The Study of Ancient Territories

Chersonesos & Metaponto

2000 Annual Report

Institute of Classical Archaeology

The University of Texas

Austin
WITH SPECIAL THANKS TO:

The National Preserve of Tauric Chersonesos, Ukraine
La Soprintendenza archeologica della Basilicata, Italy
The University of Texas at Austin
College of Liberal Arts
Center for Space Research (CSR)
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The Packard Humanities Institute (PHI)

The National Space and Aeronautics Administration (NASA) 1998–2001
Center for the Study of Ancient Territories (CSAT)

Aerofototeca, Rome
American Academy in Rome (AAR)
Regione Basilicata
Institute of Geography, National Ukrainian Academy of Sciences
Nuclear Reactor Laboratory, University of Wisconsin
Telespazio-Telaer, Matera and Rome

The Archaeological Park, Chersonesos

The Samuel H. Kress Foundation, New York
The Trust for Mutual Understanding, New York
American Express Corporation, through
World Monuments Watch, a program of the World Monuments Fund

The Chora of Metaponto

The Brown Foundation, Houston
The James R. Dougherty, Jr., Foundation, Beeville, Texas
The Spiros Martel Foundation, Houston
The Bernard and Audré Rapoport Foundation, Waco

Pottery Study, Austin

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Front cover: Grave stele of Herakleios, son of Tibeous. Chersonesos, ca. 300 B.C. Height: 1.4 m. (Reconstruction illustration)
THE STUDY OF
ANCIENT TERRITORIES

CHERSONESOS
&
METAPONTO

2000 ANNUAL REPORT

INSTITUTE OF CLASSICAL ARCHAEOLOGY
THE UNIVERSITY OF TEXAS
AUSTIN

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In Memoriam

Professor Marian B. Davis
Mrs. Anne Byrd Nalle

Dear friends and supporters of the Metaponto and Chersonesos Projects, materially and morally, from the beginning. We shall miss their wisdom, loyalty, and humor. Austin will be a poorer place without them.
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Looking back over the past year, there are clear high points of achievement by the ICA team, and a great deal of hard work. The one is, of course, impossible without the other. The temptation in these annual reports is to emphasize the more visible success while playing down the hours of drudgery such as those spent digitizing maps, checking the accuracy of databases or washing and sorting pottery. In this report we shall try to strike a medium, thereby giving a more realistic idea of what has really taken place.

The reports presented here illustrate only some of our activities, omitting some areas of ongoing work, such as site conservation and geophysics, and detailed studies such as the Black Sea fine wares. These areas either were covered in previous reports or will appear in future reports.

ICA divided its time and talents this year, as in the past, between archaeological projects at two sites of historical significance—the chora of Metaponto on the Southern coast of Italy, and Chersonesos in Crimea on the Black Sea, at opposite poles of the Greek colonial world. The sites are closely comparable in many ways and they share a distinction: in all of the Greek world they are the sites which offer the greatest possibilities for discovering how life was lived in the Greek countryside. Not surprisingly, ICA’s projects at Chersonesos and Metaponto are closely related and overlap in many ways—in methods, expertise and personnel. It was at Chersonesos that analysis of imagery from space was developed in the 1998 and 1999 seasons, and these methods were used successfully at Metaponto this year and last. The accurate recording of pottery forms and analysis of pottery fabric is being perfected at Meta-

Figure 1. The main building of the Centro di Agroarcheologia after restoration, October 2000.
Over the last quarter century ICA has developed a truly interdisciplinary approach to the archaeology of the ancient countryside. Many avenues of investigation, from the study of ancient plant, animal and human remains, of geomorphology and remote sensing imagery from space to the traditional archaeological practices of excavation, field survey and ceramic study, have helped to create a comprehensive picture of life in rural areas of antiquity which provided the economic base for the culture of the Greek and Roman periods. Over the last two years generous grants from the Packard Humanities Institute have made it possible to intensify these efforts by creating a core team that works twelve months of the year in a new center where a critical mass of talent can work productively. Though “interdisciplinarity” has become a buzz word on university campuses, university politics and bureaucracy have all too often frustrated attempts to create a team and a program that produce significant results. At ICA we have grown rapidly and efficiently into such a team, thanks largely to the generosity and foresight of PHI. The results are already evident.

Rapid growth has required expanded facilities. Thanks to the PHI grant and the University administration, ICA is in the process of moving into its new offices in Austin at MCC, a part of the University of Texas research campus. (The remaining office space in the Classics Department will be ideal for the ceramics study center, which employs a number of campus-based students in various capacities.) The MCC location, one flight below the Center for Space Research (CSR) has greatly facilitated contacts with our colleague Melba Crawford, her staff and students, as well as among different members of our own group working on the same and related projects. The move should be completed by year’s end.

In the following pages you will find reports on some of the important research activities of a very busy year.

**Metaponto**

Metaponto-related work, both in Austin and Italy, this year as in the past, has focused mainly on preparing the comprehensive publication of the chora, and of field work (excavation, survey and scientific analysis) which began a quarter century ago. Steve Thompson, with help from Albert Prieto and Christian Hartnett, has been updating the survey databases and creating a GIS for the entire chora of Metaponto, while preparing the results of the survey of the chora—between Bradano and Basento—for publication (Figure 18). This survey, began in 1980, was the first survey of an ancient Greek territory in Italy, and with our Croton Survey, is a unique record of colonial Greek rural settlement. Steve’s work could be ready for publication as early as the end of 2001. It will include the important discoveries of “division lines” (see *Annual Report 1999*).

The most urgent work remaining is the dating of the black gloss pottery from the sites. Kara Nicholas made a good start in 2000. A further campaign, scheduled for spring 2001 with a team including specialists in Roman pottery led by Prof. Paul Arthur, will be required to complete this essential part of the project.

![Figure 2. Guiseppe Di Taranto, our foreman for a quarter-century, by the entrance of the Centro, whose restoration he supervised.](image-url)
ICA’s Metaponto project, like that for Chersonesos, is applying the advanced technology of space-based remote sensing to the archaeology of the chora which is providing truly spectacular results. The discoveries of “division lines” made in 1999 were expanded and refined in Austin by Jessica Trelogan. This is the earliest known example of Greek land division, and, with Chersonesos, is now the most fully and accurately studied. While it is exciting to apply new methods such as these to previously insoluble archaeological problems, we at ICA are expending an equal effort on the basic problem of chronology, the key to which is the relatively unglamorous and extremely time-consuming study of ceramics.

Finding some one to “do” the pottery is the perennial problem of excavation directors everywhere. Who will take on the task and stay with it to completion? At ICA we have such a person in Mariah Wade, who has formed a small team of dedicated and talented students at the undergraduate and graduate levels (see Section 2). In 2000 Mariah and her team, working through the summer at Metaponto, completed the daunting task of dating the black-gloss pottery from Pantanello sanctuary (Figure 13). When this work is published, it will join her previous work on undecorated wares as a basic reference for archaeologists working in Southern Italy. Our goal is to have this and the Pantanello sanctuary site study ready for publication in 2002–03. Student projects include the unguentaria by Mindy Spearman, the loomweights by Brownwen Wickkiser, and the lamps by Justin Walsh.

Ongoing analysis of ceramics in Austin has an additional, scientific component—the studying of the chemical constituents of the clays employed, using neutron activation analysis. The laboratory work, as reported in the 1999 Annual Report, is being carried out at the University of Wisconsin-Madison. Mariah will deliver a paper on this work at the AIA meeting in San Diego in early January.

With a chronology firmly based on the pottery evidence, we can write confidently, about the historical development of excavated sites in the chora. The basic research is extremely labor intensive, and the tasks monotonous and repetitive, but the results are absolutely essential if we are to move beyond archaeological data to history. I am concerned that the university system in the U.S. is failing to produce the necessary experts. In this crucial area, ICA is helping to fill a serious gap, and starting to become an important center for research on ancient pottery.

For six weeks this summer, the survey team, under the direction of Albert Prieto, added not only new sites in the Bradano–Basento area, but also observations about recent changes taking place in the chora that affect our results (see Section 3). These findings are important for the survey publications in progress. The collaboration between Steve Thompson, Jessica Trelogan and Albert Prieto is producing true state of the art work in the study of the ancient countryside.

This summer and fall our foreman of many years, Giuseppe Di Taranto, worked to restore the farm manager’s house at Pantanello as the new home-away-from-home of ICA at Metaponto (Figures 1 & 2). In an agreement signed last year, the “Centro di Agroarcheologia” will have a permanent base for research and will develop programs with the Region of Basilicata that focus on ancient agriculture. The survey team lived in the structure this summer while the work was in progress. The “Centro” was formally inaugurated with representatives of the Soprintendenza archaeologica della Basilicata and the Region on September 27, 2000. The ceremony included a visit to the Pantanello sanctuary site, a slide talk by me in the conference hall of the Azienda (experimental farm) Pantanello, and remarks by Professor Dinu Adamesteamu, the former President of the Region, Dr. Raffaele DiNardo, the current President, Dr. Filippo Bubbico, and Dr. Michele Brucoli, Assessor of Agriculture. (Both Vice President DeFilippo and former President DiNardo were instrumental in establishing the Centro.)

The theme of this 40th annual Convegno di studi sulla Magna Grecia, this fall at Taranto, was the chora from the Black Sea to the Mediterranean—our theme. Naturally ICA and collaborating institutions in Italy and Ukraine were well represented. Steve Thompson, Lorenzo Costantini, and Maciej and Renata Henneberg gave papers in the session devoted to new technologies; Galina Nikolaenko reported on the Chora of Chersonesos, and I spoke on the Chora of Metaponto on the day allotted to case studies. The largely Italian audience was exposed for the first time to scholars from the Black Sea and to an area that rivals Southern Italy in archaeological riches. It was a beneficial experience for all, and we were able to host our guests from the Black Sea in the new “Centro.”
Chersoneso

Our efforts at Chersoneso this year included:

• The ongoing study of imagery from space and creation of a GIS for the whole of the chora incorporating earlier studies by our colleague Galina Nikolaenko, and the land-based remote sensing results.

• The large scale excavation at the site of Bezymyannaya (begun in 1997) and the study of excavation materials from this site.

• The conservation of a previously excavated structure Site 151.

• A campaign devoted to photographing the unique series of polychrome stelai—one of the treasures of the Chersoneso Museum—using a large format camera (Chris Williams) and ultraviolet photography (Richard Posamentir).

• The establishment of a computer system for the Museum and a Chersoneso-based web site.

• A major diplomatic campaign to assure the future of the Preserve, the archaeological sites, and the Museum structures.

The multilayered archaeological plan of the chora of Chersoneso—one of the major aspects of NASA sponsored projects—developed dramatically with the acquisition of a new image with very high resolution, the Ikonos (see Section 4). Jessica Trelogan was able to combine this image, the results of geophysical prospection using electrical resistivity, and the results of the ground penetrating radar in one area, Bezymyannaya, to reveal a very dense concentration of features over the site of the hilltop fortress—site of our excavation—and down the slope. These results have been confirmed in part by the excavation. Where structures appear in the imagery, the excavations have revealed them. This is an impressively large site, covering many hectares. The problem is now to identify fully its functions and chronology in its successive phases.

Mikhail Nikolaenko and his team carried out the resistivity survey with assistance from Irina Harris (Figure 4). The new equipment, which records the data automatically in digital form, has increased the rate of coverage by four or five times with greatly improved accuracy. Jessica Trelogan used this information in creating the multilayered GIS for Bezymyannaya.

Meanwhile Paul Lehman and Carlos Cordova continued their long-term investigation of the changing environment of the chora, with increasingly detailed geomorphological analysis and studies of the pollen sequences at several sites where this organic material has been well preserved (Figures 60, 61). Ultimately it will be possible to incorporate similar information, as well as plans and photos of excavated artifacts for all the sites of the chora in digital form. Our goal is to be able to view the chora in detail in all of the stages of its historic development from the prehistoric to the present. The GIS will be a powerful tool not only for study, but also for the preservation of this unique ancient countryside. A parallel project should be undertaken for the ancient city.

Figure 3. Excavation of a human burial at Bezymyannaya, by Kirsty Waring (ICA team member) and Evgeniy Rogov (Co-Field Director), June 2000.
Excavation this year focused on the crest of the hilltop at Bezymyannaya, where two previous campaigns (1997–1998) had revealed significant monuments of the Crimean war, the Late Roman and Early Byzantine periods, and traces of a structure of the 3rd or 2nd century B.C. This year, under the able direction of Steve Thompson, the excavation area was doubled and an extensive structure of the Hellenistic period was partially revealed (Figures 41, 48). This, it seems, was much more than a fortified farmhouse, which it resembles in plan, because it appears to be three times larger than the largest known examples. There are the numerous structures on the slope below it, which suggest a larger settlement, perhaps a phorourion or a fortress to protect the best land route from the Crimean hinterland to Chersonesos. The archaeological evidence from other areas suggests that the larger settlement was occupied in the Greek and Roman periods, and later moved to the hilltop in the Early Byzantine period (4th to 7th century A.D.).

The study of materials from Bezymyannaya went on contemporaneously with the excavation. Paul Arthur and his assistant Cosima Castronovi analyzed the coarse wares from previous seasons and drew significant samples (see Section 6). Paul is one of the leading experts in Roman and Medieval pottery and his enthusiasm for the unprepossessing material was contagious. He helped us work out the dating of key contexts with his analysis. Denis Zhuravlev continued his study of the fine red-gloss ware.

