picture of the excavation process itself so that others can understand how and why we have interpreted things the way we have (leaving open the possibility of new interpretations). We have approached all aspects of the system with a careful eye to avoid falling into the all-too-easy trap of valuing precision over accuracy and practicality. While our total station allows us to re-

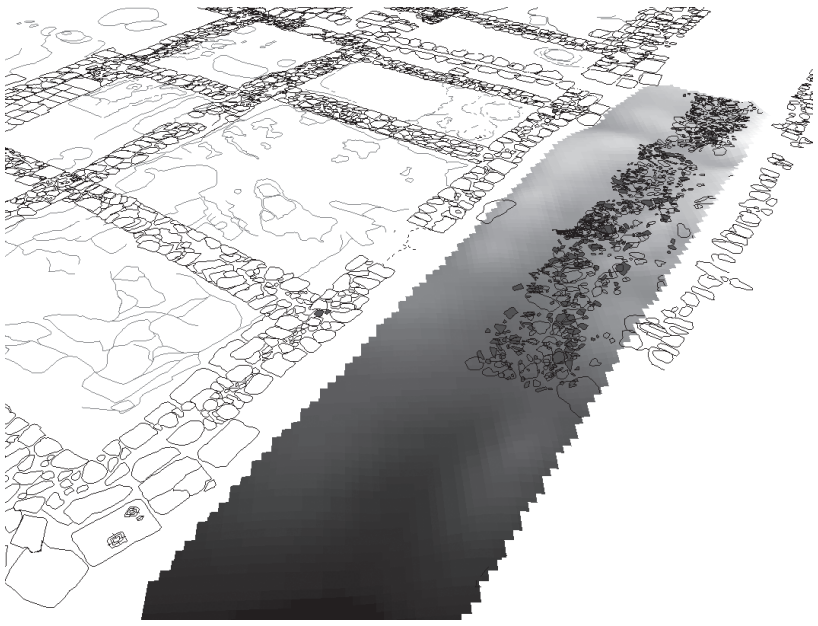

Figure 1. 3D topographic surface of the *stenopos*, with digitized tile fall draped over it.

cord every sherd at sub-millimeter precision, it is not necessarily wise—and can be misleading—to do so. The following discussion covers the main problems we have tried to address in designing the system, from data capture to management and access, and, ultimately, to storage and dissemination.

Data Capture

We made a conscious decision to favor a combination of traditional paper and digital recording for the primary set of documentation in the field. While the total station (with its peripheral data collector) is an absolutely key component of our toolkit, most of our planning is still done with pen on paper. We rely on the total station heavily (in fact, during the 2005 season, we often had two stations running at once) for providing the spatial location of key finds (in x, y, and z coordinates), samples, spot elevations, and for geo-referencing hand-drawn plans and near-vertical digital photography. We also use it for some general planning (location of newly opened trenches, profile lines, etc.) and for topographic surface mapping (including, this season, an experimental program of recording micro-topographic surfaces of individual contexts (Fig. 1).

The main set of total station data that becomes part of the digital site plan consists of accessioned ('special') finds, samples (metallurgical, architectural, paleobotanical, organic, soil, and charcoal), other unaccessioned finds (nails, industrial debris, wood, bone), and spot elevations. The special finds and sample data are given unique identification corresponding to their associated records within the database, numbers with which they can be joined. The other unaccessioned finds are given brief descriptions directly in the total station data collector, and their locations recorded. Although each of these finds is not given an unique number nor described individually in detail, by recording their location we are providing a basic means of looking at general distribution patterns that may help us to understand what activities were going on in particular parts of the site.

Primary context recording, site notebooks, and the majority of context and state plans are still done on paper, then incorporated into the database and GIS back in the lab. While this does add an extra step of data entry, we have decided it is ultimately much faster and less cumbersome in the field than recording on hand-held computers. In addition, this paper record provides an extra set of primary documentation that is arguably more stable than digital, and gives us an added opportunity—in the data-entry phase—to check for errors and omissions while the site is still fresh in our minds and near enough to look at.

In addition to the paper records and total station mapping data, we are now relying entirely on digital photography for traditional site and finds photography, as well as for near-vertical photography for some layer planning. This latter class of photographs, which we refer to as "geo-photos," is used for planning complex contexts such as tile falls, rubble layers, or disarticulated skeletons. Total station points are collected on visible targets within each photo-frame, basic ortho-rectifying and geo-referencing operations are performed, and the photographs are mosaicked together within the GIS (Fig. 2). In this way we are able to do 'heads-up' digitizing on screen to plan contexts that would otherwise take hours to plan at an acceptable scale in the field (and would, in any case, still need to be digitized). This season we conducted a number of timed trials on complex layers using traditional planning (at a scale of 1:50) vs. planning from geo-photos. From start to finish, including taking the digital photos, geo-referencing and digitizing, the geo-photo method was consistently faster and more accurate (as well as being much more precise than could be achieved by drawing at 1:50). Ultimately, this is a more efficient and practical method for very complex layers, like tile falls, that would take hours to plan by hand, which in many cases are not done due to time constraints.)

Data Management

Clearly, our data capture methods are generating a proliferation of digital data every season, a fairly standard situation on most excavations these days. The use of a relational database to manage the tabular and textual data as well as the data files themselves is vital to keeping it all organized while allowing us to access, query and manipulate the data with relative ease. We have now become

equally reliant on GIS software (currently ESRI's ArcGIS 9.x) to do the same for our spatial data. Having the two work together more-or-less seamlessly is extremely useful, not just for the day-to-day work in the field, but also for post-excavation analysis and write-up, and, ultimately, for dissemination of the primary data as a central part of the excavation's publication (see Plate 3, p. 55).

Database

The database's back-end is built on MS SQL server, which sits on a central server within the site house. This enables it to be accessed from multiple workstations and allows for a large number of concurrent connections. The front-end, built within Microsoft Access, consists simply of a collection of forms, pre-defined queries, and some custom code written in Visual Basic. No data are held within the Access file itself, but instead are held in tables within the MS SQL server. As these tables reside on the server, the process of data entry is made much easier and safer from a data-integrity point of view. With row-level locking (i.e. multiple edits can happen simultaneously on a given table, but as each row is edited, it is locked out until the edit is finished), we can have several people doing data-entry at once without problems comparing and merging different versions of the data.

The database was designed in a modular fashion, allowing certain modules to be used or not depending on the excavation and associated recording strategies (e.g., if geo-photos are not being taken on a particular site, the module can be turned off). The core modules in use are contexts, photographs, special finds, drawings and samples. The context module effectively recreates the paper context form, but allows more dynamic access to the data through querying and searching. It is also linked to the other modules, allowing, for example, excavation photos to be viewed directly from the digital form. The photo modules are used to catalog the vast number of digital photographic files (and their associated metadata) that are collected during the season. These include the site and context photographs as well as photographs of accessioned finds. In addition to the core modules, we have also developed modules to manage survey data files and field notes, 3D topographic surfaces, and geo-photos.

One of the major advantages of this system is that different front-ends can be tailored to different users without changing the core tables and relationships of the database itself. We are thus not tied to a specific front-end, but can customize of the interface of the system for different types of users or audiences. For our current, in-house use, Microsoft Access was chosen because it is widely used (and thus familiar to many of our team-members), and is relatively quick and easy for creating data entry forms and basic pre-defined queries. Finally, if a snapshot of the database is needed (to send, e.g., to a researcher who is not connected to our server) the tables can be easily imported into the Access front-end and act as a stand-alone database. Our next step—planned for the 2006 season—will be to develop a web-based interface that allows users to access the data with a standard web browser.

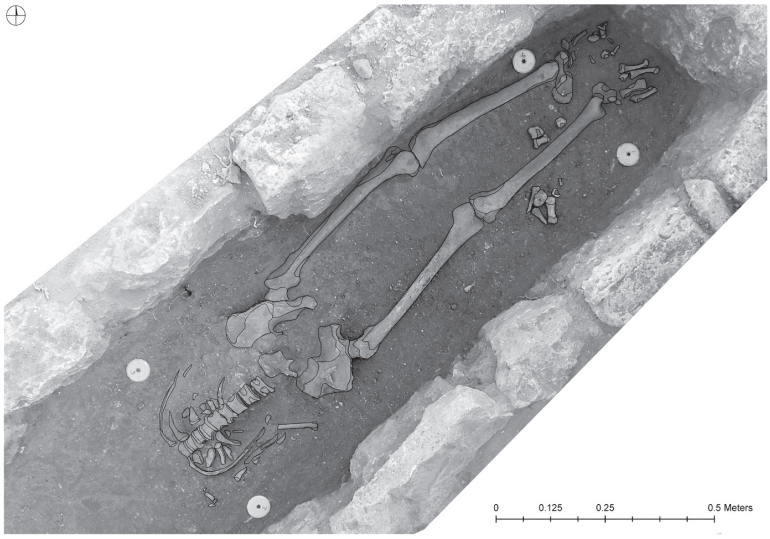

Figure 2. Skeleton from tomb 3 digitized from a geo-referenced photo.

GIS

One of the major advances of the 2005 season was to incorporate properly the database with the spatial data housed within the GIS. This had been problematic for us in the past, but has been dramatically improved by the migration from Access to MS SQL server for the database and from ArcView 3.2 to ArcGIS 9.x for the spatial data. With this combination it is much easier to join spatial and non-spatial data tables, making it possible to access the whole of the dataset through either the database front-end or through a map-based interface.

The GIS, like the database (and, of course, the excavation itself), is centered on the archaeological context. In previous incarnations of the GIS, we had been somewhat inconsistent in digitizing each context, instead focusing on architectural plans and locations of finds. We have now streamlined the data capture process (drawing, scanning, georeferencing, and digitizing) enough that we can produce efficiently a digital plan of each context within the GIS without slowing down our work in the field. Each of the digital context plans is linked via the database to all the other information recorded about it, including the context record sheet, site notes, finds, samples, and photographs, greatly enhancing our ability to visualize and interpret the site. We have developed a set of conventions for planning in the field and have translated these into a set of custom symbols (line, point, and polygon types) that allow us to rapidly reproduce legible, publication quality plans of individual contexts, giving a more complete site plan that includes more than just rooms and walls (Plate 3, p. 55).

While the process of collecting and processing all this spatial data is time-consuming, it will provide an invaluable tool for post-excavation analysis and publication that will save time and energy in the long run. Having such a rich set of primary data at the fingertips of our increasingly international team of specialists will be a huge help in interpreting this complex site. Eventually, by making our data available via the Internet as part of the final publication, we will allow others to see how we came to that interpretation and they might reinterpret it for themselves.

Data Storage and Dissemination

We consider long-term preservation of the primary documentation generated just as important as the preservation of the site and the artifacts recovered from it. So, it is vital that we use robust and sustainable methods for archiving and storing the digital data. This is a hotly debated topic at the moment and there are many options available. As we continue to research the issue, one of our guiding principles is to ensure that the data are described in a sufficiently semantic way that they can be reconstructed without the need for specific software. Technology moves at such a rate that it is naïve to assume that, for example, Microsoft Access 2000 files will be legible beyond the next 10 years.

The current trend seems to be moving toward a preference for some form of markup language such as XML (eXtensible Markup Language) and GML (Geography Markup Language, for geospatial data). A major task for the 2006 season will be to ensure that all our data are structured and documented in such a way that this export will be relatively painless.

Our eventual plan for publication of this site is includes making the full set of primary data available as a companion to the print publication. This practice is becoming increasingly common for archaeological projects, but the data provided is usually presented in a fairly raw form, comprehensible only to the internal team. During the 2006 season, we plan to begin development of a web-based interface (including a map-based view) that will offer several different approaches to browsing or searching for information that will be useful and intuitive to internal and external researchers alike. This approach in no way negates the print publication; instead, it enhances both, allowing the reader not only to read our interpretation, but also to investigate the primary data directly, in order discover how we have interpreted the site or for comparanda for understanding other sites.