Coins give us the most precise indications of when the site was occupied. Unfortunately too few are found in crucial contexts. Outstanding among this year’s coins is one with the portrait of the Emperor Alexander Severus (225–235 A.D.), the only one of the more than three dozen so far found on the site that belongs to the period between 150–250 A.D., when we know that Roman legions were stationed in the area (Figures 45, 46).

Earlier experiments in the conservation of the Hellenistic farmhouse (Site 151) carried out in 1996–98 did not provide a good solution for this stone structure. The specially-developed grout failed and it was necessary to change formulas to protect the structure from the climate extremes of high summer heat and significantly colder winters than those experienced in the Mediterranean. Vera Nikolaenko and her team rose to the occasion and have nearly completed the re-conservation of the structure (Figure 6).

In the period intervening between our last field campaign in Chersonesos in 1998 and this summer, monks of the Orthodox Church of the Moscow Patriarchy managed to gain entrance to some buildings of the Preserve and proceeded to set up housekeeping. They made public their intentions of reclaiming a significant portion of the ancient city and the current buildings of the Preserve as “Church property.” This was the situation I met when I arrived in June and which I set about immediately to rectify, first by establishing contact with the highest levels of the Ukrainian government in Kyiv and the local administration in Sevastopol. These discussions were followed with a series of meetings in early October with our delegation, consisting of the former U.S. Ambassador to Ukraine and his wife, William and Suzanne Miller, Brooke Shearer and Destry Jarvis of the U.S. National Park Service, Asele Surina of ICA, Svetlana Telenkova, our trilingual interpreter, and myself (Figures 5, 9 and 10). After meetings with the Ukrainian Vice Premier, M. Zhulinskiy, the Minister of Culture, B. Stupka, and the Mayor of Sevastopol, L. Zhunko, the matter appears to have been definitively resolved. The Church will continue its restoration of the 19th century cathedral and be allowed to hold services in it, but the site, the buildings and the cathedral, we have been assured, will remain parts of the Preserve (Figure 7).
A crucial factor in these discussions was the detailed plans worked out over the summer and fall by our team of U.S. and Ukrainian architects and officials of the Preserve. The architectural team included Carl Holiday as principal coordinator, Alma Maldonado, Nikolai Andrusenko, Tatiana Bazhanova and three architecture students from the University of Texas, Stan Pipkin, Martha Kennan and Seth Bossung. Svetlana Telenkova took on the daunting task of interpreting and mediating. The final product, a series of nineteen panels with plans and panoramic photographs, justified the effort (Figure 8). The Preserve plan can be implemented in stages and it provides admirably for all the types of visitors who will benefit from the Preserve: students and scholars, international and local tourists (explanatory material will be multilingual), recreationists from the city, and, of course, worshippers. This approach should avoid confrontation and may lead, we hope, to cooperation between the Church and archaeologists excavating early Christian churches. A version of the plan for the Preserve is now being prepared by Carl Holiday and Alma Maldonado for publication in book form and on a CD-ROM. It should be ready by the end of January 2001.

Figure 5. William Miller and the Oath of Chersonesos, an eloquent statement of democracy from the 4th c B.C. Chersonesos Museum, October 2000.

Figure 6. Vera Nikolaenko and her conservation team at Site 151, July 2000.
As the economic situation in Sevastopol worsens with the decline of the military presence, tourism could offer a clean, viable alternative industry. This consideration, no doubt, worked in our favor. Our representatives from the National Park Service immediately recognized the potential of the Preserve and Sevastopol. They are currently arranging a visitors’ program for future leaders from Sevastopol, so they can learn how cultural resources are managed in the U.S. and can evaluate the resulting economic benefits for the community.

In addition to this important diplomatic mission, our delegation established the basis for future cooperation among universities in Ukraine for training students in archaeology. These schools will include Taras Shevchenko University (Kyiv University, Russian speaking), Kyiv Mohyla Academy (Ukrainian and English speaking) and the Archaeological Institute of the Academy of Sciences in Classical Archaeology at Chersonesos. This cooperation, we hope, will extend eventually to student exchanges with U.S. and European institutions.

The staff of ICA has been active on many fronts, not the least in contributions to scholarly journals and participation in professional conferences. Besides the Taranto Convegno mentioned above, five of our team will be giving papers at the Annual Meeting of the Archaeological Institute of America in San Diego, January 3–7, 2001. The October issue of Journal of the AIA features a long, multiple-authored article summarizing ICA’s first five years in Chersonesos. It is now available on the Internet at www.ajaonline.org. (Thanks to the newly-installed computer equipment, our collaborators in Sevastopol can now read these articles immediately. This marks an end to Chersonesos’ long isolation.)

Figure 7. The ruined 19th century cathedral of Saint Vlodymyr on the acropolis of Chersonesos, under reconstruction, June 2000.

Figure 8. Phase I plan for the Archaeological preserve at Chersonesos, by Carl Holiday, Alma Maldonado, and team. 2000.
Looking forward to the coming year in Chersonesos, our goals will be to expand the excavation and conservation to include not only the chora but the ancient city in a collaborative effort with Paul Arthur and his students from the University of Lecce in Southern Italy. This will bring us a step closer to creating an international center for archaeology at Chersonesos—a goal long shared by the National Preserve and the Institute of Classical Archaeology. In 2001 the Ukrainian component of the excavation crew will include principally students of archaeology from institutions all over the country, with the focus on training in archaeological field methods. An expanded effort will be made to develop a truly interdisciplinary archaeological project, and to create the infrastructure of laboratories, storage space, and computer facilities that will be a model for Ukraine and Eastern Europe.
Aims, 2000
For nearly a decade ICA has dedicated considerable effort and resources studying Greek and Roman ceramics, gradually incorporating many of the methodologies described below. Our study’s focus is on the large ceramic collection recovered from the 1974–91 excavations of the major rural sanctuary of Pantanello, two kilometers from the walls of the urban center of Metaponto. The pottery is Greek and Roman, ranging in date from the late 7th century B.C. to the 1st century A.D.

This year, some 3000 records, each with fifty-three data fields, were painstakingly checked by Dr. Wade to prepare them for statistical analysis, the goal of our campaign. The Pantanello Ceramic Group’s work in 2000 is the continuation of a long-term project, with some fresh approaches. This year’s program had ten main objectives:

1. Finish the data entry for the archaeological ceramic material collected from the Pantanello Sanctuary.
2. Standardize the ceramic databases so the material can be exported into statistical programs for analysis.
3. Find, process, identify, objectively analyze, and date all the black gloss materials from the Pantanello Sanctuary excavations.
4. Enter the black gloss data collected during the 2000 summer study season.
5. Design and evaluate specific drawing conventions to be used in the Pantanello publications.
6. Select all the black gloss pieces (and some other materials) to be drawn for publication.
7. Initiate studies of several special categories of ceramic artifacts for publication.
8. Analyze the results of the ceramic samples sent for petrographic and neutron activation analysis at the end of 1999.
9. Select and process 150 new ceramic samples for neutron activation analysis.
10. Determine stratigraphic relationships and evaluate the integrity and reliability of ceramic contexts from excavation field notes of the years 1974–91.

<table>
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<th>5th c</th>
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<td>282</td>
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<td>20.8%</td>
<td>27.9%</td>
<td>25.6%</td>
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Table 1. Pottery lot distribution by date.

Figure 11. Special study of unguentaria by Melinda Spearman.
Results, 2000
The ceramic data from analyses performed in 1991–94 and 1999 have been almost totally entered into a database. These represent about 8000 records consisting of a variety of measurements and observations such as the rim or base diameter, thickness of the walls, form of the vessel, type of visible inclusions, as well as particular manufacturing traits. About 2000 records collected during this year’s season remain to be entered.

During the summer field season I worked with an able and dedicated ceramic group—James Collins, Melinda Spearman, and Bronwen Wickkiser. We identified, analyzed and dated all the black gloss pottery from the Pantanello Sanctuary, excavated during 1974–78, 1981, 1982 and 1991. Before this summer the group’s focus had been on the coarse undecorated wares, which, unlike the finer black gloss, are virtually terra incognita for archaeologists of Greek Southern Italy. The black gloss collection is vast and mostly fragmentary, and we were fortunate to have the collaboration of Dr. Vincenzo Cracolici who has extensive experience with ceramics from the Metapontine area and particularly with the black gloss materials from the urban site of Metaponto. Cooperation and the free interchange of information are the policy and one of the great strengths of the ICA Metaponto project.

Preliminary dating based on the black gloss materials (954 pottery lots) indicates the sanctuary portion of the site was probably used from the very late 7th century through the 1st century B.C. The early date is suggested by some fragmentary cups made in the Ionian style (Table 1).

About 2000 black gloss diagnostic vessel parts were examined and recorded. Of these, the majority is represented by a variety of drinking vessel forms (746 vessels or 37%). It is premature to talk about the percentage of other classes of vessel forms, but it is interesting that, apart from the various drinking forms, the most frequent form is the one-handler cup (130 vessels or 6.5%), thought to be a cup for dipping into liquids. Comparatively, plates (or dishes) are fairly under-represented (94 vessels or 5%). These figures will certainly change once the entire black gloss material is entered into the database.

While the black gloss materials were being analyzed, the team selected the most important diagnostic ceramic pieces and assemblages to be drawn. Prior to the field season James Collins and Christian Hartnett identified, evaluated, and rated all previous ceramic drawings to determine what drawings could be adapted to the set of conventions prepared for Pantanello, and for eventual publication.

A great deal of thought and research was put into determining what graphic information should be put into the illustration of ceramic pieces for the Sanctu-

Figure 12. The Pantanello sanctuary. View from the south, 1991 excavation season.
ary volumes. We wanted the drawings to display the maximum information in the simplest, clearest, most accurate and efficient way. (Most published ceramic drawings do not provide enough graphic information for easy and effective comparison.) These drawing conventions maximize the amount of information available to the reader by separating vessel contours from surface decoration. In addition, while maintaining the clearest and most objective perspective on the vessel, the drawings provide the different decorative perspectives to safeguard chronologically-distinguishing characteristics. These conventions are being applied to various drawings to determine how well they fit different vessels and parts of vessels, and may be revised. James is also devising a process of preparing the drawings for scanning and publication (Figure 14).

Apart from the vast collections of pottery, certain objects require exclusive treatment. These can provide chronological information, as well clues about trade and cult. For example, the unguentaria, a specific vessel type for unguents and perfumes are being studied by Melinda Spearman (Figure 11). During the summer Melinda located, analyzed, photographed, and selected unguentaria from the Sanctuary for drawing. Bronwen Wickkiser did the same for the collection of loom-weights, and some were rather unusual. Justin Walsh, a graduate student from Virginia who worked in Metaponto for the Survey Project and later for the Sanctuary Project, has taken on the Greek and Hellenistic lamps from the Sanctuary. Justin located, analyzed, photographed and drew (or selected for drawing) all lamps found in the Sanctuary.

Mariah Wade is studying the so-called “Ionic cups.” The large number of these vessels found at Pantanello and the problems associated with them require immediate and concentrated attention. The results will be important also for the survey chronology.

Marsha Robbins, who is doing her Ph.D. on the Pantanello Roman amphorae, worked in Metaponto from April through the first days of June and returned for further work in October 2000. Marsha examined the amphorae from the farm sites of San Biagio, San Angelo Greco, San Angelo Vecchio, and Fattoria Stefan, reconstructing several specimens (Figure 16). She also took approximately 300 ceramic samples from the farm sites and the various Pantanello kiln deposits. These samples will be thin-sectioned and subjected to mineralogical analysis as part of Marsha’s dissertation work at the University of Southampton (Figure 15).

In December 1999, we sent 64 ceramic samples to be analyzed by the University of Wisconsin Nuclear Laboratory. These ceramic samples included materials from Metaponto and Chersonesos. We received the results of those analyses in February 2000. The Institute of Classical Archaeology was very fortunate to have been allowed by the Director of the Wisconsin Nuclear Reactor Laboratory, Dr. Cashwell, to participate in a grant from the Department of Energy. As this grant does not include analysis of the results, Mariah Wade has done some preliminary work on the results, but the statistical analysis needs to be performed by a professional statistician and specialist in the field. Myles Miller, an archaeologist and statistician whose work has included analysis of neutron activation results has undertaken the task.

Part of the strategy employed in this analytical program is to increase the chemical and petrographic ceramic database for the Metapontine and the Black Sea areas. To this end, some of the samples sent for neutron activation analysis (i.e., chemical fingerprint) were also subjected to petrographic analysis (i.e., mineralogical fingerprint). The information obtained from these two scientific techniques will increase considerably the database for Southern Italy and Chersonesos, particularly because our sample includes a variety of wares and vessel types. In the future, researchers having ceramics analyzed by neutron activation will have much more chemical and petrographic data from Southern Italy for comparison. The information from neutron activation may help distinguish between the local copy and the imported vessel as well as confirm the validity of some distinctions between wares made solely on the basis of visual observation.