Conservation Report 2005

Chris Cleere & Cathy Daly
Consultants to ICA

ICA's conservation efforts at Chersonesos ran from July to September, with a team returning in November to mount an exhibit in the new Packard Laboratory. The regular season included conservation of objects from the concurrent excavation and from the Museum collection, conservation of exposed archaeological structures, training sessions for the Preserve staff and international team members in conservation techniques and documentation, and the design of storage facilities in the Packard Laboratory.

Objects Conservation

The 2005 objects conservation project occupied all of July and August. This year ICA brought both international conservation specialists and students to work alongside the Preserve's team. This was the first season of work in the newly-refurbished (but not yet fully equipped) conservation laboratory. It was a great pleasure to see how conditions had improved from the previous year.

Figure 1. Conservation intern Maya Froidevaux prepares an on-site dendochronology sample for laboratory analysis.

Continuing the work of last year's objects conservation season, the main aims for 2005 were:

- To assist the busy preserve conservators with the conservation of objects from ICA's excavation;
- To act as both catalyst and vehicle for international training and exchange;
- To improve, through the introduction of digital technology, the recording systems for both written and photographic object documentation.

Objects Treatment

During the 2004 season, the NPTC conservators actively participated in artifact recovery at the excavation site. In 2005, this successful involvement continued with conservators using on-site lifting techniques to recover fractured and carbonized wood samples (Fig. 1). The lifting methods developed during the last two field seasons could be used to protect fragile objects found in future excavations.

During the 2004 excavation, a large number of broken amphorae was discovered in room 33. A

Figure 2. Team members reassemble amphora fragments in the Conservation Lab. (Photos: C. Daley)

concerted effort was made in 2005 to reconstruct the resulting puzzle of fragments (Fig. 2 and Plate 2F, p. 18). By season's end, complete profiles of three vessels had been reconstructed. These profiles will be of stylistic and analytic value, and will enable the calculation of the amphorae volumes, a critical diagnostic measure.

The vast majority of objects conserved in 2005 were copper alloys (bronze or brass). Over 90 coins were found during the four week season. By the end of August approximately seventy had been conserved.

One unusual find of 2005 was a copper alloy padlock decorated with three standing lions and ornate surface engraving (front cover and Plate 2A, p. 18). Cleaning revealed two inscriptions among the decoration, one identifying the lock's maker. The tool marks of the engraver could be seen under magnification and were recorded using a digital video microscope (Fig. 3). (See also Rabinowitz and Sedikova, p. 16.)

All of the iron artifacts recovered from the site required X-ray analysis to determine the extent of preservation, original shape and technological detail, information that was obscured by soil and corrosion. As there was no X-ray machine at the preserve, the objects were sent to a facility in Sevastopol. In preparation for this, each find was sewn into plastic sheets cut to fit the x-ray plates, with objects of similar density kept together (Fig. 4). This painstaking preparatory work was carried out during the summer season. The X-rays will be available for the preserve staff to consult when conserving the objects in the future.

Site conservation

The site conservation project ran throughout August and September. The refinement of techniques and experience gained in the previous three seasons led to increased productivity by what is now a highly-skilled team. The result was stabilization of all the material and structures exposed by the ICA excavations in 2005 and earlier. No material was left untreated for the upcoming winter months (Fig. 5). The GIS recording system introduced in the previous year now is fully functional, efficient, and usable, making possible a database of conservaton projects recorded in real-time. (See Trelogan and Eve, p. 35)

As 2006 is the final season of excavation at the city site for some time, thought was given to presentation and maintenance. Exposed floor and bedrock surfaces will need covering to prevent vegetative colonization, erosion, and frost damage. ICA and Preserve staff discussed ways in which these coverings could aid visitors' site interpretation. Locally available materials were examined and a list of variants drawn up. It was decided that areas originally located within structures or buildings would be covered with a hard packed clay-gravel mix while grass, regularly trimmed, would be allowed to grow in courtyards and exterior spaces. Streets will be cleared and maintained in their original condition, their Byzantine cobbled surfaces maintained. As with all aspects of the site conservation project, the methodology is experi-

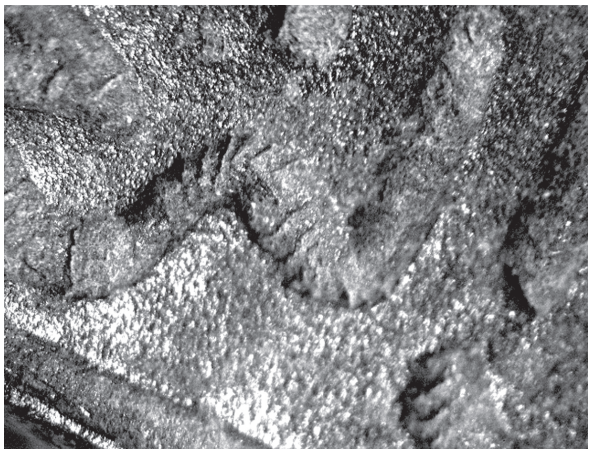

Figure 3. A photomicrograph of the lock showing engraver's tool marks.

Figure 4. Inga Shvedova sews metal objects into plastic sheeting in preparation for X-ray analysis.

mental. When refined, it is hoped these conventions will be adopted as a standard for the site as a whole.

Training and collaboration

The ICA conservation projects bring together international specialists with expertise in numerous disciplines, resulting in far-reaching, informal exchanges of information. There are also various organized seminars, training sessions, and discussion groups. Both students and professionals deliver weekly conservation seminars covering all areas of their expertise.

In 2005 the exchange of information and expertise became more formal, with the participation in the projects of Ukrainian conservation and heritage management professionals. Yulia Strelenko, senior scientific researcher at the State Research Institute of Monuments Preservation Studies, and Roman Gutsulyak, Deputy Director of Scientific Work at the State Scientific-Technological Center of Preservation and Restoration of Monuments, added their considerable knowledge and experience to the site conservation project. One result of this collaboration will be the further testing and modification of materials to be used in the 2006 season (Fig. 6).

Alexandr Mindzhulin, head of the Sculpture at the Applied Arts and Architecture Conservation Workshop; Anna Shiyanova, Artistic Conservator at the Institute of Archaeology of the National Academy of Sciences of Ukraine; Tatiana Midzhulina, head of the Textile Conservation Research at the Conservation Center of Ukraine; and Svetlana Strelnikova, General Director of the National Scientific Research Conservation Center of Ukraine visited Chersonesos to assess the needs of the Preserve collections and conservation laboratories and the effect of the ICA's conservation projects. The group undertook the training and assessment of the entire conservation team, culminating in official certification of both NPTC conservators and international participants. This successful collaboration led to a commitment from all sides to continue and expand the training project in coming seasons.

Recording

During the 2005 season the conservation team and the Megarika project worked together to build a database system for conservation records. This database is intended to be linked to the other Preserve-wide database designed by Megarika. Such an integrated system would allow researchers to follow an object from its excavation database, to the museum's collection database, through to its final conservation report and place of storage.

With the training and advice given by ICA photographer Chris Williams, the photographic recording of objects was also greatly improved. This is vital as the objects conservation team is responsible for photographing all special finds, an essential part of the excavation record.

Figure 5. Conservation team pointing a wall at the city site.

Figure 6. Conservation advisor Roman Gutsulyak on site.

The Packard Laboratory

With the approaching completion of the Packard Laboratory, two design projects were undertaken during the summer. The first was intended to equip the Laboratory's storage facilities. The Museum staff arrived at an optimal shelf size for storing artifacts and a local manufacturer was found. Floor plans and layout were discussed and designed, resulting in the addition of 860 meters of new shelf space, a significant addition to the Museum's storage capacity. A modern environmental monitoring system was installed, and training in its operation and maintenance was provided by Andrew Holbrook, Collections Manager for the Museum of London (Fig. 7). The system is expandible and wireless, enabling possible future expansion to Preserve galleries, archives and storage areas.

The second design project involved the mounting of an exhibition of the Hellenistic grave stelai and their associated objects. Richard Posamentir, who is collaborating in the study of this material, curated the exhibit. In November, some of the conservation team returned to Chersonesos to begin the joining and preparation of the objects. (Fig. 8). NPTC conservators used this visit to learn more about the techniques, materials, and ethics of stone conservation.

2005 and Beyond

The 2005 conservation season built on the successes of previous years, and consolidated ICA's contribution to the preservation of NPTC sites and artifacts. The construction of computerized recording databases will make record keeping easier and improve access to conservation records. We continued to carry out practical conservation treatments and ongoing research into methodologies, and were pleased to see the increase in the exchange of information among professionals and students. The role of the conservators has been expanded to cover all aspects of the function of NPTC's work, including excavation, collections care, storage design, and object display and presentation.

Special thanks are due to the Preserve conservators Inga Shvedova (Head of the Conservation Laboratory), Olga Demyanova, Julia Ryzhova, Olga Andreeva, and Natalia Kuleva. Without their constant and intelligent support, our work would have been impossible.

We hope that in 2006 the training element of the projects and involvement of the wider Ukrainian conservation profession will come to the fore and that through the shared experiences with the international conservation profession Chersonesos will become a center of conservation excellence for all of Ukraine.

Figure 7. Andrew Holbrook conducts a training session on environmental monitoring with Preserve conservation staff.

Figure 8. Dmitry Davydov (standing) and Aleksandr Kuzmin (kneeling) assemble stele fragments in the Packard Laboratory.

Library and Archive Preservation and Conservation Training at NPTC

James Stroud
Associate Director for Conservation and Building Management
Harry Ransom Humanities Research Center at the University of Texas

In May, June, and July 2005, four conservators from the Harry Ransom Humanities Research Center at the University of Texas, along with three UT students, travelled to Sevastopol at the request of ICA. Our goal was to provide basic instruction in the preservation and conservation of books, manuscripts, and photographs at the National Preserve of Tauric Chersonesos (NPTC) Museum and Archives.

The four Ransom Center conservators included James Stroud (Associate Director for Conservation and Building Management), Olivia Primanis (Senior Conservator and head of Book Conservation), Stephanie Watkins (head of Paper Conservation), and Barbara Brown (head of Photography Conservation). Each conservator provided instruction during one of four two-week sessions.

Three UT students, Tish Brewer and Katherine Kelly, both graduate students at the University's Kilgarlin Center for the Preservation of the Cultural Record, and Emily Rainwater, undergraduate student in the Ancient History and Classical Civilizations program, were invited to serve as teaching assistants to the conservators and to pursue collection storage projects at NPTC.

Staff at the NPTC participating in the training programs included Olga Kondyuk from the Library, and Nonna Krasovskaya, Tatiana Dianova, and Svetlana Suhinina from the Archive. Lucy Grinenko, head of the Library, was able to attend some of the sessions when not engaged with other administrative duties.

Project Objectives

The primary focus of the Ransom Center training sessions at NPTC was to teach basic remedial and preventative conservation skills to the staff of the Chersonesos Library and Archive. Our goal was threefold:

- to provide skills applicable to the basic stabilization of damage typically found in such holdings
- to encourage preservation programs which would improve the way the collections are stored and used
- to encourage staff to continue practicing these new skills.

Figure 1. James Stroud demonstrates document preservation techniques to Preserve staff. (Photo: G. Mack)

Previous ICA Preservation Efforts at NPTC

The 2005 efforts at the Preserve built on two previous seasons of work by UT students. Holly Robertson, graduate student at the UT Kilgarlin Center, spent the summer of 2003 working with Preserve staff to promote general archival and preservation procedures. She introduced the staff to techniques of folder and storage container construction to be used with the paper, book, and glass plate negative collections. She prepared surveys of the Library and Archive collections, and of the environmental state of the Preserve building housing these collections.

During the summer 2004 season, Robin Howard, a UT graduate student in Archival Studies, worked on the organization of archival records, joined by Emily Rainwater.

In 2004 ICA commissioned a survey of the entire collections care programs at the Preserve conducted by a team from the Museum of London Specialist Services, under the direction of Robert Howell. This effort produced a thorough map of the environmental conditions of the Museum, Library, and Archive collections.

Preliminary Preparations

In late 2004, the Ransom Center conservators, in consultation with Olga Kondyuk the Preserve, developed syllabi for the upcoming training sessions. In light of these plans, the conservators were able to determine supplies needed for the summer and beyond. Preliminary planning, preservation supply purchases, and project scheduling were coordinated by Glenn Mack at ICA. These supplies, along with surplus material donated by the Ransom Center, were collected and sent surface freight in a shipping container. (Each participant would also fly with a trunk of supplies, a precaution that proved fortunate when the container failed to arrive in time.)

Figure 2. Working in the NPTC Archives under the guidance of UT's Barbara Brown, the Preserve staff works on the preservation of glass plate negatives. (Photo: B. Brown)

On-site Projects

Part of the team's summer schedule included addressing and attending meetings in Ukraine. James Stroud's first stop was in Kyiv, where, along with Glenn Mack, he met with staff and administrators at the Vernadski Library and the Ukraine National Center for Restoration. Together they assessed the conservation facilities and discussed conservation practices and training opportunities. This visit provided an opportunity to talk with Dr. Galina Novikova, Deputy Director at the National Center for Restoration, who was in charge of coordinating an international conference on conservation to be held in Kyiv later in May.

Stroud traveled on to Sevastopol, where he started instructional sessions with the Library and Archive staff. His sessions focused on basic paper repair techniques appropriate for books, documents, and, to some extent, photographs.

The group was able to provide instruction and training on basic approaches to a number of important fundamental procedures. Working with typical examples from the Chersonesos collections, the group practiced techniques for dry surface cleaning, flattening of creases and distortions, repair of tears, reinforcement of weakened and fragile areas, filling of holes and other missing areas, removal of old repairs and attachments, reduction of residual adhesives, and humidification and flattening of paper. Because of the complexity of some of the examples selected for the sessions, the group also engaged in washing and lining of paper and rebinding of pamphlets. Joined in late May by the two teaching assistants, Stroud and

three NPTC archivists further investigated paper conservation treatments, including techniques for disbinding, repair, and rehousing of bound newspaper clippings and treatment of oversize maps.

On June 10, Stroud participated in a second conference, "The New Scriptorium," hosted by the National Preserve and the Harry Ransom Center. The conference was organized by Olga Kondyuk and Lucy Grinenko. Thirty-seven librarians and archivists from throughout the Crimea attended. Stroud's presentation addressed the need for and possible mechanisms for the organization of local, regional, and national conservation and preservation organizations as well as developing institutional initiatives for greater public outreach and funding programs.

Book conservator Olivia Primanis arrived in late May and began working with Olga Kondyuk, as well as giving instruction to the general group. Then, working more closely with Kondyuk and teaching assistants Rainwater and Brewer, Primanis formed her "binding group." Each participant in this group undertook a complex binding repair project that could be completed during the training sessions. This approach exposed Kondyuk and the others to a variety of conservation treatment procedures and book binding techniques. The group engaged in discussions about appropriate treatments for each book and completed written and photographic documentation. The group also investigated conservation treatment and preservation housing materials and equipment, as well as library furniture, that could be manufactured or sold in the Ukraine. They worked with a local metal fabricator to design and fabricate bookends, a need not previously addressed.

During this time, under the direction of Primanis and Krasovskya, the two teaching assistants undertook, with the Archive staff, the design and implementation of a rehousing project for over 1000 photographic prints.

Of her experience in Sevastopol, Primanis said, "I became aware of the profound effect that ICA's support has had on the staff and programs of this extraordinary archeological site, museum, library, and archive. ICA has bolstered the efforts of a devoted staff in the care of their collections with educational opportunities, proper collection housing programs, construction of new facilities, and improving researchers' access to the Preserve's scholarly resources through the Megarika project."

Paper conservator Stephanie Watkins arrived in Sevastopol in mid-June. Her training sessions reinforced and developed concepts and procedures taught earlier in the summer. Watkins had developed a training manual of materials and procedures to provide ongoing reference for the NPTC staff. A copy of the manual on compact disc was given to Kondyuk for eventual translation into Russian to share with colleagues throughout the country.

During Watkins's sessions, the participants learned about damp blotter packs to remove labels, mechanical hot air techniques to remove pressure-sensitive tape, and color matching of book cloth for repair. When not teaching, Watkins worked with Kondyuk to consider broader conservation issues and completed several unfinished oversize projects that remained from Stroud's sessions. Watkins and Stroud prepared a presentation to William Green Miller, former United States ambassador to Ukraine, and Joe Carter, Director of the ICA, during their visit to the National Preserve in late June.

On July 1, the last Ransom Center conservator, Barbara Brown, arrived to begin her two-week training session on the basics of photograph conservation and preservation. Olga Shmidt, a paper

Figure 3. In Kyiv, NPTC members participate in a conference on conservation practices. (Photo: G. Mack)

conservator at the Ukraine National Center for Restoration in Kiev, also arrived in Sevastopol to participate in Brown's sessions.

Brown discussed techniques used in the creation of photographic prints and negatives and discussed these methods in the context of basic process identification for 19th and early 20th century photographic prints and negatives in relation to the types of damage and deterioration that can occur. She examined photographic prints selected from the collections by the archivists and reviewed process identification and the condition and housing of the photographs.

The archivists were particularly concerned with problems of broken glass plate negatives, and Brown demonstrated techniques for housing and stabilizing these broken plates. She taught the staff to make four-flap archival paper enclosures to store the stabilized, re-housed plates. She and Shmidt also demonstrated a wide variety of techniques for mends, fills, consolidation of emulsion, and visual compensation for areas of loss.

During the second week, sheets of new glass cut to a size larger than the glass plate negatives were purchased in Sevastopol for the glass plate housing project, and Brown continued to work with project participants to house more of the broken negatives. This project was completed by the end of the week. Brown provided Shmidt and Kondyuk with lists of supplies and suppliers, a bibliography of references relating to photograph conservation and preservation, and also examples of photograph conservation condition and treatment report forms. She provided them with contact names for information on a workshop on surveying photograph collections, to be held in St. Petersburg, Russia later that fall. Brown also presented copies of reference publications issued by the Image Permanence Institute, for the growing collection of preservation resources at the Preserve.

Conclusion

The Harry Ransom Center believes the summer 2005 training sessions in Sevastopol were of great value to the staff and programs of the Ransom Center, ICA, and the NPTC. These three institutions have achieved the fundamental goal of this project. This might best be summed up as introducing Preserve staff to basic conservation treatment and advanced housing techniques useful for the stabilization of damaged paper, book, and photograph collections to such a point that damaged works can be safely handled by researchers at the Preserve. Staff of the Preserve were enthusiastic about the program, were engaged in it fully, and learned procedures and techniques directly applicable to their work to protect and preserve the rich holdings of the Preserve. Staff of the Ransom Center became intimately engaged in the workings of the Preserve's Library and Archive. There is now an established, sustainable pattern for the long-term exchange of information and communication to support the documentary and cultural record of Tauric Chersonesos and its preservation. In addition, a much larger network was conceived as a result of this experience. It has the potential to join the strengths of the University of Texas preservation program with those fostered through the Ukrainian Ministry of Culture and the Ukrainian National Center for Restoration.

With new support from the Trust for Mutual Understanding, Olga Kondyuk will come to the University of Texas for two months in 2006 to serve an internship in the conservation facilities of the Harry Ransom Center. James Stroud and Barbara Brown will return to the National Preserve in June 2006 to continue training sessions for the Library and Archive staff. This also will provide an excellent opportunity for Stroud and Dr. Galina Novikova, Deputy Director of the National Center for Restoration, to continue their discussions regarding greater opportunities for the formation of regional centers and library and archives conservation training programs within Ukraine.

The Megarika Project in 2005

Lyudmila Grinenko
Head Librarian, NPTC

The Megarika project began in response to the need to create a series of museum databases which would duplicate and thus preserve paper records. The concept has developed into an integrated system, changing and advancing many aspects of the National Preserve.

In 2005, collaboration with the Harry Ransom Humanities Research Center (HRC) of the University of Texas at Austin allowed us to expand our digital preservation project to include a new initiative aimed at physically conserving and restoring books and archive documents. "Total Preservation of Cultural Heritage Records" has become our new motto.

Digitizing the Archive and Library

The first stage of document digitization was completed this year, involving the conversion into electronic form of all the archaeological reports of excavations in Chersonesos and its environs from 1973–1993. The array of digitized documents already consists of 1,243 archive files and includes the text of reports, photo albums, drawings, field journals, and lists of finds.

The text of each report has been converted into Microsoft Word. The hypertext markup of these documents, now under construction, will make it possible to access illustrations, drawings, or lists of coins and small finds immediately from the text. A database has been developed in which all these digitized documents can be searched using several parameters; additionally, future reports in digital form can be added to this database (nicknamed "Bouleuterion").

Most of our attention this year was given to the preservation of documents from the Fondi, the Preserve's collections storage department. Books containing records of the finds recovered during the last 70 years are in poor condition because of the quality of the paper and constant use by museum employees and outside scholars.

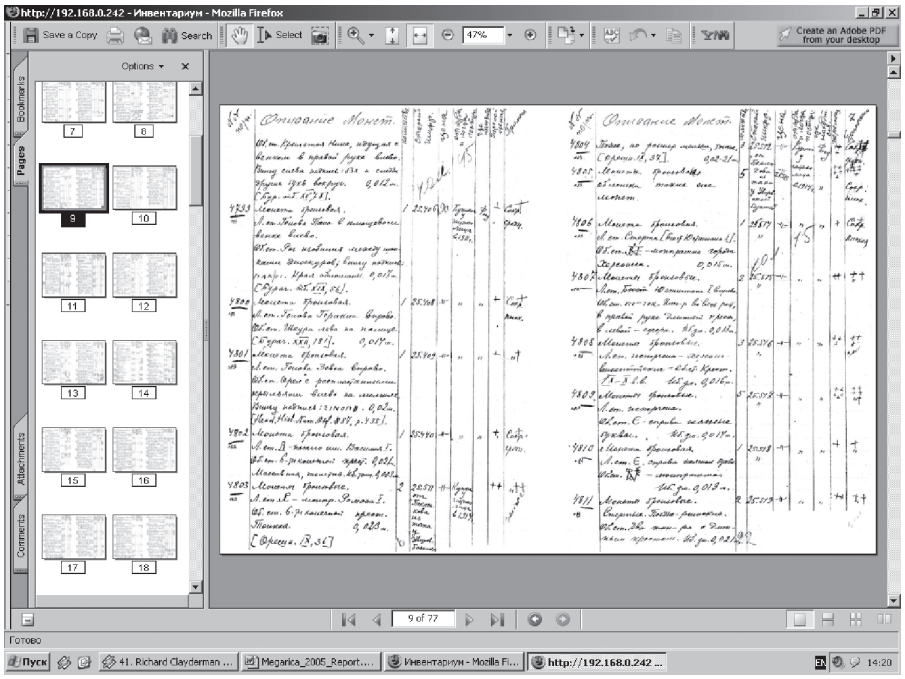

Figure 1. An example of a Museum Registry book, scanned and placed in a web browser, allowing researchers use of the documents without threat of damage to the originals.