Figure 13. Pottery lot from the Pantanello Sanctuary (PZ91.337).
At this time it is premature to comment on the results obtained from the petrographic analysis since these results, to be truly significant, should be coupled with the results from the neutron activation samples. These results will also be a part of the paper to be delivered by Mariah Wade entitled “Human and chemical fingerprints: potters and pots from Pantanello, Southern Italy.”

In July of this year Mariah and Don Wade prepared and processed 150 ceramic samples that were sent to the UW Nuclear Reactor Laboratory for analysis. These samples were selected and brought from Metaponto to the United States with the permission of the Archaeological Superintendent of the Basilicata Region, Dr. Maria Luisa Nava and Dr. Antonio de Siena, Director of the Metaponto Museum. Again the batch of ceramic samples sent to Wisconsin included several from the Chersonesos area. Once more we wish to acknowledge the help and generosity of Dr. Cashwell as well as that of Dr. Robert Agasie, who have been exceedingly helpful in matters regarding the processing of samples. The results from this set of samples will be available before the end of the year, although we may not be able to comment on the results until next year.

The geomorphological and environmental history of the Pantanello site is complex. The difficult job of unraveling these histories and their intersections is, however, absolutely essential in making sense of the site’s development and artifacts, including the pottery. During the months spent in Metaponto Don Wade, drawing on a lifetime’s experience as a geologist, read and analyzed field notes from the various excavation seasons to determine the correct stratigraphic relationships, providing the ceramic group with a ranking of the integrity and reliability of ceramic contexts. This task is still in progress.

Proposal

Anywhere in the world that humans produced ceramics, archaeologists have constructed time sequences mainly on ceramic remains. Ceramic items are the most prevalent human artifacts found in archaeological contexts and that, if nothing else, should stress the relevance of the subject to archaeological projects. Why then is there such a scarcity of specialists in this area?

During the years that I have been involved with the Pantanello Project—particularly with the study of ceramic materials—I have become convinced of the need for a comprehensive ceramics study program to emphasize and train students in the various aspects of the study of ceramics. Such a comprehensive and multi-disciplinary program would provide the student with methodological and technical background, as well as experience in the various phases of ceramic study. It would include such things as preliminary processing, observation, identification of forms, fabrics and manufacturing techniques, recording, database construction, drawing and digitizing techniques, reconstruction and conservation, as well as analytical techniques such as neutron activation analysis and petrography. This program of study would appeal to students of ceramics
and archaeologists of all geographic areas because, apart from regional formal characteristics, archaeological ceramicists worldwide face similar problems and challenges. Most archaeological ceramicists spend a great deal of time acquiring experience on the job and while this is a time honored learning practice, it is not cost effective and leads to considerable back-tracking and unnecessary mistakes.

A comprehensive ceramics study program would cross over disciplinary boundaries and bring together experts from various fields whose ideas and innovative approaches would greatly benefit the study of ceramics and clarify archaeological time sequences. Such a program would rely on visiting scholars who, through thematic seminars, would fulfill the diverse needs of the program and elevate the study of ceramics to its proper place within archaeological studies. The program could also serve as a clearinghouse for scientific data available from various ceramic projects, systematizing and facilitating comparison of analytical results.

Figure 15. Thin-section of a storage amphora showing a "bubbly" texture probably resulting from the dissolution of calcareous foraminifera.

Figure 16. Marsha Robbins at work on the Pantanello amphorae.
Objectives
Much of this year was spent preparing the definitive publication of ICA’s first phase of field survey (1981–84) in the chora of Metaponto, or the metapontino, which covered an approximate 4 x 10 km rectangular transect bounded by the Bradano and Basento Rivers. Intensive coverage of the major cultivable topographic zones of the metapontino—river valley, marine terrace, and terrace-valley transitional slope—is crucial for calculating the actual density of ancient settlement, and the identity and scale of its components, in specific historical periods. The data-set from this first phase comprises 560 sites, including farmhouses, tombs, and assorted small rural structures (e.g., sanctuaries and kilns), dating from the prehistoric to colonial Greek era and to Medieval and recent times.

Farmhouses in the metapontino are generally distinguishable as scatters with an area of more than 700 m² in area, containing numerous building stones and a wide range of ceramic types: black-gloss, table, storage, and cooking wares, as well as enormous quantities of rooftiles. Tombs usually appear as scatters of less than 700 m² containing a more limited range of ceramics: mostly black-gloss, figured, table, and storage wares, as well as small quantities of rooftiles. The remaining rural structures fall into a single “other” category. These are scatters composed of mostly building stone and rooftiles (very few other ceramic types present), generally less than 1000 m² and difficult to identify precisely without telltale artifacts like terracotta figurines, architectural decorations in terracotta, or misfired ceramic waste. Prehistoric scatters are readily distinguished by the presence of lithic artifacts and/or coarse, unevenly-fired pottery.

At Metaponto, the survey concentrated on the fields offering the easiest access and the best visibility, usually freshly-plowed or recently-harvested fields. This practice allowed for a total coverage of only ca. 23 km² of the total 42 km² contained within the transect. The boundaries of the surveyed areas were drawn by hand on 1:10,000 topographic maps. Early survey theory focused more on sites than landscape, so that in the Metaponto survey information about individual fields (plots)—shape, area, type of cultivation, artifacts noted—was not recorded. Detailed information was taken only from sites, which, upon discovery, were described...
by the name of their locality (a “neighborhood” in the countryside), their approximate dimensions, the current cultivation, the density of artifacts visible on the surface (expressed in relative terms as “light,” “moderate,” or “heavy”), and the types of artifacts collected. The site’s geographic center, approximately determined with the aid of hand-held compasses and pacing, was marked with a small circle on the 1:10,000 maps.

Advances in survey practice since 1985 make it possible to obtain precisely the site’s location (using a high-resolution GPS), shape, distribution and density of surface artifacts, and the geographic/topographic relationship between the site and the landscape. The 2000 season was devoted, therefore, to a limited restudy of the Bradano-Basento transect in order to gather additional, more precise data that would help bring the first-generation survey results into line with those of the 1999 survey. At the same time, repetition of the work of nearly 20 years previous would provide an opportunity to study site survival and destruction over time under various conditions of cultivation, and would offer the potential to illuminate the archaeological histories of sites across the metapontino in recent times.

The 1981–84 survey was generally confined to the marine terraces that rise step-like from the Ionian coast towards the mountains of the interior—the heart of the ancient territory—as well as the higher areas of the slopes that connect the terraces with the river valleys below. The valleys of the Bradano and Basento Rivers were largely ignored in the belief that alluvial soil carried down from the mountains over two millennia had buried all signs of human activity there—a view which found some scientific confirmation when UT geographer James Abbott located several deep cuts in the Bradano, Basento, and Cavone valleys displaying the remains of Greek, Roman, and even prehistoric sites at depths of up to 15 m (45 ft) below the current valley-floors. But the 1999 survey season demonstrated that this conclusion, while essentially accurate, was not applicable everywhere in the metapontino: a series of Greco-Roman sites were discovered on the floor of the Basento valley, close to the Pantanello sanctuary.

A second goal of the 2000 campaign, therefore, was the survey of large parts of the valleys within the transect to provide data on ancient settlement patterns there.

Figure 18. Satellite image of the metapontino showing areas surveyed between the Bradano and Basento Rivers, 1981–2000.
Methodology
The methodology developed for the 1999 field survey was employed again in 2000: detailed information was recorded for plots (for example, land-use, approximate density and types of surface artifacts, types and counts of collected diagnostic artifacts) and sites were subjected to density-mapping at 5 m or 10 m intervals, providing very detailed information on site size and shape, location of the site center, and artifact density and distribution. There was one significant modification: the traditional method of marking the boundaries of a given plot, using a hand-held compass, pacing, and the 1:10,000 topographic maps, was entirely replaced by a Global Positioning System (GPS) unit, the Trimble Pathfinder Pro XL GPS receiver on loan from the Center for Space Research. CSR also provided a subscription to LandStar, a commercial satellite service that enhances the GPS signals in real time on their way from the satellites to the receiver on earth, with a final positional accuracy of ca. 50 cm (1.5 ft.).

A given plot was mapped by a single member of the crew carrying the GPS in a backpack around the perimeter (Figure 17). The GPS generally was programmed to record a position every five seconds for high-precision mapping; the position interval was increased (to 10 seconds, for example) in very regular, straight-sided fields, where high precision could be achieved with fewer points. The effectiveness of the GPS was reduced when dense stands of tall trees blocked the path between antenna and satellite, allowing the receiver to take very few points.) An average plot (4–6 ha. in size and largely treeless) required about 10 minutes of mapping. At the end of the day, the data was downloaded from the GPS data collector to a personal computer equipped with Trimble’s Pathfinder Office software for visualizing and editing plot data. Once verified for accuracy, the data was exported as an ArcView Shapefile, the format of the Metaponto GIS. In the GIS, the plots were instantly available for comparison with the accumulated survey data as well as the digitized 1:10,000 topographic maps and historic aerial photographs, for precise editing of the boundaries, and for entry of the information (area, land-use, etc.) recorded in the field. This procedure saved a great deal of time by entirely eliminating the need to scan the field maps.

![Figure 19. Map of survey activity in the Bradano River valley, superimposed on a satellite image.](image_url)
Results

New Survey

This year a total of approximately 2.4 km$^2$ of new coverage was added to the pre-existing 23 km$^2$ of coverage in the Bradano-Basento transect (Figure 18). The first target area for this year was the Bradano River valley. 1.21 km$^2$ of terra incognita were surveyed in 28 plots, spanning the entire width of the river’s right (southern) bank. Very few artifacts—mostly modern or medieval—were encountered, and not a single site. These results support the general geomorphologic conclusion that the rivers have, over the course of two millennia, buried all surface archaeological remains beneath deep alluvial strata. (No sites, in fact, were found in the lowest areas of the Bradano valley during the 1999 pipeline survey; the Cavone valley, too, proved to be sterile.) The few artifacts noted or collected during survey in 2000 were probably washed down into the valley from the structures dotting the line of low terraces to the south. That there were ancient structures in the lowest parts of the Bradano valley is likely, but reconstruction of their distribution and chronology may never be possible.

In the second target area, the Basento River Valley, 1.06 km$^2$ of new coverage were added in 27 plots on the left (northern) bank (Figure 20). Three Greek farmhouses (Sites 771, 774, and 783) and three Greek tombs (Sites 775, 780, and 787) were discovered in this area, all of which had been exposed for some time, judging from the general weakness of the scatters. Two of the tombs and two of the farmhouses lie on the lowest slopes between the high marine terraces and the valley, while the remaining farmhouse and tomb (Sites 780 and 783) lie on the valley floor, like several Greek sites discovered further down the course of the Basento valley in the 1999 survey.

In the Lago del Lupo locality (the focus of the re-survey effort—see below), twelve plots totaling 0.17 km$^2$ were surveyed to fill in gaps in the original survey coverage (Figure 21). One plot at the western edge of the transect contained a site (773) that is either a Greek farmhouse or a group of Greek tombs. Two adjacent plots in the southeastern corner of the transect contained what appears to be a nucleated group consisting of a Greek farmhouse and 5 associated tombs (Sites 776–779, 781–782).

Figure 20. Map of survey activity in the Basento River valley, superimposed on an aerial photograph.
Eighteen of the twenty-three “surviving” sites show considerable change in the area of surface artifact scatter—by “considerable” we mean at least a 30% increase or decrease in the area as measured in 2000 compared to the original measurements made in 1981–82. (The remaining five sites changed very little.) In 1981–82 these 18 sites had areas ranging from 50 to 5600 m² and an average area of 1600 m². In 2000 these same sites had areas ranging from 25 to 12,000 m² and an average of 2800 m².