Book restorer Olga Kondyuk evaluated all of these documents. After discussion with the Fondi staff and the Preserve Administration, the decision was made to take the original books out of use. Digital copies of these inventory registers and printouts made from them will be substituted for the purposes of research. So far, we have scanned fifty-three Museum Registry books that contain lists of numismatic finds and artifacts of ceramics, glass, bone, and metal (Fig. 1).

Our digital preservation efforts continued with other archival material, as well. In 2005, we carried on our program, begun in 2003, of scanning the Preserve's large collection of 19th and early 20th century glass-plate negatives (Fig. 2). 3,368 negative images have already been scanned. Of these 1,496 were in a poor state of preservation. Through digital restoration techniques, it is now possible to view these negative images in close to their original state, without further endangering the fragile originals (Fig. 3). The plates were scanned at 600 dpi and saved in TIFF format, while copies in JPEG format were made for convenient viewing on the Preserve's computer network. These scans satisfy both archival and research needs.

Figure 2. NPTC Head Archivist Nonna Krasovskaya scans from the Preserve's collection of glass plate negatives.

The comprehensive approach of our project is well-illustrated by our work with the materials from the Library. In the last year, the digitization of the Library's rare and highly used books took precedence over the digitization of archaeological reports. We needed to develop an electronic collection of the journal *Izvestiya Tavricheskoy uchyonoy arkhivnoy komissii* ("Proceedings of Tauric Scholarly Archive Commission," usually abbreviated as ITUAK) in order to go forward with preventive conservation of the original volumes. We are also trying to digitize books that have already been restored and put in boxes for safe-keeping. A total of thirty books, or approximately ten thousand pages, were scanned in 2005.

One successful project in 2005—the digitization of the archives of the Museum's founder, K. K. Kostsyushko-Valyuzhinich—illustrates the intersection between digital archives and manuscript conversion. Professional photographer Aleksey Los digitized all the manuscripts, drawings, scholarly correspondence, squeezes, and other materials from that precious trove (fifty-two archive files and large-format materials).

Figure 3. A damaged glass plate negative, scanned and rendered as positive. Left: the plate in its original condition; right: the image after physical and digital restorative measures were applied.

Now all these documents are saved at high resolution on twenty-four DVD master disks, with low-resolution copies available on our local computer network. This important body of material will also be the basis for a pilot project to disseminate K. K. Kostsyushko-Valyuzhinich's archive over the web (Fig. 4).

Book, Paper, and Photographic Conservation

The physical preservation of books, documents, and negative images—while simultaneously making digital copies—was one of our most satisfying achievements in 2005. This has both assured the preservation of this material and made it available to a wider audience. We are grateful to our colleagues from the Institute of Classical Archaeology and its sponsor, the Packard Humanities Institute, for making this possible, and to the Harry Ransom Humanities Research Center (HRC) in Austin for lending the extensive professional expertise of its staff.

A grant from the Trust for Mutual Understanding (TMU) in New York made it possible for top experts to come from the US to Chersonesos in the summer to participate in a workshop on conservation of paper, books, and photographic material, organized by Glenn Mack of ICA and James Stroud, Deputy Director of HRC. The HRC team included Olivia Primanis (book conservator), Stephanie Watkins (paper conservator), Barbara Brown (photographic conservator), and graduate students Emily Rainwater and Tish Brewer. (See report by James Stroud, p. 43.)

Figure 4. Photographer Aleksey Los photographs material from the collection of K. K. Kostsyushko-Valyuzhinich, the Museum's founder.

In 2005, our new laboratory for book and document conservation was equipped with support provided by ICA's non-profit affiliate "Pidtrymka Chersonesu." A book press and a bookbinding machine were ordered from the Institute of Printing Industry in Lviv, while other devices and materials were imported from the U. S. On the personnel side, Olga Kondyuk, our book and document restorer, received advanced training in 2005 at the V. I. Vernadsky Library of the National Academy of Sciences of Ukraine in Kyiv, and will continue her training in 2006 at the HRC in Austin.

Database Development

In March 2005 a new programmer, Andrey Zhelnin, joined us. An alumnus of the Department of Computer Systems and Networks of Sevastopol Technology University, he brings to the project a command of modern computing technologies. We can thus progress from the simple registration and searching of materials already scanned to a high level of data management using new software products. We now use a MS-SQL Server to store data and apply MS.NET technology in the applications we develop. An essential aspect of our project is that the programmer is working in constant contact with the eventual users.

Andrey has now created applications to allow conservators of books and archaeological materials to document not only the results but also the process of restoration. These programs allow the manipulation of images and text and make it easy to print records and search results. Another program has been developed to manage the archaeological collections held by the Fondi Department. This program also addresses issues of consistent classification of objects. In the past, different departments had various systems of recording and storing information, making it difficult to connect an object with the records of its discovery and conservation. In 2004 and 2005, we worked together with the scientific staff of the Preserve—in the Archives, the Fondi, the Conservation department, and the Exhibition department—to develop a system of classification that would combine data about every object and archaeological structure with all related documents in a single system. Now the classification of artifacts uses the same terms and the same topographical references as the classification of drawings and photographs.

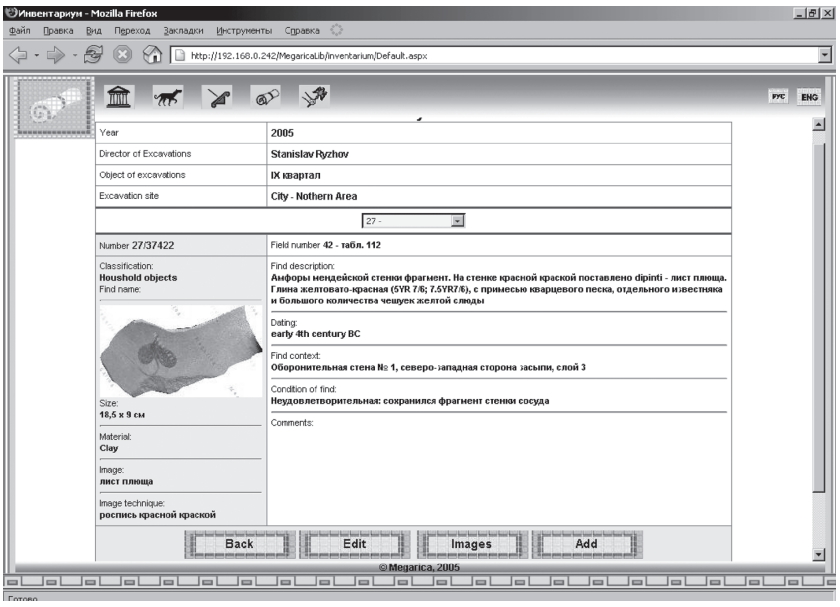

Figure 5. A new database, when complete, will allow searches of artifacts in the Fondi Department and establish a standard system of classification.

This, we hope, will be the foundation of a uniform database for the whole Preserve. At the moment the conservation and Fondi programs are in the final stage of development. As we move forward, we plan to use the single classification system as the basis for subsequent software development, eventually uniting all aspects of documentation, storage, display, conservation, and preservation (Fig. 5).

3-D Graphic Architectural Reconstruction

In autumn of 2005, we began a promising new project to develop three-dimensional computer-based reconstructions of archaeological structures. Andrey Kondyuk, graphic designer for the Megarika project, will apply his considerable experience in creating three-dimensional computer models to the archaeological record (Fig. 6). The first case study is the site excavated in 2003, Block XXXVI, in the central area of the ancient city (now under the north end of the Packard Laboratory).

Working with the excavation supervisors J. Carter and S. G. Ryzhov, Andrey aims to reveal the buildings that existed in this area during different major periods of the city's history: Hellenistic, Roman, and Medieval. He will then turn his talents to the proposed Archaeological Park of the Ancient Chora.

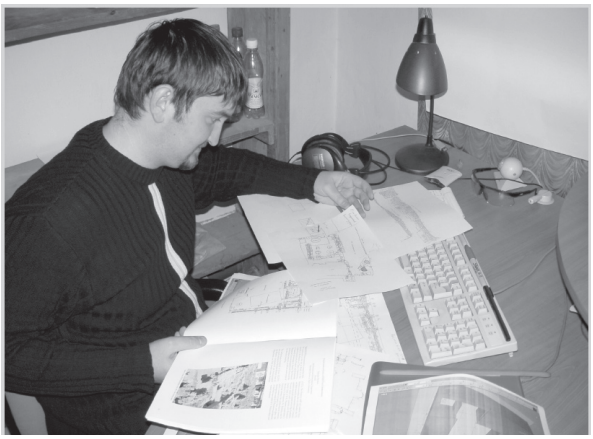

Figure 6. Andrey Kondyuk converts site maps of the Chersonesos city Block 36 into digital models.

Just as Andrey's work will allow us to view and share a third dimension of the archaeological record, reminding us that ancient life was not flat, 2005 has made great strides in a dimension of archaeology and research most people take for granted. The preservation and dissemination of archaeological documentation and the creation of systems to make it easier to ask questions are every bit as important as fieldwork and monuments. In 2006, we hope our contributions in this regard will become even more visible at Chersonesos and beyond.

Pidtrymka Chersonesu ('Support for Chersonesos') in 2005

Taissa Bushnell
Director, Pidtrymka Chersonesu

Pidtrymka Chersonesu (PC) has become an indispensable asset both to ICA and to the National Preserve of Tauric Chersonesos in helping to coordinate and run complex long-term projects aimed at making Chersonesos a world-class heritage site. Thanks to the tireless efforts of Lex-Service, a Sevastopol-based legal and auditing firm which supervises PC's daily activities, 2005 saw the successful completion of one of ICA's major undertakings at the Preserve, the construction of a multi-story storage facility and finds laboratory, known as the Packard Laboratory. On behalf of ICA, *Pidtrymka Chersonesu* took the lead in organizing weekly meetings at the construction site which brought together the general contractor, subcontractors, and Preserve representatives to discuss the tasks and challenges at hand. This was not an easy assignment, yet Ekaterina Kruchinina, Lex Service's legal department head, ably conducted the weekly gatherings and made sure progress was being made, at the same time often having to smooth tempers and reconcile strained relations, inevitable by-products of building a major structure on an archaeological preserve of international significance with foreign financing.

It is with confidence, then, that ICA entrusts PC with the supervision, both organizational and financial, of a host of its collaborative endeavors with the Preserve. In 2005, apart from the construction project which absorbed most of our time and effort, PC continued to oversee such activities at the Preserve as the purchase of computer equip-

Figure 1. (Above) The 19th century monastery bathhouse on the site of the future Packard Laboratory. (Below) The completed Packard Laboratory, September 2005.

ment and supplies, the transition of internet providers, and the financial support of the Megarika project and of site conservation in the chora. It also assisted the Preserve administration on occasion with such practical matters as tax and legal advice.

As 2005 saw the conclusion of one large-scale PC project, so it witnessed the beginning of several new ones. For example, at the end of 2005 the creation of the management plan started in earnest. This document will ensure the proper management and continued development of the Preserve as the Ukrainian government prepares the site for eventual nomination to UNESCO's World Heritage List. Also, in 2006 PC will expand its activities to include outreach to the Ukrainian-American community, whose various organizations work both in the US and abroad to support Ukraine on its path to becoming a prosperous and truly democratic country. Efforts will aim at promoting Chersonesos to the general Ukrainian-American public and especially to their scientific and heritage management organizations; we will explore the possibility of creating partnerships with them for the benefit of Chersonesos.

The Packard Laboratory

October 2005 marked the completion of the Preserve's first modern building, which will be used as a collections storage facility, finds laboratory, and data processing center during the field season (Fig. 1). Built entirely with funds provided in a generous grant from the Packard Humanities Institute, this facility will be equipped with the necessary infrastructure for the proper storage of archaeological artifacts (security alarms, environmental monitoring devices, substantial shelving), large spaces, heating and air conditioning units for the comfortable year-round study of finds, and computer equipment for eight work stations on the gallery floor (Fig. 2). The numerous members of the ICA/Preserve scientific team will finally have a unified space in which to work during the excavation season and areas large and secure enough for the temporary storage of finds during analysis. An open-storage display of Hellenistic painted stelai (Fig. 3), which have been conserved and rejoined as part of a joint ICA/Preserve project, will create an attractive ground floor area. This will be an ideal room for conferences; in fact, a meeting to discuss the management plan for Chersonesos (see below), planned for June 2006 and involving

Figure 2. Interior of the Packard Laboratory as work stations are being installed around the upper level.

Figure 3. Initial preparations for stelai display in the Laboratory.

all stakeholders of Chersonesos—including the Ministry of Culture and Tourism of Ukraine, the Ukrainian National Commission of UNESCO, the Sevastopol city authorities, and others—will make excellent use of the new space.

Visitors to the Preserve will notice that the design of the building takes into account its unique location. First, the exterior appearance needed to blend into the general look of the rest of the Preserve structures, which are remnants of a 19th century monastery. From the colors of the roof and facade to the shape of the windows and even the bars on the windows, all details had to comply with the standards set by the Preserve administration. Second, windows were introduced on the first basement level to provide views onto the archaeological structures which were excavated during the course of construction (Fig. 4). Finally, stone tracery marks the line of medieval walls, excavated and reburied in the course of construction, to provide visual continuity with the rest of the structures, which include a 4th c BC city street and 10th–13th c rooms (Fig. 5).

On a personal note, this project was quite a learning experience for everyone involved: for the general contractor for whom this was the first major construction on an archaeological preserve, with all the restrictions that entails; for the Preserve which had to ensure that the archaeological resource on and near the site was protected, and that all approvals were secured from the Ministry of Culture; and finally, for ICA in Austin and PC in Sevastopol. Taking on a large-scale construction project in a foreign country was challenging enough, but building in Sevastopol had its own peculiarities. We had to learn about local building practices and requirements and tackle bureaucratic problems. One example was the delay in the final stage of handing over the building to the Preserve, which happened to coincide with a change in the city building authority: the review board responsible for this stage was transferred from the city administration to the town administration; the former had ceased to perform this function while the latter was not yet set up to take it over. We learned to take these obstacles in stride.

Figure 4. Windows looking onto the archaeological structures under the building.

Figure 5. Stone tracery marking medieval walls reburied after excavation.

Management Plan

The current internationally accepted method by which archaeological sites are conserved and presented to the public is called value-based management. Through this method the values ascribed to a site by all participants in that site are protected. These values may be cultural, scientific, economic, recreational, religious, historical, and political. Inevitably, conflicts arise between values. For example, large numbers of visitors who want to explore an archaeological site may damage the site merely by walking on fragile paths or archaeological structures. In this case, the recreational values that the visitors derive from the site do not correspond with the site's historical or scientific values. The uncontrolled use of the site by visitors has a negative impact on the physical fabric of the site (Fig. 6). It is, therefore, the responsibility of site managers to try to balance the values of all participants in the life of an archaeological site without compromising the site's integrity. This kind of consideration for the use of an archaeological site is an example of why a policy governing visitor management and site conservation must be deliberately discussed and formulated into a plan. A management plan for an archaeological site, then, consists of a number of topics, such as protection and planning mechanisms, monitoring and maintenance, research, and visitor management and conservation to ensure that the site has the proper framework for continued use and preservation.

Figure 6. Students climbing on fragile archaeological monuments dramatize the challenge of visitor management at Chersonesos and the need to find a balance between public access and site preservation.

A site's inscription on UNESCO's World Heritage List often coincides with increased visitation rates. Chersonesos is on Ukraine's Tentative List of sites which will eventually be nominated to UNESCO. The annual visitor numbers at Chersonesos have already more than doubled since 2000, and if the site does, in fact, become a World Heritage site, visitor numbers will increase even more. The effects of mass tourism must be acknowledged and planned for if the integrity of Chersonesos is to be protected. This is one of the main reasons why UNESCO requires a site to have a management plan.

The general director of the Preserve, Leonid Marchenko, has formally invited Henry Cleere, former World Heritage Coordinator at ICOMOS, the advisory body for UNESCO, in issues of cultural heritage, to act as consultant in the creation of a management plan for Chersonesos. With this task ahead, Dr. Cleere and the author met with government officials, private conservation firms, and non-governmental organizations in Kyiv and Sevastopol in February 2006 to begin a dialogue about the future of Chersonesos and its nomination to the World Heritage List. A draft management plan will be written and distributed to these participants in the nomination process for their review and comment. A second draft will be written in time for a 2006 meeting to be held at Chersonesos for all stakeholders to discuss the plan and the future nomination. A final version should be ready for distribution and approval by the Ministry of Culture and Ukraine's National Commission for UNESCO at the Ministry of Foreign Affairs in the near future.

The meetings in February were highly fruitful for both Dr. Cleere and the author, and the various Ukrainian organizations involved in heritage management. Further cooperation will give us a chance to delve more deeply into heritage issues in Ukraine, while the process of creating a management plan will train the various Ukrainian organizations in producing similar plans for other heritage sites in Ukraine.

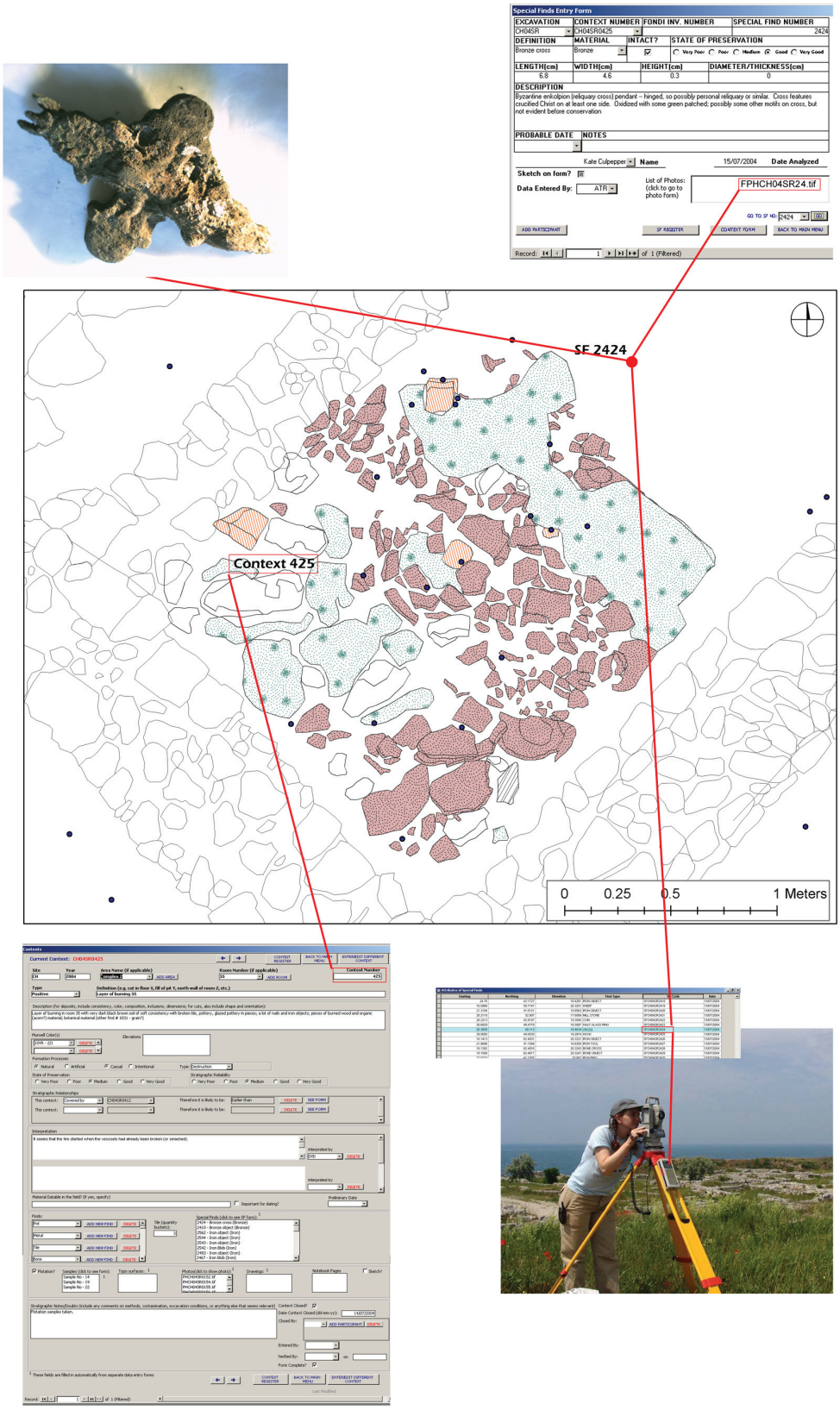

Plate 3. Digital plan of context 425 together with its database record (bottom left). Also shown is find no. SF2424 from that context (top left), database record (top right), and total station data (bottom right). (See Trelogan and Eve, p. 35)

Plate 4, Figure A. Sheep graze beside an abandoned structure in the Cappaianca locality overlooking the Basento valley. The town of Pisticci is visible in the background. (See following article.)

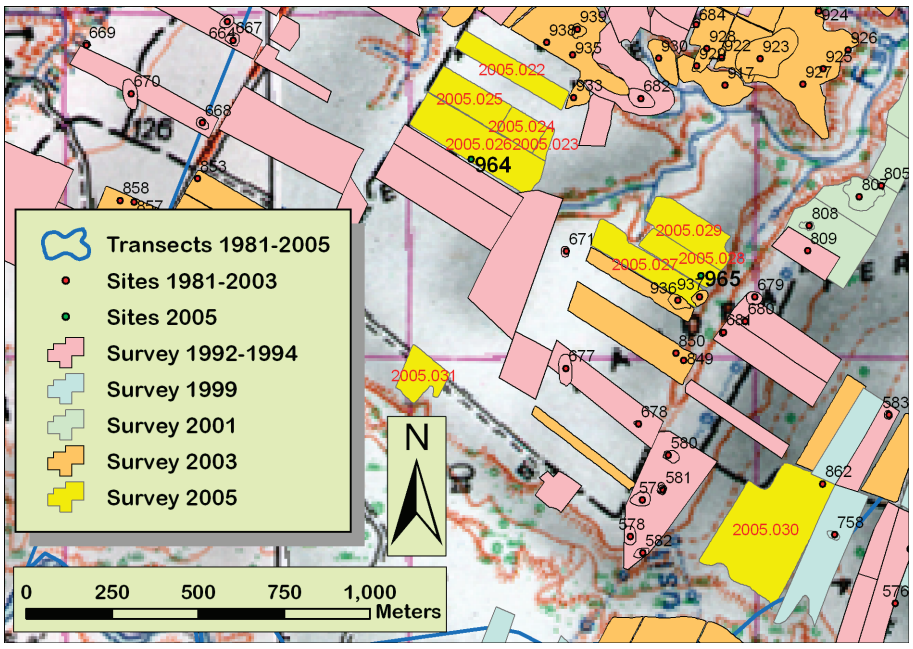

Figure B. ICA survey activity in the Feroleto locality.

Field Survey in Southern Italy: Metaponto and Crotone

Alberto Prieto
ICA Research Staff

In the late summer and early fall of 2005 ICA, continuing its long-standing collaboration with the *Soprintendenza per i Beni Archeologici per la Basilicata*, held a 13th season of intensive field survey at Metaponto (1981–2003). At the same time ICA resumed its research program in the chora of Croton. (For detailed summary accounts of ICA's projects at Crotone, see the ICA report *The Chora of Croton 1983–1989*.)