The most likely cause of these often startling changes in site-area is the dramatic transformation of agriculture in the metapontino over the past 20 years. In 1981–84, the 23 sites under consideration were discovered in only four different types of cultivations, the so-called “Mediterranean triad” of wheat, olive, and vine (the fourth cultivation being a single almond grove). In 2000 the number of cultivations practiced in these same fields was nine, and the economic emphasis has by now shifted decisively away from the traditional “triad” to fruits—plum, orange, melon, and peach—which can be sold more profitably in the European Common Market. Fruit-bearing trees and vines require a mechanical overturning of the earth (up to 1.5 m/4 ft) to replace the exhausted topsoil. With the number and range of cultivations expanded, more and more overturning is performed throughout the metapontino. This kind of work, as we know from our experience in 1999, often brings up archaeological remains. It is therefore not surprising that most of the 13 sites showing area increases of 30% or greater are those lying in fields which were once cultivated in wheat or another shallowly-plowed crop and have been transformed into orchards, vineyards, or groves. The relatively small scatter brought up by the old, shallow plow has been replaced by a larger scatter brought about by the deep-plow or the mechanical scoop. The five sites showing strong decreases in area, however, are those lying in fields that generally had already been mechanically turned over in 1981–84 and were subsequently re-worked for other fruit-bearing crops. In these cases, most of the sites’ remains were probably exposed by the first overturning of the earth. The weak edges would be re-buried by the second overturning, while the denser core of artifacts would tend to remain visible. Since the first-generation survey did not map the density of artifacts on sites, we can compare counts of only collected artifacts (and not of all artifacts visible on the surface). The original survey methodology called for the total collection of all diagnostic artifacts—rim, bases, and handles of pots, as well as all decorated pottery, prehistoric pottery, and lithic artifacts. (The current methodology is to collect in intervals across the site surface, typically every 2.5 or

### Table 2. Basic numerical results of the re-survey summarized.

<table>
<thead>
<tr>
<th></th>
<th>Lago del Lupo</th>
<th>Basento Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area Re-surveyed</strong></td>
<td>1.44 km²</td>
<td>0.29 km²</td>
</tr>
<tr>
<td><strong>Number of Plots</strong></td>
<td>67</td>
<td>9</td>
</tr>
<tr>
<td><strong>Sites 1982–84</strong></td>
<td>27</td>
<td>10</td>
</tr>
<tr>
<td><strong>Sites 2000</strong></td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td><strong>% Sites Lost</strong></td>
<td>26%</td>
<td>70%</td>
</tr>
</tbody>
</table>

Re-survey
A return to areas surveyed in earlier seasons was conducted on a small scale in the Basento valley and on a larger scale in the area of Lago del Lupo, high on the marine terraces at the center of the transect (Figures 20, 21). The results of this effort demonstrate that the first-generation Metaponto survey methodology was as accurate and precise as possible at the time. Consider that, this year, only one new site was discovered in the re-surveyed plots—and this particular Greek farmhouse, Site 772, was already known to a French survey team working in the late 1960s. Only one new chronological component was added to just one site, No. 174, which was identified this year as a prehistoric lithic manufacturing area as well as a Greek farm structure. (Some previously identified chronological components for certain sites, however, were not observed again in 2000.) All of the 2000 site density estimates (“light,” “moderate,” and “high”) were the same or lower than the 1981–84 estimates, demonstrating that the criteria used to estimate density then and those used now are basically equivalent. And no site as marked on the map in 1981–84 falls more than 80 m from the position as measured with the GPS in 2000. Given the great difficulty of locating a site on a paper map using a compass and pacing, often with few or poor landmarks, the first-generation site positions are remarkably accurate.

Only 23 (62%) of the 37 sites originally discovered in these two areas were identified a second time (Table 2). This brings us to considerations of site survival and/or destruction, one of the principal issues that the re-survey was intended to address. We shall consider the 23 “surviving” sites first, followed by the 14 “missing” sites.

The most basic gauge of a site's condition is the area of the coherent artifact scatter visible on the surface. (Most of these sites, incidentally, lie in a field that had been deep-plowed for the first time just days before the survey crew arrived, leaving dense clusters of broken tomb-tiles, pottery, and stone tomb-slabs on the surface and demonstrating once again that there are still untouched sites awaiting discovery by survey.)
In order to make the 2000 artifact collection counts equivalent to the 1981–84 counts, then, we need to consider the percentage of total area covered in 2000, which we estimate to be about 20% of that done in 1981–84.) The variation in artifact densities at the same sites after a twenty-year interval is a significant phenomenon which must be considered in interpreting the results and in drawing conclusions about the size and relative importance of the surveyed sites.

Lost sites
Fourteen sites recorded in 1981–84 were not recognized during the re-survey. In most of these cases we returned to the relevant plots a second time, a day or two later and at a different time of day, to search for the sites again using a closer survey interval (5 m rather than the usual 10 m). On none of these occasions were we successful in identifying the missing sites, suggesting that they had been reburied or dispersed beyond recognition. At this point they were declared “missing” or “lost” sites.

Four of these missing sites lay in a single plot in the Basento valley (00-87), where seven sites were originally documented—mostly farmhouses containing Greek and Roman materials (Figure 22). This plot presented particular challenges for re-survey because of the poor surface visibility (about 40%) due to wheat stubble. We decided to map the artifact density of the entire field to define better the sites (Figure 23). From the density map we concluded that these seven original sites (147, 153–157, and 159) have by now fused into just three sites (redesignated Sites 788–790 for ease of reference, Figure 20)—a likely result when close intersite proximity is combined with plow-induced smearing for so many years. This is the only example of merged sites encountered in the re-survey areas, although we suspect that there are other analogous cases waiting to be discovered in similarly dense groupings of sites. But we should be careful about accepting the obvious conclusion before the full archaeological verdict is returned. One of the most important factors in survey is the land-use at the time of survey—i.e., what was being cultivated at the time. In 1982 this particular plot was a vineyard, a type of cultivation that, according to our experience, usually offers an overall surface visibility of between 80 and 100%, among the highest visibility percentages observable throughout the chora of Meta-
ponto. Considering a vineyard’s excellent visibility and the fact that vineyards are deep-dug before planting (stirring up any artifacts below), it is also very likely that the original surveyors found these sites freshly exposed on the surface in 1982 with near-perfect visibility, and that we were simply unable to see so clearly this year through the wheat. This hypothesis will be tested in another season, when the field is free of cultivation.

The remaining ten missing sites (110, 133, 134, 138, 149, 151, 160, 166, 220, and 281) all have very similar characteristics, based on what was recorded of them in 1981–84 (Figures 20, 21). The majority of them were comparatively small sites, a mixture of farmhouses, tombs, and other structures, with areas of maximum 1000 m$^2$. Most were categorized as having “light” surface artifact scatters and also had among the lowest counts of collected artifacts (typically below 20 total). Thus we can tentatively state that small sites with few artifacts are the most likely to disappear from the archaeological record. A tomb, for example, has fewer physical components than a farmhouse, and a small number of artifacts is highly susceptible to dispersal under the plow or the backhoe. However, we should also note that there are another five sites with the same characteristics that not only were recognized during re-survey, but were even found to have enlarged areas. These five sites all lie in fields that have been changed from wheat to fruit production.
Although these results are very encouraging, the size of the sample—approximately 7% of the known sites (37 of 560)—limits us to very general conclusions. More re-survey will be needed in future seasons to further refine our hypotheses about site survival and destruction and to derive statistically meaningful results.

Revisits
Through the re-survey we have begun to trace the histories of sites in the chora of Metaponto on a large scale, reconstructing the accumulated effects of the plow and other agricultural machinery that force sites to surface, submerge, move, and spread. It would be valuable, although time-consuming, to initiate annual or biannual density-mapping of sites. This year we began a pilot phase of such an experiment, which we have termed "revisiting."

Theoretically, any site could be profitably subjected to revisiting. In practice, however, sites that have been exposed by agricultural activity for the first time very recently (as indicated by the cultivation history of the field, the density and wear of surface artifacts, etc.) offer the greatest potential rewards, since in these cases the archaeological history can be followed from the very first exposure. By documenting a range of different site-types (farmhouses, tombs, etc.) repeatedly over several seasons and in different agricultural and geomorphologic settings, we hope to be able to reconstruct the histories of similar sites in more advanced states of degradation across the chora.

This year we returned to a single plot (99-81) in the Pizzica locality that contained a dense group of freshly-exposed Greek farmhouses and tombs surveyed in 1999—Sites 728, 730, and 732. By the beginning of the 2000 season, this plot had been plowed over only half of its surface, the remaining half lying beneath cut wheat. The open half of the plot was revisited in late June, the wheat-covered half in early August, after the wheat stubble had been plowed under. The western edge of the field had been heavily disturbed by the digging of several trenches (varying from ca. 1–2 m in depth) for the laying of irrigation pipes that replace an older concrete trough irrigation system. One of the shallower trenches, in fact, actually cut through the farmhouse Site 728, exposing small sections of foundation-walls and collapsed rooftiles.

A comparison of two artificial contour maps for Sites 728 and 730 derived from the density maps made in 1999 and 2000 indicates that the artifact counts in the areas between the sites and southeast of Site 728 have decreased substantially in 12 months, forcing the boundaries of the two sites to retract in places by as much as 30 m. The locations of the sites’ centers have shifted slightly (approximately 10 m, some of which may be due to error in recreating the 1999 density map grid in 2000). These sites will be revisited again in future seasons.

Figure 24. Medusa-head antefix from Greek farmhouse Site 772, Lago del Lupo locality.
Work continued on the NASA-funded remote sensing project, begun in fall of 1998 in collaboration with the UT Center for Space Research (CSR). The first phase of the project was the creation of a digital database of remotely sensed data. Historic aerial and high-resolution satellite photography, as well as more recent digital panchromatic data were acquired to improve the existing maps of the ancient chora and to determine which areas of the chora are still visible above ground. A series of multi-spectral Landsat scenes were obtained to extract environmental data (such as vegetation and soils) and to trace the recent changes to modern land use. We now have a large database of remotely sensed data from a wide variety of sensors dating from the earliest aerial photographs taken during World War II to the most up-to-date high-resolution satellite imagery. This year we have added two new satellite images to our archive and are continuing the study of modern land cover change as a way of monitoring areas of the chora vulnerable to urban sprawl.

Figure 25. CORONA satellite photography from September 1968. Dividing roads and interior planting walls in the area around Omega Bay are clearly visible in the close-up view on the left.
CORONA Satellite Photography, IRS 5m and IKONOS 1 m Panchromatic Digital Imagery

Most useful for documenting the ancient cadastral grid has been a set of high-resolution (approximately 2–3 meter) satellite photographs from the recently declassified CORONA reconnaissance missions of the 1960s and 1970s. The CORONA satellites were used primarily to monitor activities in the Soviet Union during the Cold War. Long swaths of the earth’s surface were photographed in black and white, and the 70 mm negative strips were subsequently dropped through the atmosphere in large canisters retrieved by passing aircraft. These photographs predate much of the recent urban and suburban land development and also cover the entire Heraklean Peninsula (in contrast to aerial photographs that must be mosaicked together) making them an excellent source for mapping the chora.

Hoping to determine which areas of the divided chora were destroyed by encroaching urban areas and unregulated dacha developments as well as erosion on the coast, we obtained a panchromatic digital image from the Indian Remote Sensing (IRS) satellite acquired in October 1997. Although the spatial resolution (5 m on
the ground per pixel) proved to be not quite high enough to make out much detail of the ancient cadastral system, the relatively recent date and low level of geometric distortion (compared to photographic data) makes it ideal as a geographic base image to which the rest of the data used in this study has been geographically referenced.

Until the recent successful launch of the IKONOS satellite, which is acquiring the world's first commercially available 1 meter resolution data, the 5 meter IRS imagery was the highest resolution and most recent satellite data available. Thanks to a generous grant from the Packard Humanities Institute, we were able to purchase a large scene acquired in March 2000. The 1 meter ground resolution and large spatial extent of this image is an excellent means of identifying archaeological features that have not yet been destroyed by human or natural causes (Figure 26). IKONOS data holds great potential, not only for mapping ancient dividing roads, but also for discovering individual buried sites (farm houses, necropoleis, and sanctuaries). It will also be extremely useful for the creation of a current and accurate map of the modern land use on the peninsula, crucial for planning the proposed archaeological and natural preserves.

There are drawbacks to this type of data, including its high price, lack of camera models (which makes it difficult to correct for geometric distortions inherent in the data), and the potential of cloud cover. The advantages—its recent date, incredible detail, and spatial extent—more than compensate, however.

**Landsat Multi-Spectral Data**

A series of scenes from the Landsat Thematic Mapper (TM) satellite were obtained for mapping natural land cover (e.g. vegetation, hydrology, and soils), and tracing the changes to modern land use (e.g. urban, agricultural, and industrial areas) since the 1980s. We have added to the series a new multi-spectral image from the Landsat 7 satellite acquired in July 2000. With three other Landsat images (from 1984, 1988, and 1992), this brings our time series of one consistent data type up to date. A new algorithm (developed at CSR) is being used to complete the series land use and land cover classifications started in 1998.

Landsat TM data, which have a relatively low spatial resolution (30 meters), are an excellent source for extracting environmental information. The data contain six different channels (i.e., reflectance values recorded for discrete portions of the electromagnetic spectrum) that can be combined in different color composites to highlight features of interest (Figure 32).

**Digital Elevation Model**

Because there are no available large-scale topographic maps of this militarily sensitive area, our colleagues at CSR are developing a digital elevation model (DEM) using pairs of synthetic aperture radar (SAR) data. Although the results are still preliminary and require more work, they do seem to be an improvement over the DEM that we created by digitizing topographic contours from a 1:50,000 map (Figure 31).

The DEM will be an integral part of this study. Understanding settlement patterns as they relate to topography, watersheds and geomorphology of the peninsula will be crucial for examining the relationships between human settlement and the physical environment. Here we have draped one of the Landsat scenes over the DEM to create a three-dimensional surface view of the peninsula (Figure 33). For visualizations that will be published both on CD-ROM and on the web, as well as in the Preserve’s museum exhibit hall, we are creating a three-dimensional fly through using this surface view.
Geographic Information System
Using this database of multi-resolution air- and space-based imagery as the spatial framework and mapping base, we have begun to compile results from the last century of archaeological research in the chora with current excavation results, sub-surface remote sensing data, local total station maps, and paleo-environmental and geomorphologic data. All of this information (including the imagery itself) is being incorporated into a Geographic Information System (GIS). Our goal is to integrate the wide range of available information about the chora into one geographically consistent and easily accessible format that can be updated as new information becomes available. Environmental data such as current land cover, geomorphology, and topography can also be extracted from the imagery or entered in tabular form from data collected in the field (such as pollen cores) in order to better understand and visualize the relationship between human (both past and present) and natural landscapes (See Lehman and Cordova, below).