As in the 2003 campaign at Metaponto (see Prieto, *Annual Report* 2003), the leadership duties were divided between Cesare D'Annibale (director of the first phase of survey at both Metaponto and Crotone), and Alberto Prieto, co-editor—with J.C. Carter—of the forthcoming first volume of results from the Metaponto survey.

Metaponto

As in 2003, at Metaponto the survey team continued to fill in the gaps in the coverage of the ca. 8 x 4 km transect covering the broad, gently sloping marine terraces between the Basento and Cavone Rivers, an area that has been under investigation since 1992 (Fig. 1). This area has proven challenging because of a greater degree of development compared to the original Bradano–Basento transect: many fields south of the Basento have been extensively leveled or excavated, others are left uncultivated for large parts of every year, and there is a heavy density of settlement in and around the modern town of Marconia, which itself occupies a full quarter of the transect. Combined, these factors have damaged, destroyed, or concealed the archaeological record across the transect and

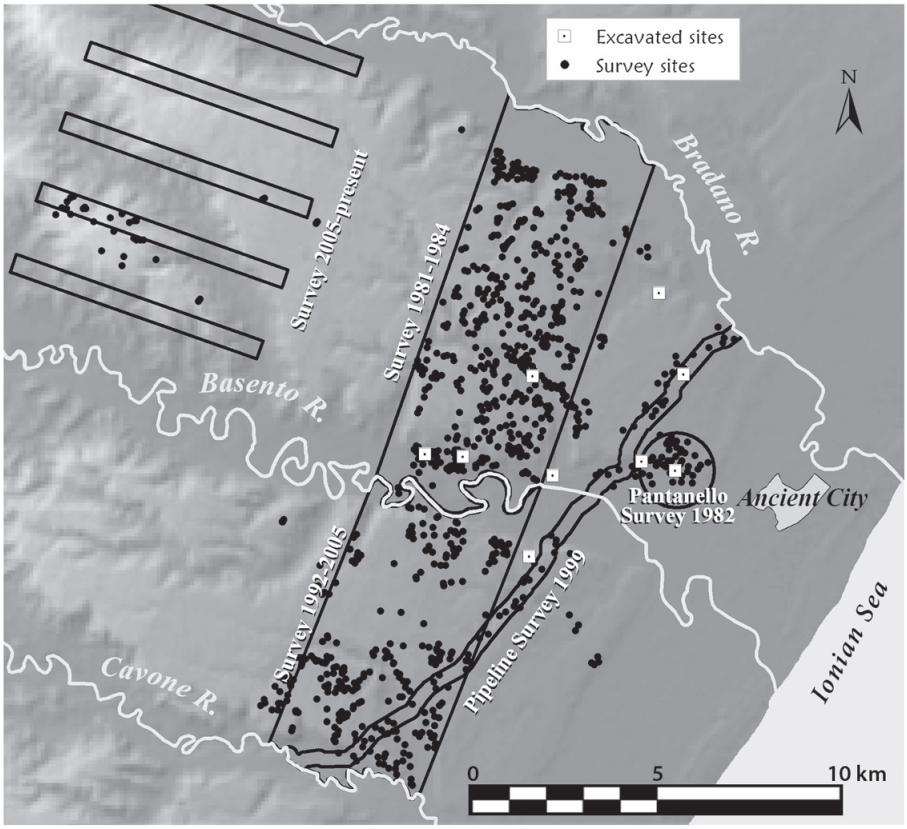

Figure 1. ICA survey activity in the Metapontino, 1981–2005.

have slowed the progress of the survey by forcing the team to spend a greater proportion of its time hunting for accessible fields.

This year the team managed to cover 10 important fields in the Feroleto locality that have eluded study since 1992 (Plate 4B, p. 56). These plots, totaling approximately 0.27 km^2 of surface area, are planted in wheat every year. Their owners are wealthy proprietors of the large fruit farms that occupy most of Feroleto and the Cavone valley; they clearly do not depend on the produce of these small fields for revenue, since they usually leave the stubble standing in the field after the harvest until the end of the fall, rather than plowing it under in the early summer to make way for a summer crop. This year, contrary to habit, they plowed the stubble under early, and the ICA team was able to discover two new sites (a Greek farmhouse and tomb) and revisit two Greek farmhouses partially obscured by wheat stubble in the past (Fig. 2).

Now that research on the low terraces in the hinterland immediately behind the ancient city is winding down, the team has opened a new research front in the rugged highlands between the Bradano and Basento, ca. 15–20 km northwest of the ancient city (Fig. 1). This is a very different environment from the lower terraces (Fig. 3). The landscape here consists of tall, narrow ridges and deep, narrow valleys with knobby, often steep slopes perched precariously above "knuckles" of exposed clay banks, the tell-tale signs of the massive erosion that has plagued the region for millennia (a subject treated in J. T. Abbott's contribution to the forthcoming first volume of survey results). The irregularity of the terrain makes agriculture difficult, so that pastoralism is the primary activity of highland residents; flocks of sheep and goats roam the fields constantly. Along the river valleys, where the elevation is generally lower and surfaces are less steep, agriculture once again becomes the dominant form of land use (see Plate 4A, p. 56).

Figure 2. The survey team revisits a Greek farmhouse—Site 937, discovered in 2003—now more visible due to recent plowing.

The goal of the new survey project is to attempt to define the hypothetical contact (or buffer) zone that separated the Greek chora from the territory held by the indigenous Italic population, an idea developed by D'Annibale at the beginning of the Metaponto survey project and tested in 1981–1982 with the survey of a small highland locality which contained eight ancient sites of unclear type and cultural affiliation. The contact zone is believed to lie somewhere between the modern town of Bernalda and the 4th–3rd century BC fortified indigenous settlement at Pomarico Vecchio. The new study area is defined by a 10 x 7 km rectangle with its southwest corner immediately below Pomarico Vecchio, its southeast corner in the Gaudella locality that lies just above Bernalda, its northeast corner in the Bradano valley (San Vito locality), and its northwest corner in the Il Perito locality overlooking the Bradano.

Because the study area is so large, it cannot be examined as a single transect comprising a block of contiguous terrain, as were the lower terraces. D'Annibale has accordingly devised a sampling strategy that accounts for both the size and the topography of the landscape (Fig. 4): five long, thin transects measuring 7 x 0.5 km cover the study area at regular intervals of 1.5 km from Bradano to Basento, and they are oriented to follow the general course of the rivers (and, in turn, of the landscape generally). This system provides a maximum sample of approximately 18 km^2 over the entire length and breadth of the study area, so that the contact zone (if it exists here) can be traced from one river to the other. It also facilitates the team's movement over the terrain by following the prevailing orientation of the landscape (i.e., the orientation of the ridges and valleys) created by the regional subsurface geological structures (the subject of Prof. Robert L. Folk's contribution to the forthcoming volume on the survey), so that less time is needed to travel from field to field.

Figure 3. A field on the Lama di Palio ridge, with the Tempe Rosse ridge in the background beyond the La Canala valley.

In the 10 days the team spent in the new study area, 21 plots totaling 0.65 km^2 were covered in the three central transects (Fig. 4), and 24 new sites were documented, bringing ICA's grand total for the Metapontino to 965. Many of the new sites have multiple occupation phases, including 11 prehistoric activity areas, 10 Greek farmhouses, five Greek tombs/necropoleis, six Greek agrarian structures of unknown function, two Roman farmhouses, three small stone agro-pastoral structures of recent date, and one small brick kiln of recent date.

These preliminary results are surprising in two ways. The prehistoric presence is much more pronounced than might have been thought, as the highlands are cooler and less accessible than the coastal zone, and, arguably, less attractive to prehistoric humans. One of the sites encountered was unusually large (more than 100 x 100 m) and contained blades made from obsidian (Fig. 5), a volcanic glass imported from the Lipari islands off the north coast of Sicily and a relative rarity among the artifacts found in this area. The Greek presence is also stronger than expected (Fig. 6), and a clearly indigenous presence is yet to be encountered. This raises the question: did Metapontine control extend right up to major indigenous settlements, or did indigenous residents simply build and live in a manner that is difficult to distinguish archaeologically from the Greek manner? The comparatively sparse Roman presence in this

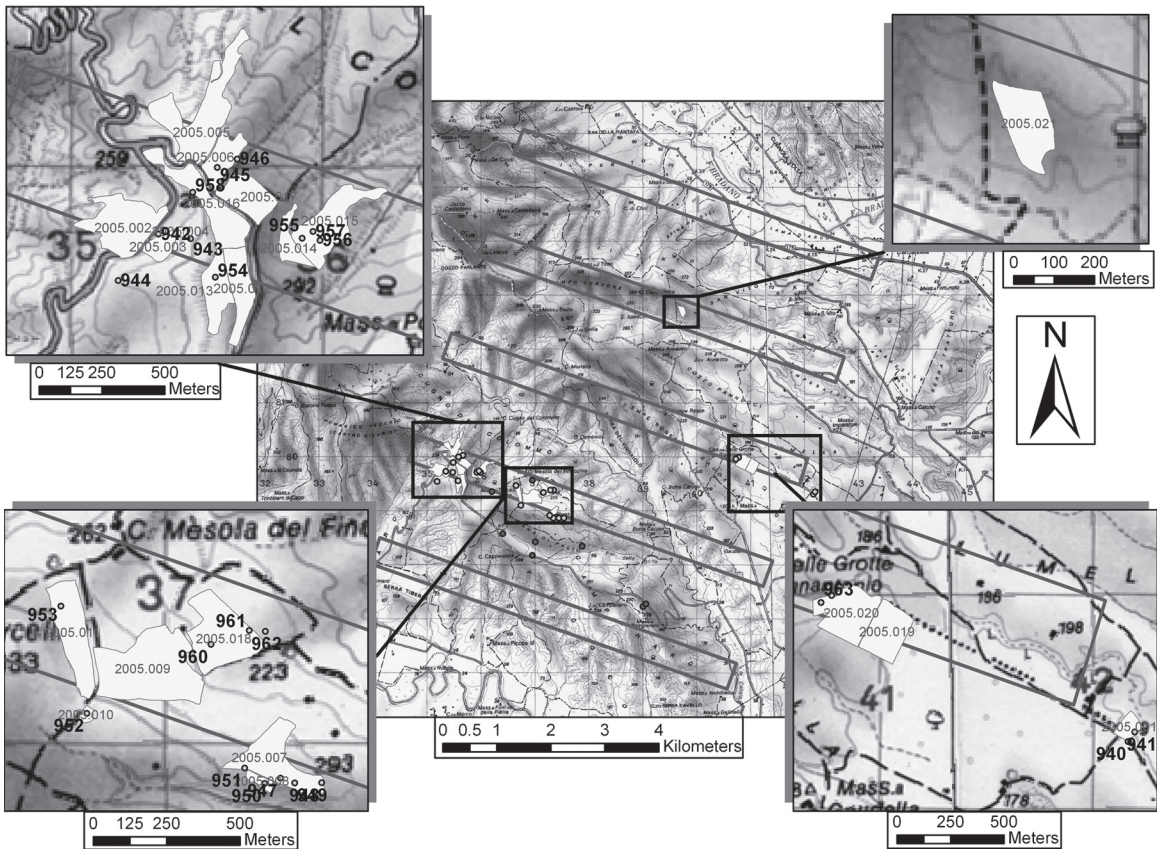

Figure 4. The new survey transects between Bradano and Basento and the 2005 coverage.