The Chora of Chersonesos

Figure 29. Hillshade map created from topographic total station data from the hilltop at Bezymyannaya.

Figure 30. Preliminary GIS map of the Chersonesos chora. This vector layer indicates the final stage of land division as reconstructed by Galina Nikolaenko. Hand drawn maps were georeferenced and digitized to create this map. Individual plots and farmhouses carry unique numbers which will eventually be linked to other information in a relational database. Such information might include excavator, year excavated, type and date ranges of sites, and material recovered in excavation.
Figure 31. Landsat TM data from 1984, 1988, and 1992 (below) are displayed in a “true color” composite (TM bands 3, 2, and 1). Above, the new Landsat ETM+ scene from July 2000 is displayed in an infrared composite (TM bands 4, 3, and 2). This color combination is useful for distinguishing vegetation types. In the infrared combination, the color image shows vegetation appearing in a range of reds, with the green, leafy vegetation showing up the brightest.
Figure 32. Comparison of the DEM derived from synthetic aperture radar (SAR) pair (left) and that from contour lines digitized from a 1:50,000 scale map. Heraklean Peninsula.

Figure 33. Three-dimensional surface view of the Peninsula. The 1992 Landsat TM scene is draped over the DEM.
The layers of information can be displayed at any scale, from the micro-topography (Figure 29) or subsurface expression of individual sites to the complex system of roads and agricultural works (Figure 30) that comprise the ancient chora. The final result will be a powerful tool for the storage, query, display and dissemination of cultural and environmental data for the Heraklean Peninsula and surrounding areas.

Considerable progress was made on the GIS this year. We have begun to assemble information from excavation and mapping campaigns undertaken by the National Preserve of Tauric Chersonesos during the last several decades. This summer we were able to scan a large number of Galina Nikolaenko’s maps of the Chersonesan agricultural works. Back in Austin, these maps were geographically referenced to our base of satellite imagery and were then digitized into vector layers representing the major roads, planting walls, farmhouses, and fortifications that comprise the ancient chora (Figure 34). With the vector layers overlaid on the high-resolution imagery, we will be able to compare these maps with the archaeological remains still visible on the surface (Figure 29).

The next step is to create a relational database that will include as much information as possible about each plot and farmhouse from the published literature available generally and from the archives of the Preserve. We are developing a database structure and are considering types of information to include, such as site type, dimensions, excavator and excavation dates, ancient land use, publications, plans, and photographs. This database could eventually be linked with others envisioned for the Chersonesos project, such as an artifact database from the city and other sites in the chora, as well as a catalogue of holdings in the Chersonesos library and archives. Ultimately, we plan to make our database available on the Internet for widest possible dissemination.
2000 Excavation Season at Bezymyannaya in the Territory of Greek Chersonesos
Stephen Thompson

This summer the Institute of Classical Archaeology and the National Preserve of Tauric Chersonesos participated in their third season of collaborative excavations at the site of Bezymyannaya from June 1st to July 19th. Dr. Stephen Thompson (ICA) and Dr. Evgeny Rogov (Russian Academy of Sciences, St. Petersburg) served as co-Field Directors during the 2000 excavation season. At its largest, the excavation crew numbered 21 individuals drawn from the United States, Canada, Sweden, Russia, and Ukraine. Jessica Trelogan (ICA) directed digital surveying and mapping at Bezymyannaya, while Tatiana Bazhanova and Nikolai Andrushenko (Kyiv) were responsible for drafting scaled plans and stratigraphic profiles at the site. Between June 5 and June 18, Prof. Paul Arthur and Dr. Cosima Castronovi (Università di Lecce, Italy) carried out preliminary analyses of all ceramic artifacts recovered from Bezymyannaya during the 1997, 1998, and early 2000 seasons. From July 5 through July 19, Dr. Denis Zhuravlev (State Historic Museum of Moscow) continued his study of the Roman red slip ceramics from Bezymyannaya. Concomitant with the 2000 excavation season, Irina Harris (Boston University), Mikhail Nikolaenko, and Sergei Shakuro (National Preserve of Tauric Chersonesos) carried out an electro-resistivity survey over some 42,000 m² of the Bezymyannaya hill, providing the first detailed and seamless plan of the extensive architectural remains at the site. Nikolaenko continued the resistivity survey through mid-October, eventually covering nearly 60,000 m² of the Bezymyannaya hill.

Bezymyannaya, literally “No Name Hill,” is one of a series of high points along the Sapun Heights, part the steep escarpment that defines the inner, eastern edge of the Heraklean Peninsula (Figure 35). Immediately north of Bezymyannaya, a relatively narrow and shallow valley, the Zolotaya Balka, breaches the escarpment and provides the easiest, and still the main overland route into and out of the Heraklean Peninsula. Looking west from Bezymyannaya, one can take in the entire northwestern coast of the Heraklean Peninsula, from Lighthouse Point in the south to ancient Chersonesos and Sevastopol in the north. East of Bezymyannaya lies the broad Balaklava Valley, which drains to the southern coast of the Peninsula, and beyond the Balaklava to the north runs the valley of the Chernaya River, draining to the northeast into the long, narrow harbor of Sevastopol. During both the Crimean War and World War II, control of the Sapun Heights region played a vital role in the defense of modern Sevastopol, as the Heights controlled the overland route to the city and harbor.

Figure 35. Map of Heraklean Peninsula showing sites and locales mentioned in text.
With respect to ancient cultural geography, Bezymyannaya lies at the southeastern margin of the formal, divided chora of Chersonesos, approximately 10 kilometers southeast of the ancient city. In Galina Nikolaenko’s reconstruction of the system of land division in the colonial Greek territory (Figure 35), Bezymyannaya Hill occupies the southeastern corner of Plot 402 and marks the terminus of the major arterial “Road R” whose northwest course passes just south of ancient Chersonesos.

Before formal investigations began at Bezymyannaya in 1997, a roughly 60 x 60 meter enclosure defined by a bank and ditch was clearly visible on the summit of the hill (Figure 38), and was thought to be the remnants of a Roman fortification. Documentary sources as well as epigraphic evidence from Chersonesos attest to the presence of Roman troops stationed at Chersonesos during the late second and early third centuries A.D. Characteristic red gloss pottery of the period also was known from sporadic surface finds at Bezymyannaya. Black gloss pottery of the Greek period was also reported from the hill and, given Bezymyannaya’s position at the margin of the Chersonesan chora, it was further thought that the site may yield non-Greek indigenous Taurian remains. Some 30 known sites in this region and just to the west are, based on material remains, associated with Taurian occupation primarily from the 4th century B.C. onwards. Bezymyannaya, then, was chosen for excavation by the joint ICA/National Preserve team because of the site’s peripheral and strategic setting with respect the chora of Chersonesos, and its potential to reveal a range of historically and culturally diverse aspects of the region’s long-term settlement history.

The two earlier seasons at Bezymyannaya had focused largely on the southwestern corner of the approximately 60 x 60 m bank-and-ditch enclosure. The 1997 and 1998 seasons provided abundant artifactual evidence, primarily ceramics but also a number of coins, documenting a sequence of continuous occupation at the site running, minimally, from around the third century B.C. and lasting through the sixth century A.D. Unfortunately, much of this material comes from superficial and other disturbed, secondary contexts, of which there are many at the site.

Bomb craters and slit trenches mar much of the surface of the hilltop, and along with the abundant shrapnel and other military debris that litter the ground, attest to Bezymyannaya’s active role during the Second World War. Scavenging of wire and other bits of scrap metal left over from the war has also left its mark on the site. Evaluating the extent of these late disturbances and the integrity of the underlying ancient deposits was very much a focus of the first two seasons of excavation, and it fair to say that at the beginning of this season’s field work there was a widespread sense that the site’s ancient layers had been substantially compromised. Adding to the feeling of dashed expectations was the growing realization that the

Figure 36. View of excavation in area of Rooms 9 and 11 at Bezymyannaya.
bank-and-ditch fort at Bezymyannaya probably belonged to the Crimean War. In addition to the copious quantities of World War II debris encountered during excavation, lesser quantities of nineteenth century lead bullets and mini-balls also had been discovered during the first two seasons at the site. As excavation progressed, it also became increasingly clear that the fort’s inner bank was a relatively late construction. Just how late remained difficult to determine archaeologically, but archival research in 1998 turned up a Crimean War era map (Figure 37) showing a square fortification on the hill that all but clinched a mid-19th century date.

This summer, in addition to continuing excavation in areas exposed during previous seasons, we opened an additional 300 m² of the site, expanding the total area of our excavations at Bezymyannaya to just over 700 m² (Figure 38). Most of our efforts were again concentrated in the southwestern corner of the fort area, though individual 5x5 meter units were also opened east, west, and north of this main excavation area in an effort to begin ground-truthing of the resistivity survey results.

One main objective this summer was to explore the southwestern perimeter of the existing excavation area, with particular attention focused on defining the extent and content of the encircling ditch or fossa. Although clearly visible from the surface, apart from two limited soundings cut into it in 1997, this feature had been virtually unexplored. Given the suspected late date of the fossa we decided to remove these late soils before the excavation of adjoining, earlier deposits. Clearing the ditch would also, we hoped, give us a convenient cross-section of the strata that it cuts through, and help us to assess better the damages caused to earlier deposits and architectural remains.

Work within the western ditch proved one of the most productive and revealing aspects of this summer’s season. In all, we removed fill from the ditch over a distance of 35 meters down the western side of the fort and around its southwestern corner, making a series of important discoveries in the process. The first discovery was a skeleton, missing its head and much of its upper body, and associated with 20th century military hard
ware and clothing. These apparently unburied remains lay slumped against the western face of the ditch, and rested on ditch fill some 20 cm above the base of the feature. The position of this unfortunate soldier clearly indicates that the ditch, at least as a partially filled linear depression, predates its mid-20th century re-use. A second, unburied World War II casualty, this time along the inside of the southern bank (Figure 39), further attests to this most recent re-use of the Bezymyannaya hill.

Excavations in the western fossa this summer also produced, this time from a layer of trampled, compacted soil at its very base, an unfired nineteenth century rifled lead bullet. Clearly, the ditch was open to its base during the Crimean War and in all likelihood was constructed during this period. Though from a surface context along the eastern side of the excavation area, discovery this season of an 1834 Turkish coin (Figure 40), pierced for suspension, is the best evidence yet for the nationality of the troops stationed here during the Crimean War.

Complete removal of the modern soils filling the western fossa revealed that the outer, western face of this 2.5 meter wide feature consisted of a vertical, earthen cut through clear cultural strata. The inner face of the ditch, however, followed precisely the line of a rough, somewhat intermittent stone wall or series of ancient walls that run down this side of the site. Even more surprisingly, however, was the discovery that the base of the fossa bottomed out exactly on the surface of the foundation course of a well-constructed wall of limestone ashlar blocks (Wall 38, Figure 41). No foundation trench was associated with this wall. Rather, a sloping, wedge-like layer of very compact, reddish-orange clay was exposed at the base of the ditch banked up against the wall’s western face. The layer of clay, which seems to be a non-local soil carried into the site for construction purposes, rests upon what appears to be a truncated, artifactually sterile natural soil horizon.

Figure 38. Excavation areas at Bezymyannaya Hill.
Towards its southern end, the outer face of the ditch turned 90 degrees to the east. This portion of the ditch has not been excavated in its entirety, but it currently appears that the feature opened out into a larger and possibly deeper subterranean space at this corner of the fortification. Most surprising, however, is the fact that this widening of the ditch follows precisely the plan of the underlying architectural remains exposed at its base. As seen in this year’s final site plan (Figure 41), removal of the ditch fill here exposed the badly robbed foundation course of a roughly 6 x 9 meter structure, internally divided into two rooms (Rooms 6 and 8), and again constructed of large, well-squared limestone blocks. This corner structure we interpret as a tower protruding from the corner of a larger structure dated, in all probability, to the late 3rd–2nd century B.C. The close congruence between the line of the ditch and these underlying architectural remains strongly suggests that construction of the defensive feature during the Crimean War and the robbing of ancient walls may well have taken place simultaneously, with perhaps the robbed masonry being reused along the apparently elevated northern and western sides of the fortification. While the ditch, then, is clearly late, the plan of this Crimean War fortification appears to closely mirror the hilltop’s underlying ancient architectural plan.

Further details of the site’s Hellenistic Period plan ultimately must await additional excavation. Various indications emerged this past summer, however, to suggest a large, multi-level complex centered on an open courtyard. Towards the northeastern extreme of the excavated area, bedrock has been exposed no more than 50 centimeters below the modern ground surface in the area labeled “Room 4” in 1998. Just within the outer walls of the early structure, are an often-bewildering series of superimposed walls and rooms and pavements. The latest constructions we have here, as determined by the relationships between architectural elements, are the late reuse of Room 7, documented in 1998, and construction of Room 11, exposed this summer. Paul Arthur’s study of the Bezymyannaya ceramics indicates that the latest ancient artifacts thus far recovered at the site consist of Late Roman fine wares datable to the late 6th–early 7th centuries as well as fragments of a local hand-made ware that may date as late as the 8th or 9th centuries A.D. This late material is so far most heavily concentrated within the “courtyard” area of Room 4 and within the deposits overlying the stone pavement of Room 10 exposed in 1998. Despite the labeling of these areas as “rooms”, both appear to be “outside” spaces, and very possibly the strata excavated here represent sheet midden accumulated around the late occupations of Rooms 7 and 11.