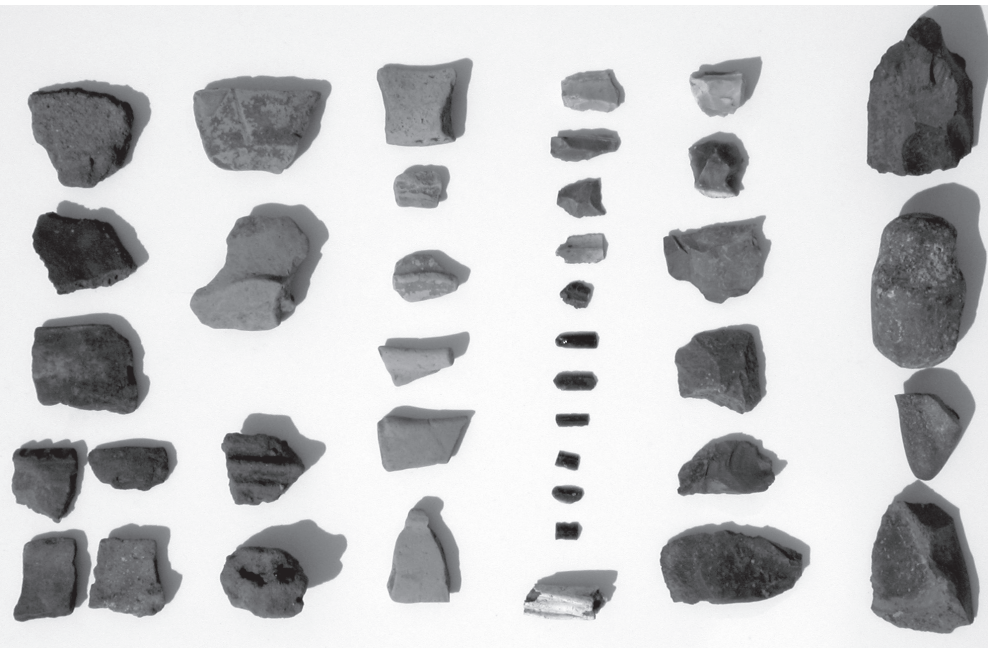

Figure 5. Prehistoric artifacts—pottery (left) and lithics (right)—from Site 960 in Lama di Palio. The six obsidian blades recovered lie above the animal bone in the third column from right.

Figure 6. Artifacts from Site 950, an Archaic Greek farmhouse in the Lama di Palio locality, including a complete stone grinding set consisting of a large, flat base (held between the thighs) and a small, flat hand-held grinder.

area is consonant with what is known about the Roman presence elsewhere in the interior of Basilicata, namely a consistent pattern of settlement either in a very few nucleations (towns, villages) or in very isolated individual rural structures (villas, farmhouses). The next several seasons will reveal whether these observations are historic realities or rather a product of limited sampling.

Crotone

The Crotone survey was originally conceived in 1983 as a source of comparative data for the Metaponto survey. Was the remarkably high density of settlement of the Metapontino in the colonial period (ca. 22 sites per km^2, higher than any figure recorded in mainland Greece) peculiar to Metapontine history, or was it part of a larger

historical phenomenon involving Magna Graecia as a whole? The much greater size of Croton's chora—perhaps as much as 40 x 20 km, stretching from the Neto River north of Croton to the southern promontories known as Capo Rizzuto and Le Castella, and extending west from the sea to the Tacina River—meant that the survey could not cover the landscape as exhaustively as had the survey of the marine terraces behind Metaponto. The study area for the survey was therefore limited to the southern half of the ancient chora, the part that began 5 km south of Croton and directly west of the famed Temple of Hera on Cape Lakinion, encompassing approximately 220 km^2. A sampling strategy was employed according to which the study area was gridded into 1 x 1 km squares, 28 of which were selected randomly for complete coverage. In the first four field campaigns (1983–1986) half of these squares were examined completely, and the rest were only partially traversed. At the same time the survey design was modified to include complete coverage of areas with special significance for the history of the chora, chief among which was the Sanctuary of Hera on Cape Lakinion and the land immediately adjacent to it. In all, a total of 32 km^2 (13%) of the study area was examined (Fig. 7).

The second phase of survey at Crotone, initiated in 2005 with the fifth campaign, was designed by D'Annibale to advance the objectives of the first phase. Three long, thin transects (two oriented east–west, the third north–south) were created using the original sampling grid of the territory, each measuring 1 km in width and up to 16 km in length (Fig. 7). Each transect incorporates at

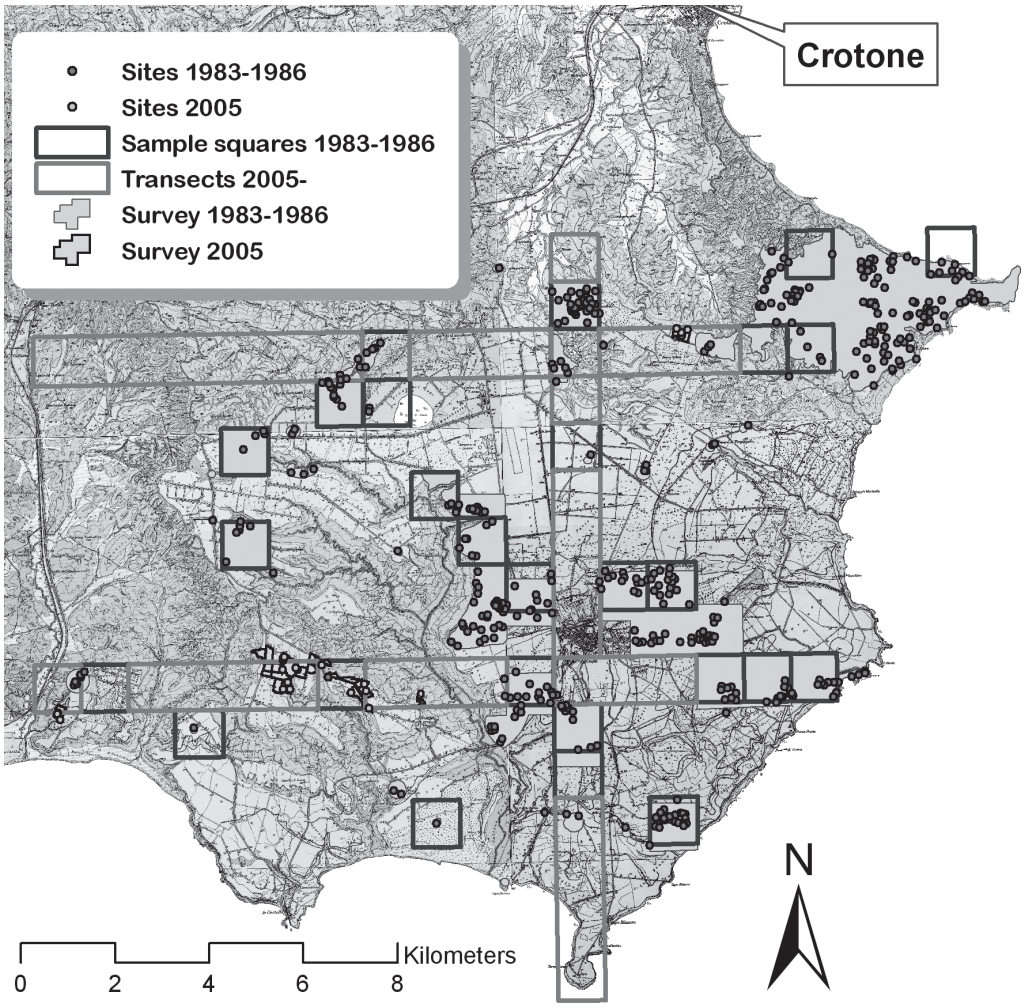

Figure 7. ICA survey activity in the territory of Croton, 1983–2005.

least three of the original 28 sample squares, so that an additional seven squares will be added to the 14 covered in the first phase. The new design also provides an important additional dimension to the research. Of the 32 km^2 covered between 1983 and 1986, approximately 26 km^2 (80%) is marine terrace, a geomorphological unit that represents only 53% of the study area, leaving the other geomorphological units strongly under-represented. Continuous coverage of broad swathes of the territory from the interior to the sea, in both cardinal orientations, will guarantee a more complete sample of settlements on all of the most important topographic and geomorphological formations, from the high table-lands and shallow stream valleys of the interior (Fig. 8) to the sloping coastal plains (Fig. 9). The goal of the second phase is complete coverage (or maximum possible coverage) of the vertical transect and at least one of the horizontal transects.

In nine days the survey team covered 29 plots in the two east–west transects, for a total of 0.93 km^2, and discovered 21 new sites, bringing the total of the five seasons to 478. In the more southern of the two, one plot (0.04 km^2) was examined in the Carcarella–Torrazzo locality, near the southwest corner of the ancient chora; the three sites documented there include two prehistoric activity areas, one Greek farmhouse, and one Greek agrarian structure of unknown function. In the Ritani locality, ca. 5 km north of the 16th c Spanish castle at Le Castella and also in the lower horizontal transect, 25 plots were walked, adding 0.80 km^2 of coverage, and the 14 sites encountered appear to be five Greek farmhouses, three Greek tombs/necropoleis, five Greek agrarian structures of unknown function, one Roman agrarian structure of unknown function, one Late Antique farmhouse, two Late Antique agrarian structures of unknown function, and one recent agrarian structure.

Only three plots totaling 0.09 km^2 were examined in the more northern of the east-west transects, in the Bosco Salica locality. Four sites with multiple occupation phases were documented: one prehistoric activity area, three Greek farmhouses, one Roman farmhouse, and one Roman agrarian structure of unknown function.

An important secondary result of this year's brief campaign at Crotone is a fresh evaluation of the landscape 20 years after the beginning of the project. Part of Crotone's original attraction to ICA was the slower pace of development in the territory relative to the Metapontino. In the early 1980s the modern landscape south of Crotone was much less intensively worked (after initial clearing in connection with the agrarian reform of the 1950s) than the landscape behind Metaponto. This situation translated into an absence of isolated settlements (most residents in the province preferred to live in towns) and a less intrusive agriculture (most fields were cultivated in simple seasonal crops like wheat or vegetables, so that there was less deep digging and plowing). Fortunately not much has changed in the intervening decades. The sites in the chora of Croton are still largely undamaged and easy to recognize on the surface, and navigation within the countryside is relatively easy. The team this year discovered some of the richest prehistoric, Greek, and Roman sites we have encountered, so there is every reason to believe that future seasons will be just as productive (Fig. 10).

Figure 8. View from the high marine terrace near Villaggio Salica to the northwest, towards modern Crotone and the Ionian Sea.

Figure 9. The survey team walks a low-lying field in the Carcarella locality, 1 km north of the sea near Le Castella.

Fieldwork in 2006 will again be split between the contact zone in the Metapontino and the new transects at Crotone, but each project will be the subject of a dedicated season to advance field coverage significantly.

Technology and Methods

The survey methodology (walking intervals and collection strategies) employed at Metaponto and Crotone is largely the same one developed by D'Annibale for the first phase in the early 1980s (Fig. 11), and it incorporates the best elements of the documentation strategies used in the first and second phases of the Metaponto survey (1981–1984 and 1992–2003). The 2005 field season marked a further significant step in the evolution of field methods by virtue of being the first season in which all primary documentation in the field was performed digitally: no paper was used to record notes, site locations, etc.

The team had three GPS receivers at its disposal, each used for a dedicated task. The large backpack unit recorded the boundaries of plots (Fig. 12), and the handheld unit recorded the boundaries of artifact scatters defined as sites (Fig. 13). The pocket unit attached to the Xplore iX104 tablet computer recorded the point of maximum artifact density within sites (Fig. 14) and served as the primary navigation/orientation aid in lieu of the paper map-sheets (Fig. 15) The Xplore furthermore housed the databases that stored descriptive information about each plot and site. The databases were designed to require a minimum of text-entry, since the computer's configuration did not include time-saving features such as handwriting recognition; most data-entry was performed through pull-down menus and check-boxes.