In addition to our work this summer in the western fossa and our expansion of the larger excavation area to the north and east, we also attempted deeper soundings in areas opened during earlier seasons. In Rooms 9 and 1, where these soundings have been deepest, we encountered thick strata of intentional fill overlying earlier, still very incompletely exposed floors. The latest material thus far recovered from the overlying intentional fills can be dated to the 3rd or 4th century A.D.,
Figure 41. Final site plan of Bezmyannaya showing outline of Crimean War trench.
Figure 42. Selected ceramic artifacts recovered during the 2000 season at Bezymyannaya.

Figure 43. Isodomic block exposed within intentional fill (Context 4049) in Room 9.
and includes a nearly complete lamp (Figure 42:4), which has close parallels to examples from Chersonesos, and an amphora rim and neck (Figure 42:5). The 3rd–4th century fill of Room 9 also contained a large isodomic block (Figure 43), apparently from the site’s earliest Hellenistic Phase, suggesting some collapse or dismantling of the site by this period. At present, this date for the fill fits rather nicely with a mid-fourth century A.D. date for the earliest surfaces founded on the fill, derived from a coin discovered within Room 7 in 1998.

Earlier Roman artifacts were again found in abundance this season, and include a nearly complete small, Eastern Sigillata B bowl (Figure 44) dated to the late 1st century A.D., and a silver denarius (Figure 46) issued by Severus Alexander sometime between 222 and 228 A.D., one of several coins from Bezymyannaya dating to the period for which the presence of Roman legions at Chersonesos is documented. Good primary contexts for this period remain elusive. Much the same applies to the Hellenistic period, represented by various fragments of molded “Megarian” bowls of the 2nd century B.C., as well as by four of the fifteen coins discovered this summer (Figure 45), including one silver (Fig. 45:15) and three bronze specimens (45: 5, 7, and 11). These four coins are all issues of Chersonesos and range in date from the early 2nd to the mid-1st century B.C.

After three seasons of excavation, a fuller sense of the architectural phasing of the site has begun to emerge (Figure 48). To begin with, present evidence suggests that the earliest architectural remains at the site belong to the late third or early second century B.C. During this Hellenistic phase, the site appears to have consisted of a square to rectangular enclosure comprised of an outer suite of rooms terraced into the hilltop and surrounding a higher, probably open courtyard, defined by at least one tower at its southwestern corner. During the later Hellenistic and Roman periods, various walls were widened and the entryway into the complex ap-

Figure 44. Small bowl, Eastern Sigillata B (late first century A.D.), Context 4058B. Below: detail of bottom, with Greek-lettered graffito. (Base detail, actual size)
Figure 45. Coins recovered during the 2000 field season at Bezymyannaya. (Enlarged 1.5x)

1. Istanbul, Sultan Mahmud II, A.D. 1834, bronze (S.F. 419)
2. Theodosius I, A.D. 379–395, bronze (S.F. 414)
3. Chersonesos, A.D. 180–192, bronze (S.F. 416)
4. Chersonesos Mint, probably 2nd or 1st century B.C., bronze (S.F. 415)
5. Panticapaion, 70–63 B.C., bronze (S.F. 417)
6. Anastasius, A.D. 491–518, bronze (S.F. 419)
7. Chersonesos Mint, 120–110 B.C., bronze (S.F. 436)
8. Arcadius, A.D. 395–408 B.C., bronze (S.F. 439)
9. Valentinian, A.D. 375–392, bronze (S.F. 441)
10. Leo I, A.D. 457–474, bronze (S.F. 442)
11. Chersonesos Mint, 180–170 B.C., bronze (S.F. 458)
12. Elia Flaccilla, A.D. 379–395, bronze (S.F. 463)
13. Severus Alexander, A.D. 222–228, silver (S.F. 477)
14. Unidentifiable, bronze (S.F. 479)
15. Chersonesos Mint, 190–180 B.C., silver (S.F. 481)

Figure 46. Silver denarius of Alexander Severus from the excavations at Bezymyannaya, July 2000. (Enlarged 3x)
parently was restricted. Near the beginning of the 4th century A.D., the rooms flanking the central courtyard were filled and a series of buildings constructed on the newly-raised surface that continued to be occupied for some two or three hundred years. Current evidence indicates that Bezmyannaya was abandoned in the last centuries of the first millennium A.D. and saw no significant re-occupation until the hilltop was fortified during the Crimean War.

The extensive program of electro-resistivity survey conducted this summer aimed at mapping potential subsurface architectural features, particularly down the western slope of the hill, offers further insights into Bezmyannaya. The results of this work are shown in Figure 49, along with a preliminary interpretation. These results correspond closely with those of a more limited survey using ground penetrating radar that was conducted in 1998 (see ICA 1998 Annual Report). Many of the highly resistant linear anomalies revealed through this season’s survey probably represent subsurface walls, a suspicion confirmed in one of the two soundings conducted this summer on the western slope of the hill. The length and orientation of certain of the detected anomalies suggest terrace walls, but whether these all simply served agricultural purposes is not clear. A number of enclosed spaces, possibly buildings rather than field walls, is suggested, and it is possible that residential areas extended down slope away from the hilltop complex forming a small, rural village. Thus far, our limited excavations in these outlying areas have encountered abundant Hellenistic and Roman artifacts, and none of the later Byzantine material so common within the fort. Pavements or other occupational surfaces, however, have not thus far been found. We did, however, discover this summer three closely spaced burials (an adult and two young children) in one of the westernmost units opened. These burials lacked any accompanying grave goods, and so for now cannot be dated. In addition to continuing our work within the fort area, further excavations in these downslope areas during the 2001 season will hopefully help to resolve some of these issues about the overall size of ancient Bezmyannaya.
Figure 48. Bezymyannaya final site plan showing provisional architectural phases.

Figure 49. Results and provisional interpretation of the electro-resistivity survey conducted at Bezymyannaya, 2000.
Figure 50. View of Bezymyannaya excavation at the end of the field season, July 2000.

Figure 51. Bezymyannaya 2000 field crew.
Introduction
This report presents some first impressions of the ceramics excavated at Bezymyannaya in 1997 and 1998, following a preliminary analysis of all excavated archaeological contexts. It is by no means a completed piece of work and serves, above all, to stimulate thoughts and discussion. Its primary objective is that of providing dates for the various contexts. In addition, the pottery has been examined with a view to assessing its potential in the study of the social and economic status of the site, and some thoughts along these lines are presented below. Considering the lack of literature on Ukrainian ceramic assemblages in the West, it is also worth emphasizing both the difficulties encountered in this preliminary analysis, as well as the importance that a detailed study of the ceramics will have for scholars working in other areas.

The work is being conducted with the assistance of Cosima Castronovi for the drawings and Taissa Bushnell for help in sorting and recording. General information on the site has been provided by Stephen Thompson and Jessica Trelogan. Advice on some pottery identifications has been generously given by Drs. Larissa Sedikova (medieval archaeologist) and Oleg Savelya (prehistorian) of the Chersonesos Archaeological Museum, while Stanislav Ryzhov has kindly discussed the post-classical archaeology of Chersonesos with me.

Work strategy
Considering the limited amount of time available this year for studying the ceramics at Bezymyannaya, and pending a more thorough analysis, I have decided to
adopt what I consider to be a particularly cost-effective strategy. All the bags of so-called diagnostic pottery, separated out in 1998, all the fine wares analyzed by Denis Zhuravlev (see archive report “Fine wares and lamps from Excavations at Bezymyannaya”), as well as all the ceramics classified as small finds, have been looked at, context by context. General notes and impressions on each single stratified context have been taken, while fragments of pottery considered to be most informative or particularly interesting have been separated, separately classified, described and drawn. These pieces are identified by a ‘drawing number’ within a circle marked on each sherd in ink. They amount to 108 pieces, copies of the drawings of which have been left in the Project’s archives at Sevastopol.

The following notes are based on this work and should serve as a preliminary guide to understanding certain aspects of the site and deciding which contexts may repay more detailed study. Indeed, we have felt that quantification of context assemblages will not be particularly useful until well-stratified deposits with little residual material are brought to light. This excludes all topsoil or modern contexts, which have been cursorily examined. We have deliberately analyzed the pottery quite independently of the site’s stratigraphy and interpretation, hoping that this might help avoid any interpretative bias. Indeed, the proposed spot-dates or termini post quos have been compiled exclusively on the evidence of artifacts, although some assemblages have proved too small to provide much more than inspired guesses. Thus the next step is to compare notes, seeing whether or not the chronologies, impressions and suggestions presented below are compatible with the rest of the archaeological evidence from the site.

Preliminary observations

Site and context chronologies

So far I have noted very little in the way of good “closed” groups, in that most assemblages appear to contain fair quantities of residual material. Generally speaking, though, the pottery suggests occupation or activity dating from around the third-second centuries B.C. to the later sixth century A.D. Major late activity appears to date to the fourth and fifth centuries on “quantification” by eye, and it may be that later occupation was reduced in scale. However, this might only relate to the areas that have been excavated in 1997–1998.

Layer/context 3010 has so far yielded the latest well-dated pottery from the site, including fragments of Late Roman C ware of Hayes form 10, dated by John Hayes to c. 570–660+ A.D. The fragments from Bezymyannaya, perhaps all from a single vessel, belong to his variant A, which date appears to lie in the late sixth to early seventh centuries A.D. range. No other later Roman/Byzantine pottery found is so closely datable. Context 3010 also yielded a fair quantity of hand-made pottery, which might be of late Roman/Byzantine date, though its chronology still has to be worked-out (see below).

Hand-made pottery

Context 3010 and other contexts, especially 2053, have yielded a fair number of rather large fragments of hand-made pottery with very little abrasion. Most of these pieces belong to rather simple cooking pots, often with vegetal inclusions or impressions on the exterior surfaces (perhaps representing manufacture by being packed in straw within clamp-kilns) (Figure 54), though some present burnishing, and one rather unusual piece is decorated with incisions and is highly burnished on both interior and exterior surfaces (Figure 56). The latter has been tentatively identified as being of nomadic origin, perhaps Avar or Gothic, by local archaeologists (Larissa Sedikova and Antonina Shevchenko, personal communication), who also tell me that little interest has so far been shown in this type of ware. A further piece has been tentatively identified by Larissa as Khazar, dating to the eighth–ninth centuries, while Oleg Savelya suggests that it might even be of Hun manufacture. It is the knob of a lid with incised decoration (Figure 55). Of eighth–ninth century A.D. date may also be a number of wheel-turned sherds,
Figures 54. Roman period hand-made cooking pot with vegetal impressions.

Figures 55. Lid knob with incised decoration, possible Khazar or Hun origin.

Figures 56. Jug rim, possible Avar or Gothic.

Figures 57. Comb-decorated amphora sherd, early Medieval.

possibly from amphorae or other large closed forms, with delicate combed decoration (see Figure 57). These pieces appear to have parallels with ceramics manufactured and found at Chersonesos, where they are dated to this period.

Thus, though the hand-made pottery might look prehistoric, I wondered if it did not, instead, represent a tradition of “local” hand-made wares that survived through classical times in rural areas. Confirmation of this now seems to come from Oleg Savelya, who excludes any prehistoric attribution, and suggests rather that the material dates to within the third century B.C. to fourth century A.D. time range, being of local Scythian manufacture. If this is so, what might this mean for the site of Bezymyannaya in Roman times and later? Is there a change from hand-made to wheel-turned pottery or vice versa, and does this represent changes in food resources, food preparation and eating habits? How might these wares relate to the Roman tradition of cooking wares also found on the site and dating, at least, up to the sixth century? Does regular occupation continue or does the site see a phase of late occupation by new inhabitants or culture groups, perhaps even semi-nomadic?

The apparent rarity of hand-made pottery at Chersonesos itself does suggest that such wares were not a product of the “factories” serving the town, where ceramics were of a classical tradition. Therefore we might judge the assemblages at Bezymyannaya as representative of interaction between the local Scythian population and peoples more strongly linked to the classical city. Is Bezymyannaya thus an interface?

Whatever the case, this class of material, which, as far as I can tell, is not at all common from excavations within the city of Chersonesos itself, clearly warrants further attention.

Economic issues
I have already referred to some economic issues raised by the hand-made wares found on site. The large quantities of pottery will help to answer other questions concerning importation and use of ceramics at
the site through classical times. First of all, it is important to characterize the local products. Many of these, particularly the amphorae, are readily identifiable due to the substantial amount of work already done by Russian and Ukrainian archaeologists. However, very little of the relevant literature is available in the West and illustrations and descriptions in old reports often leave much to be desired. Therefore, detailed characterization in the English language will represent an important achievement.

Local, Crimean, amphorae abound as, of course, do other locally produced vessels. Three overfired sherds, including a jug and a *pithos* rim, may be indicative of manufacture at the site of Bezymyannaya itself. These local productions should be set against the imported vessels. From mid Imperial times onwards, a number of imports may be recognized as coming from new sources that do not seem to have been represented in Hellenistic and early Imperial times. The most common mid and later Imperial type at the site is that known generically as Late Roman Amphora 1 (= LRA 1: Riley's Carthage typology) which, at Bezymyannaya, is also represented by antecedent forms. This vessel type was produced predominantly on Cyprus and in northern Syria/Cilicia, and was exported around the ancient world in increasing quantities from the fourth century onwards. Fragmentary examples are easily confused with amphora type E-VI in Andrei Opait's typology, which seems to be a Black Sea product perhaps from the southern shore. Its fabric is similar to LR 1 and contains a lot of pyroxene, though it evolves from a Hellenistic amphora, the so called "Pseudo Coan," through an early Roman type, published in Peace 8, pls. 7 and 13.

A smaller quantity of amphorae, the so-called LRA 3, come from western Asia Minor (Meander valley area?). The only other Aegean source so far recognized is probably Chios, which has provided at least one body sherd and one stub fragment of type LRA 2. However, a couple of fragments of the amphora type known as type Kapitan II may come from the Dodecanese which, earlier, is represented by a few Rhodian amphora fragments. A fragment of Gaza amphora has also been recognized amongst the year 2000 material (context 4010).

Though the site has yielded a large quantity of red-slipped wares, most of these are of early to mid Imperial date, and the only late fragments that I have yet seen are the pieces of LRC already referred to above, probably coming from western Turkey.

The total absence of any African products, whether African Red Slip ware or amphorae is notable, though some examples did reach Chersonesos.

This general lack of late Roman fine wares, when compared to the abundance of earlier Roman fine wares and to the abundant late Roman imported amphorae, is notable. Late Roman fine wares are not particularly rare at Chersonesos itself, and this might suggest a certain amount of cultural and social distancing of Bezymyannaya from the classical city in the late empire. Perhaps new eating habits were introduced at the site, reflecting the appearance of new inhabitants. However, Mediterranean wines and olive oil seem still to have been consumed in fair quantities.

The range of fabrics noted amongst the wheel-turned cooking pottery suggests more than one source, though whether they are all to be sought in and around the Crimea, as seems likely, or further afield, is still to be seen. Of note are the twisted handles of a typical Byzantine Black Sea cooking pot type, which is common in the Ukraine and Romania in the sixth and seventh centuries, and which has been found as far away as Istanbul, Carthage, Naples and Rome.

**Proposals for the study and publication of the Bezymyannaya ceramics**

The size and scope of the project will surely lead to the accumulation of a great quantity of pottery whose study, as time passes, will become evermore intractable. This is the reason why ceramics from many large archaeological projects have never been fully published, when at all. It is thus fundamental that a system for the study and publication of the pottery is agreed upon as early as possible. A number of precedents for the study of large quantities of pottery already exist, among the most notable recent examples being Carthage and Berenice in Libya, both of which reached publication. The Berenice ceramic reports were prepared largely by two specialists (John Riley and Philip Kenrick) who, at the time, saw the pottery as Ph.D. topics and were thus able to devote most of their time to its analysis. The Carthage reports were rather different in that they were prepared by scholars who already had a lot of experience in ceramic studies, notably John Hayes, but who could not devote incommensurate amounts of time to the study of the pottery. Unless Ph.D. candidates are found to analyze the ceramics from Bezymyannaya, it will be necessary to devise a cost-effective system that will get the most out of the material in as short a time as possible. The following proposals follow this logic.
Type-series
The creation of an inter-site type-series for many of the pottery classes encountered at Bezymyannaya is clearly one of the top priorities. A site type-series must only concern ceramic classes for which standard type-series do not already exist. Thus, transport amphorae, most types of fine wares and lamps should not be the object of new type-series, but should be classified according to the pre-existing examples.

The creation of a type-series means that all pottery should be examined, though it is not cost-effective, if large quantities of pottery appear, to quantify material from surface contexts or heavily reworked contexts unless there are specific research questions to be answered (e.g. degree of disturbance of contexts). It should be looked at rapidly so as to extract basic data and unusual items.

However, many economic issues upon which pottery can shed light can only be tackled through careful ceramic quantification. I consider this an impracticality as concerns many archaeological contexts, and detailed quantification (by number and weight) should only be performed for well-dated, closed deposits, that yield little or no residual material unless, again, there are specific research questions that may be answered through the study of residuality.

Chronology
Most classical period contexts can be dated through the discovery of well-known ceramic types and other eminently datable artifacts (coins, etc.). The creation of a typology of local wares and the establishment of a sequence, preferably correlated with stratigraphic sequences from Chersonesos itself, should help to refine the dating of Bezymyannaya archaeological contexts.

Not so the early middle ages. Given the abundance of hand-made pottery, some of which is likely to date to, at least, the seventh century A.D. or later, the question of the demise of Bezymyannaya is still open. If any closed contexts of post-classical times are found, it may well be worth while contemplating the use of radiocarbon accelerator mass spectrometry dating of associated organic materials.

Quantification
We have started to set up a simple system for dealing with the ceramics from the site of Bezymyannaya, from sorting to classifying and recording. The pottery, once separated from tile (which should be quantified on site), can be divided into fine wares (black glaze and red glaze or sigillata wares), coarse wares (amphorae, cooking pottery, etc.) and hand-made wares for later consideration by specialists.

Ceramics or finds laboratory
In the future a more formal ceramics or finds laboratory can be set up. Of course, this would require a greater amount of space that is currently available, and could aim at reaching the following objectives:

- A sequence of pottery types and fabrics is created.
- An archive is created, preferably through the use of a computerized database.
- A program of petrological analysis is set up (such as exits exists for Metaponto).
- A drawing laboratory is established to cope with the increasing quantity of finds.
- An investment is made in both anthropological and faunal analyses and, eventually, in other related disciplines. (For faunal study it might be possible to start setting up a faunal reference collection, as Simon Davis is now doing for IPA [Instituto Portugues de Arqueologia] in Portugal.)

Figure 58. Steve Thompson, Jessica Trelogan and Paul Arthur examine the day’s freshly-washed pottery finds.
GEOARCHAEOLOGIC, GEOMORPHIC AND PALYNOSTICAL INVESTIGATIONS
IN THE SOUTHWEST CRIMEA, UKRAINE
Paul Lehman & Carlos Cordova

Introduction
This report summarizes the main geoarchaeologic, geomorphic and palynological results of the 2000 field season in the Southwestern Crimea. A major goal of this past season was to develop a working relationship with Ukrainian and Crimean colleagues with a view toward understanding local approaches to physical geographic classification. This goal was met, and in doing so advanced our understanding of the landscape history of the southwestern Crimea in general. Our field projects covered specific research questions on themes of site formation and the local archaeological landscape at Bezmyannaya, sea level change and coastal erosion, vegetation dynamics, and paleoenvironmental research in both the Chernaya River Valley and smaller balkas in the Heraklean Peninsula.

Figure 59. Schematic map of the Heraklean Peninsula, the Chora of Chersonesos. Indicated are the excavations of the Joint Project of ICA and NPTC at Site 151 and Bezmyannaya, and locations of core samples for soil and pollen analysis. Maps: Paul Lehman (above); Chris Williams (below)
Almost all of the fieldwork was conducted in tandem with the able assistance of Drs. Pashchenko and Gerasimenko (Kyiv), both of whom also met with us in their Kyiv offices. In addition, Dr. Gerasimenko helped us navigate the national meeting of the Ukrainian geographers association in Lutsk and very kindly showed us key field sites around Kyiv. Aleksei Ivanov (Chersonesos) was an indefatigable guide and source of information about all aspects of the southwestern Crimea; Yelena Tarasiuk (Sevastopol) cheerfully helped with the identification of plants, collection of samples, and search for bibliographic information as well as providing key information on current threats to the environment; and Aleksei Kalynychenko was our keen informant for cultural and floral aspects of the Yaila. Finally, Jessica Trelogan (ICA) kindly provided IKONOS and Landsat data in the field to Lehman and Cordova respectively. Our work was well received by our Ukrainian colleagues and we have been invited to an international quaternary and geoarchaeological meeting (INQUA-SEQS) in Kyiv in September 2001 to present our research.

Bezymyannaya & Vicinity
On the site of Bezymyannaya itself, a borehole was dug using a bucket auger in the bottom of Trench 2 to sound the subsurface of the hill. The core and the exposed NW face of Trench 2 has become a key fossil pollen locale. Two main soils are represented: a brown cinnamon soil lying underneath the Hellenic and Byzantine occupations and a black chernozem soil developed in post-occupational sediments. Pollen samples from the pre-Hellenic brown cinnamon soil show the presence of open oak woodland. However, the top sample of the soil shows a large amount of alder (Alnus) pollen, which suggests a wet environment in the area. The presence of willow (Salix) pollen in the sample confirms the existence of a nearby spring. Although there are presently no alder or willow trees in the area, a relatively wet area does exist at the foot of the northeastern side of Bezymyannaya Hill, which previous geomorphic study had revealed to be a fossil spring. Thus, at the time of Greek colonization, the hill was covered with an open oak forest with wet ground to the north and northwest, and possibly on the east side as well. The post-occupational chernozem shows much Cerealia type pollen, probably wheat and rye. They are accompanied by large number of weeds, including those of the Urticaceae and Asteraceae families. Cereals are scarce or absent in the upper three samples of the chernozem. Instead, these samples present an abundance of herbs of the Scrophulariaceae and Labiatae family, which are the ones that predominate today. Finally, the occurrence of grapevine (Vitis vinifera) pollen confirms the presence of vineyards in the vicinity. This was a major wine producing area during Greek occupation, and is currently a leading producer of wine in present day Ukraine.

Sea Level Change and Coastal Erosion
The EF research locality (Figure 59) presents dramatic evidence of coastal erosion. Photographs from this spot (available on the ICA website) reveal the importance of the difference in rock strength (between the dark purplish to greenish volcanic rocks and the lighter gray to tan limestones and marl) to the formation of capes and bays along the south coast of the Heraklean Peninsula. Similar, although not as spectacular or high, cliffs line the entire southern coast of the Heraklean Peninsula and are the product of ongoing wave erosion. This coastal erosion has caused the loss of approximately 250 m of land since the Greek occupation of Chersonesos.

A marine deposit in the limestone quarries above Sevastopol Harbor, first identified in 1997, was studied with the help of several of our colleagues. Named Belokamensk by us, the deposit is now situated roughly 90 m above sea level. Visible are more than 5 m of near shore marine sediments, themselves capped by terrestrial slopewash and a soil. Both a medieval Christian burial (recognized and identified by Ivanov) and a recent gully cut-and-fill sequence are cut into the top of the soil. The elevation, in addition to the thickness and character of the sediments, make it improbable that this is a Holocene marine terrace from Sevastopol harbor uplifted by tectonics (earthquakes). More likely, it is an uplifted Pleistocene marine terrace.

Figures 60 (above) and 61 (opposite): photomicrographs of pollen samples. Above, chenopod; opposite, oak.
Vegetation
An integral part of pollen work is the study of comparative and modern pollen from the region of interest (Figures 60, 61). Therefore, Cordova collected and analyzed thirteen surface samples. The main purpose of surface pollen analysis is the study of modern pollen rain, which is used as a reference to reconstruct vegetation communities in fossil pollen diagrams. These surface samples, however, may reflect conditions different to the original vegetation, because of the introduction of new species. As a matter of fact, a large number of pollen grains found in modern samples do not appear in old samples. Still, the frequencies of pollen provided by the modern rain are useful.

Gerasimenko very kindly aided both of us with the interpretation of paleovegetation in Ukraine and Crimea and Cordova specifically with certain local palynotypes. She also made available preliminary information from a critically important core from Lake Saki, about 50 km north of Sevastopol. Early in this project we identified this saline lake as a rich potential source of paleoenvironmental information. Unknown to us, Gerasimenko had already begun study of the sediments from Lake Saki with other Western collaborators, interested in other aspects of the paleoenvironmental record. ICA has agreed to provide two radiocarbon dates to preliminarily verify and quantify the calculated rate of deposition of the varve-like sediments; Gerasimenko will make available the pollen data and paleoenvironmental reconstruction, which has the potential to provide heretofore unimaginable data on climate and vegetation changes on a decadal basis during the period of ancient Greek occupation.

Chernaya River and Valley
Paleoenvironmental research in the 2000 field season concentrated on the Chernaya River Valley. Study of the pollen and soils in floodplain sediments is a key component of our overall research strategy. Cores taken from these sediments record the vegetation history of the entire catchment (as well as “noise” from local pollen sources and sedimentary patterns). Therefore, we spent considerable effort studying as much of the floodplain as possible and also reconnoitering the upper reaches of the Chernaya in the Baidarskaya Valley and Yaila in order to investigate vegetation and soil conditions in the source area for the lower Chernaya floodplain.