Two features of the Xplore quickly became burdensome: the lack of handwriting recognition software made the recording of unformatted observations slow and inaccurate, and the screen's decreased readability in strong sunlight required the user to shade the unit. Both of these problems were subsequently remedied by sending the unit back to the manufacturer to be re-fitted with a brighter screen that is also capable of interpreting handwritten input. The team looks forward to an even more productive season in 2006.

Figure 10. Artifacts from Site 474 in the Ritani locality. The site appears to have been a prominent Roman farmhouse, judging from the presence of finewares such as grey ware, Arretine ware, and African Red Slip ware (bottom 3 rows) and transport amphorae (top three rows) spanning several periods.

Figure 11. Proper interpretation of a site's chronology and function requires the collection of all diagnostic artifacts visible on the surface, an intensive process of slow, careful inspection.

Figure 12. Plot boundaries are recorded with the most rugged and easiest-to-use of the survey GPS receivers.

Figure 13. Site-boundary recording is best performed with the hand-held receiver, operated by a field-walker who follows a path created by one of the survey leaders.

Figure 14. The smallest (pocket) receiver attaches to the Xplore tablet computer, and together they make a convenient platform for the recording of both the site-center location and the site/plot notes.

Figure 15. The Xplore's screen allows the team to display and read georeferenced digital map sheets in a mobile GIS program, at any scale and in any combination, so that the awkward paper originals are no longer needed in the field, and the pocket GPS receiver removes all uncertainty about the team's location.

The Centro Di Agroarcheologia at Pantanello

Rosetta Torraco
Administrator for ICA

The Centro di Agroarcheologia at Pantanello, ICA's research base in southern Italy, saw active use throughout 2005. The analysis and visual documentation of the materials accumulated in 30 years of research—in particular artifacts from the field survey and the excavated farmhouses—continued in the capable hands of the Centro's two full-time researchers, Cesare Raho and Eloisa Vittoria. The study of the Roman and Medieval artifacts from the survey and excavations also advanced through the efforts of Erminia Lapadula.

Their work was interrupted for the first few months of the year by the massive flood of November, 2004, that left a meter of standing water in much of Metaponto Borgo, including the *banca,* ICA's storage building near the Museo Nazionale. Inside the *banca* numerous boxes of materials pulled for study were displaced, and most of the bags of artifacts in these boxes were soaked. By late spring, after much cleaning and repair (including the replacing of broken front-door panes and the outer security door), the *banca* was again functional. The skeletons from excavated *necropoleis* that had been submerged by the flood waters were cleaned and dried by trained staff from the Museo Nazionale, then placed in new wooden boxes. In order to limit damage from similar events, all boxes now have been moved to higher shelves, and more shelves have been added (Fig. 1). Cesare Raho took advantage of the reorganization and cleaning to create a special room at the back of the *banca* for artifact photography, with a blackout curtain and studio lighting (Fig. 2).

Figure 1. New shelves and wooden storage boxes in the banca.

Figure 2. New photography studio in the back room of the banca.

During early summer, Renata Henneberg continued her analyses of the material from excavations by ICA and the Soprintendenza in the chora and urban necropolis of Metaponto. This material, numbering nearly a thousand skeletons, is the largest and most fully-studied collections from all the Greek world.

From late August through early October the Centro was occupied by the survey team led by Alberto Prieto and Cesare D'Annibale (with the exception of the two weeks in early September when they conducted the Crotone survey in collaboration with the Soprintendenza of Calabria).

In late spring the Centro purchased a used Fiat Punto so that Centro guests and field teams can more easily move between the Centro, the *banca,* and neighboring museums and sites. In the fall the Centro filled gaps in its library holdings of basic publications by purchasing copies of the majority of the published Acts from the conference on Magna Graecia studies (held annually in Taranto).

On March 31 the Region of Basilicata, in the person of the General Director of the Department of Agriculture and Rural Development, *Dott.* Andrea Freschi, renewed its agreement with ICA for another five-year period. We are grateful to the Region for the hospitality we have enjoyed at Pantanello since 1974, and we remain firm in our mission: to investigate the history of ancient agriculture at Metaponto and its relevance to Basilicata today and to disseminate this knowledge to scholarly and popular audiences worldwide.

Figure 3. A full awning was installed on the second-floor balcony of ICA's house at Pantanello, making outdoor dining possible.

Chersonesos 2005

Fieldwork

Joseph Coleman Carter, *Director, ICA, and Classics, UT Austin*

Adam Rabinowitz, *Field Director, ICA, and Classics, UT Austin*

Chersonesos Coordinators

Taissa Bushnell, *On-site Coordinator, ICA, and Director, Pidtrymka Chersonesu*
Asele Surina, *Coordinator of Special Projects, ICA*
Marina Krotova, *On-site Administrator, ICA*

Kyiv Coordinator & Translator

Svetlana Telenkova

ICA Administration in Austin

Carol K. Cook
Pat Irwin

National Preserve of Tauric Chersonesos

Leonid Marchenko, *General Director*
Galina Nikolaenko, *Deputy Director for Research*
Larissa Sedikova, *Deputy Director for Conservation*
Ludmila Grinenko, *Head Librarian*
Nonna Krasovskaya, *Head Archivist*
Stanislav Ryzhov, *Head of Architecture & Archaeology*
Tatiana Yashaeva, *Head of Medieval Department*
Nikolai Alekseenko, *Head of Cembalo & Kalamita Branch*
Oleg Savelya, *Deputy Director for Protection of Outlying Monument*

Excavation

Ancient City

Larissa Sedikova, NPTC
Adam Rabinowitz, ICA
(Co-directors)

Field Staff

Olga Andreeva, *Ceramics and finds analysis*
Dmitry Davydov, *Trench supervisor*
Irina Don, *Ceramics and finds analysis*
Nicholas Efremov-Kendall, *Trench supervisor*
Italo Giordano, *Trench supervisor*
Gordana Karovič, *Assistant field director*
Aleksandr Kuzmin, *Trench supervisor*
Shawn Marceaux, *Trench supervisor*
Allyson McDavid, *Site architec*t
Pyotr Peresvetov, *Site architect*
Roger Sharp, *Registrar*
Anna Smokotina, *Ceramics analysis*
Anton Smirnov, *Trench supervisor*

Students and Volunteers

Aleksei Agapov
Sasha Arkhipov
Karissa Basse
Alexandr Bezbrazhnyi
Harvey Bowers
Dan Davis
Alexandr Dyachenko
Pavel Grigoriev
Jessica Hatchett
Olga Krivenko
Vladislav Litkevich
Emma Rose McLachlan
Ivan Mironenko
Katia Motsia
Larisa Novitskaya
Jessica Nowlin
Roman Reida
Stine Schierup
Anton Sherin
Alina Slipchuk
Yuriy Utrobin
Boris Zmerzlyi

Chersonesos 2005

Survey and GIS

Stuart Eve, L-P Archaeology, London
Jessica Trelogan, ICA
(Co-directors)
Viktor Samoilenko, NPTC

Conservation

Larissa Sedikova, NPTC, *Vice Director for Conservation*
Chris Cleere, Cleere Conservation Ltd., London, *Project director*

Site Conservation

Viktor Samoilenko, NPTC, *Project leader*

Dmitry Davydov
Aleksandr Diachuk
Filix Filipenko
Aleksandr Kuzmin
Vladimir Kynin
Katerina Motsia
Alexey Myazin
Larissa Novitskaya
Roman Reida
Ruslan Sayadov
Egor Tsaretskiy
Vitaliy Ustyugov
Julian Van Rensberg
Olesya Voinova

Objects Conservation

Inga Shvedova, NPTC, *Head of the Conservation Laboratory*
Julia Ryzhova, NPTC
Natalia Kuleva, NPTC
Cathy Daly, *Objects conservator*
Maya Froidevaux, *Conservation intern*
Colleen Healey, *Conservaton intern*
Vanessa Terrapon, *Conservation intern*

Collections Care

Andrew Holbrook, Collections Manager, Museum of London

Display

Erin Tyson

Library-Archive Preservation Project

James Grant Stroud, HRC, UT Austin, *Project director*
Barbara Brown, HRC, UT Austin
Olivia Primanis, HRC, UT Austin
Stephanie Watkins, HRC, UT Austin
Tish Brewer
Katherine Kelly
Emily Rainwater

Megarika Project

Alexander Semenov, *Team leader*
Andrei Kondyuk, *Lead Scanner*
Olga Kondyuk, *Book conservation*
Dimitri Krivonos, *Web development*
Alexei Romanov, *System administrator*
Vladimir Egudin, *Web-site development*
Aleksei Los', *Archival photography*

Chersonesos 2005

Stelai Research
Richard Posamentir, DAI, Istanbul, *Project director*
Marco Böber
Iris Engelmann
Christina Lippert
Andreas Schanze

Byzantine Ceramics
Joanita Vroom, University of Sheffield

Glass Analysis
Larissa Golofast, Moscow

Architectural Analysis
Konstantinos Kourelis, Clemson Univ.

Archaeometallurgy
Christopher Salter, Materials Archaeology Group, Univ. of Oxford

Fish Processing Study
Barbara Caterini, Univ. di Siena

Zooarchaeology
Aleksey Kasparov, Institute of History of Material Culture, St. Petersburg
Oleg Zhuravlev, Institute of Archaeology, National Academy of Sciences of Ukraine, Kyiv
Erol Kavountzis
Natalia Rashevskaya (assistant)

Paleobotany
Galina Pashkevich, Institute of Archaeology, National Academy of Sciences of Ukraine, Kyiv
Lesya Kirichenko (assistant)

Physical Anthropology
Renata Henneberg, Department of Anatomical Sciences, Univ. of Adelaide, Australia

Artifact Photography
Chris Williams, ICA

Publications
Inna Shtakser, Ph. D. Candidate, UT History

Translation and Interpretation
Irina Fadeeva
Natasha Streltsova
Yuliya Miroshnichenko
Karina Yakimets

Logistical Support
Sergey Kosseykin
Vasya Kirichenko

South Italy 2005
Survey

Administration
Rosetta Torraco, Bernalda, Italy

Research: Field Survey and Farmhouses
Cesare D'Annibale, Parks Canada, *Lithics, Greek coarse ware*
Gianna Ayala, U. of Sheffield, *Prehistoric pottery*
Dr. Peter Dana, UT & Middleburry College, *GIS and spatial analysis*
Erminia Lapadula, U. of Lecce, *Roman and post-Roman ceramics*
Cesare Raho, U. of Lecce, *Photography and illustration*
Eloisa Vittoria, U. of Lecce, *Greek ceramics*

Field Survey
Cesare D'Annibale, Parks Canada
Alberto Prieto, ICA
(Co-directors)
Benjamin Anderson, U. of Sydney
Anne-Marie Beavis, U. of Sydney
Dr. Peter Dana, UT & Middleburry College
Anastasia D'Annibale
Caterina Pelazza

Publications, Talks, and Papers by ICA Staff and Associates 2005

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Kasparov, Aleksey K. "The Faunal Remains from Myrmekion and Panticapaeum: Similarities and Differences." Presentation at the Third International Congress on Black Sea Antiquities (Pontic Congress). Prague, 11–18 September, 2005.

Kasparov, Aleksey K., A. Vladimir. Semenov, Sergey A. Vasil'ev, Ganna I. Zaitseva, Marina E. Kilunovskaya. "A New Paleolithic Cave Site in Tuva (South Siberia, Russia)." *Current Research on the Pleistocene,* 22 (2005): 9–10.

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