At the NG2 locality (Figure 59), two cores were originally taken in 1998, the first of which encountered gravel and came up “dry.” The second attempt was successful and subsequently analyzed by us in the laboratory. This core represents a basically continuous accumulation of overbank muds since ca. 4250 B.C. The sedimentary data indicate five major depositional units, while the chemical and magnetic analyses suggest at least three, and possibly four or more, buried soil horizons in the total core depth of 2.8 m. In terms of pollen, NG2 shows interesting local and regional vegetation changes. The floodplain was at times covered with wetlands that acted as pollen traps. Although NG2 spans the same amount of time (ca. 5000 years) as the AA section (reported on below), the pollen frequencies show more variation. The profile shows in general a decline in grass pollen, which itself is gradually replaced by mixed herbs. The pollen also shows occasional peaks of local riparian vegetation (willow, poplar and hazelnut) and aquatics, which do not necessarily reflect climatic changes, but rather migrations of the stream channel across the floodplain. The overall sum of arboreal pollen changes dramatically, suggesting alternation of cool and/or wet periods. The most prominent of these occur between ca. 700 years ago, when the presence of pollen of boreal trees such as beech (Fagus), maple (Acer), and basswood (Tilia) suggests cooler and wetter conditions. Finally, the NG2 core shows increasing amounts of grapevine pollen at a certain level, which could be the Byzantine period or earlier. At roughly the same time there is also the appearance of walnut pollen suggesting its cultivation nearby, and an increase in weed pollen suggesting intensive cultivation, all perhaps dating to the Byzantine period.
cores for NG2. Our search was guided by the availability of the IKONOS image in the field (digitally no less, thanks to Trelogan), which allowed us to pick out likely coring sites. Initial attempts at the PM (Picnic Meadow) (Figure 59) locality outside the floodplain proper were unsuccessful due to near-surface gravel, although samples were taken and sediments described in the field. After failure at the PM location, we scouted the areas immediately downstream and settled on the SB locality, which immediately proved auspicious. Using the extension rods donated to the project by Lehman, we obtained a 4.6 m core (the maximum reachable depth with our current equipment). Abundant and discreet layers of charcoal and snails, intact bedding structures, and several diagnostic soil features make SB the most exciting core yet. Field observation and interpretation is that SB is a cutoff meander of the Chernaya filled in with pulses of fine grained overbank sediments with intervening periods of stability and soil formation. Based on correlation with NG2 and the MM-AA-BBBP sequences, we tentatively believe SB spans most of the early and middle Holocene and perhaps extends well into the later Holocene.

**Balkas Yukharina and Bermana**

Three key localities come from Balkas Yukharina and Bermana in the southwest portion of the chora: MM, AA, and BBBP. All three have been reported on in previous Annual Reports, and also form the basis for the soil geomorphology section of the recent AJA article (Carter et al 2000). All three are being studied in the lab currently: Lehman for soils and sedimentary data and Cordova for pollen. One of the most significant achievements of the 2000 field season was the integration of these sections within the local Ukrainian paleosol system. That is, comparison of field properties and morphology with other extant and studied paleosols from Ukraine. Ideally, the comparative database would have included Crimean soils as well, but these are essentially unavailable due to historical factors of research organization. In this regard, the generous aid of Gerasimenko and Pashchenko was invaluable. Both observed these sections in the field (and numerous others) and Gerasimenko kindly showed us key sections in the Crimea and south of Kiev.

AA is located below Site 151, within Yukharina Balka. Three soils are represented. At the bottom is a weak soil developed in loamy gully wash. Abundant pollen of jasmine (Jasminum fruticans) and pistachio (Pistacia mutica) suggest a drier, more Mediterranean climate. The middle of the sequence contains the most prominent (cinnamon) soil; it represents a wetter and still warm phase from roughly 3000 B.C. to 1000 B.C. The pollen pattern—willow trees, Cyperaceae (sedge family) and other sub-aquatic species along with an arboreal pollen sum that does not support a regionally moist climate—and the evidence for high groundwater levels in the soil itself give the impression that balka bottoms were wet, meadow-like ribbons running amidst the drier forest-steppe interfluves.

The surrounding slopes were still relatively stable at this point, but sometime after 1000 B.C. the balkas dried out and the surrounding slopes shed the remainder of their subsoils, represented in the AA profile by the upper coarse colluvium. Precise dating of the upper colluvium is not currently possible, but excavation of the dark, ashy deposit at the top of the exposure should provide a maximum date. Another interesting aspect is that those deposits younger than 1000 B.C. show an increase in certain trees, especially the pistachio (Pistacia mutica). This is an ironic situation, given the fact that weeds and cultivated plants also increased at that moment. Among the cultivated plants, the pollen diagram shows grapevine (Vitis vinifera), walnut (Juglans), and cereals. The strong presence of pistachio at this time suggests the hypothesis that Greek colonists may have used these trees as part of their orchards or to mark lot boundaries.

The borrow pit at Balka Bermana (BBBP) yielded perhaps the most surprising result to date. The very well developed soil in the middle of that section was expected to date to ca. 3000 B.C., but instead dated to just over 5000 B.C. Considerable discussion in the field failed to resolve the difference, but the possibility that the soil was actually two soils welded together was raised, as was the possibility of differential representation in the various balkas. Bracketing radiocarbon dates, urgently needed to firmly date the whole sequence, will be available soon. Detailed lab and pollen work are also a priority, because the BBBP exposure is likely to become as important a soil geomorphology reference locality as the site of Balka Bermana is for archaeology.

The overall conclusion reached after discussion in the field and subsequent correspondence is that the current suite of paleoenvironmental research localities represents an excellent database for reconstructing the environmental history of the southwestern Crimea, and compares favorably to that available for southern Ukraine (Donets and lower Dnieper/Bug areas mainly). Most importantly, the environmental histories of southern Ukrainian and the Crimea appear broadly similar.
Conclusion

Taken together, the soil and pollen data at hand indicate a biophysical environment in a constant state of adjustment. Vegetation and soil regimes were still responding to the massive shift in climate caused by deglaciation when catastrophic flooding of the Black Sea basin by marine water from the Mediterranean approximately 5600 B.C. caused the level of the Black Sea to rise by more than 100 m. This in turn brought the sea many kilometers closer to the Heraklean Peninsula than before. This radical and rapid reconfiguration of the land and sea in the southwestern Crimea altered the local climate of the Heraklean Peninsula in ways we do not now precisely understand. Those events surely also affected the Neolithic human occupants of the area and likely led to changes in land use practices. Better information on Neolithic and Bronze Age populations in the southwestern Crimea would help estimate their contribution to middle Holocene changes in vegetation and soils. Similarly, better paleoclimate information from salt lakes relatively unaffected by human land use practices would provide an unbiased assessment of natural factors affecting vegetation and soils. Given the initiatives already underway by other members and associates of the Chersonesos project, in the coming years the southwestern Crimea has the potential to become an outstanding exemplar of interdisciplinary research.

We are currently focusing on the later part of the Holocene and the problem of soil chernozemization because of its relevance to environmental change in the ancient and medieval eras. Although climate and vegetation in the southern steppes demonstrably moves back and forth between wetter and moister phases, there is a net overall shift to drier and more open conditions. This is reflected in the soils as a switch from forest-steppe soils (cinnamon soils) to chernozems (prairie soils). These changes should not be seen as phase states, but rather as a preponderance of one set of interrelated processes or another. The key interpretive question is the relative importance of human land use or climate change in driving the changes in vegetation and soil regime. Initial answers to that conundrum are forthcoming in papers to be presented to the 2001 Annual Meeting of the Association of American Geographers.
Communications Overview

In February 2000 ICA examined its information technology needs for the joint project in Chersonesos, Crimea. The ultimate communications goal is to coordinate the summer fieldwork with the long-term technological development of the National Preserve of the Tauric Chersonesos in Sevastopol.

In our strategic plan, we identified five major areas of growth and improvement at the Preserve:
1. Telephone lines and equipment
2. Internet access
3. Computer equipment and software
4. Web site development
5. Staff training

We initiated the communications plan for the year 2000 (Phase I) and developed approaches (Phase II) for the coming years. Phase I concentrated on reliable Internet access and web site development. Phase II focuses on digitizing the Preserve’s library and archives, creating web-based research databases, and producing an interactive virtual-reality web site to serve both public and scientific interests.

Post-Soviet realities and infrastructure

Working on a scientific project in a remote area of the former Soviet Union that depends on the latest technology is akin to taking a sports car off road and racing through a rock-covered field. Such a driver would be faced with a choice of changing the mode of transport, modifying the route, or building a new road altogether. This summer, we tried a similar combination of all three approaches to achieve our goals. The communications project goes well beyond simply purchasing new equipment for the Museum. Importing computers and software is relatively straightforward; integrating them into the Museum operations and ICA’s summer fieldwork is more complex. Sustaining a productive and efficient technology operation depends on skilled people, and skilled people are the product of investment in education and training. Fortunately, the Museum staff is highly educated, technically sophisticated, and eager to explore the opportunities that technology can offer.

The greatest immediate obstacle for communications, however, is the lack of infrastructure. In summer 2000, the electricity was regularly cut off for several hours a day. Power surges damaged equipment. Telephone service was interrupted for days at a time. Ukrainian telecommunications infrastructure is seriously antiquated, with over half the equipment network at least 20 years old. (Some of the oldest switches are pre-revolutionary.)

Figure 62. Dacha One, site of the communications headquarters, with a newly-installed satellite dish.
The telephone line of Dacha One, where we set up our field workstation, was split among three telephones in the Preserve, precariously spanning the 100 meters from the Museum to the Dacha. The resulting signal was too weak, allowing modem connection rates of no greater than 14.4 Kb/second, and often no more than 300 bps. (At this rate, an average web page of 60 KB would take twelve minutes to load.) This limitation, coupled with unreliable Internet access providers, effectively eliminated the option of dialup Internet access.

As an interim solution, we installed a temporary satellite connection, bypassing the telephone system. Our efforts were unexpectedly foiled by communications interruptions from the Black Sea fleet. Ultimately, we purchased a generator, laid new cable, and installed our own switching equipment at the phone company station. The Museum now has Internet access at the rate of 115 Kbps (allowing the average web page to load in about five seconds), which is now used for web research and e-mail.

In spite of the overwhelming difficulties related to Sevastopol’s communications and energy network, ICA made key equipment purchases, identified local technology partners, and prepared the staff for the introduction of computer-based operations. The outcome of our communication groundwork includes making the research for the National Preserve of Tauric Chersonesos available on the Internet, improving the efficiency of research and data compilation, and preparing the Museum for the establishment of the Archaeological Park and International Field School.

**Preserve Involvement**

A Slavic proverb, “the appetite arrives during a meal,” reflects the notion that desire or facility increases as an activity proceeds. ICA’s technological improvements for the Preserve enhanced the work environment by providing e-mail and Internet access for museum personnel. An additional benefit of our comprehensive technological plan is that the Preserve staff has a renewed interest collaborating on tasks and projects that are now a possibility with the new technology. This “appetite” can be seen in the Museum’s creation of a database for the library holdings, preserving and cataloging the archive holdings, conducting Internet-based research, networking with colleagues world wide, and using computer software for GIS, Global Positioning Systems, and other technologies essential to NPTC projects.

**Telephone lines and equipment**

Telephone communications dramatically improved this summer. ICA installed a dedicated line for Internet access, a separate line for the new Museum phone system, and five cellular telephones for field coordination. Thanks to the new equipment and Internet access, ICA and the Museum also have the capability to videoconference, exchange real-time images, and even remotely monitor the rooms in which the cameras are located.

**Internet Access**

During the summer 2000 season we had limited Internet access with dialup service satellite links. High speed Digital Subscriber Line (DSL) Internet access was added in November.
Computer equipment and software
ICA acquired two new powerful desktop computers, a scanner, a digital camera, and other peripherals to upgrade museum communications. One system is located in the museum library for general use by staff. The second system, located in an adjacent room, is used for creation of web-based material. Software was evaluated, upgraded, and standardized with the Austin offices. Given the tenuous situation with electricity, ICA also furnished the museum with a generator during power outages.

Web sites
Creation of the Preserve web site (www.chersonesos.org) was the primary focus of communications work during the summer. Lyudmila (Lucy) Grinenko is the main editor of the web site, which displays information in English, Ukrainian, and Russian. With steady contributions of research and articles by the Museum staff, the web site will continue to expand and their research will be available to a wider audience.

Over the past year, ICA also made substantial additions to its web site at www.utexas.edu/research/ica. We reorganized the information at the site and added new features including 360-degree panoramic movies, a search engine, annual reports, and Italian, Ukrainian, and Russian summary introductions.

Technical training of Chersonesos staff
Most of the training this summer excavation season was devoted to Lucy and Nonna Krasovskaya from the Museum Library and Archives. To continue this critical process ICA has made arrangements for year-round computer training of the museum staff by Sevastopol Technical University, in Internet, e-mail, and basic administrative programs (word processing, spreadsheets, database, and accounting).

Phase II
Phase II is the implementation stage of many of the projects that were initiated during the 2000 campaign. Some of the highest priority items include:
• Adding computer equipment for researchers
• Computer training of museum staff by Sevastopol Technical University
• Creating databases for fieldwork, archives, library, etc.
• Web integration of and access to created databases
• Preserving and digitizing library and archives
• Managing Chersonesos and ICA web sites
• Producing multimedia web site for Chersonesos

Conclusion
The foundation for major improvements in communications has been laid. Ultimate success depends upon further investment in equipment and continued training for the Museum staff. By the 2001 field season, we expect to overcome the technological lags and obstacles that have become an accepted way of life in the former USSR. With sustained oversight and direction from ICA, communications between Austin and Sevastopol will greatly improve and the Museum will soon be in a position logistically to handle the larger projects, specifically an Archaeological Preserve and International Field School.

Figure 64. Nonna Krasovskaya and Glenn Mack discuss the Library Archive database.
METAPONTO
2000 Campaign

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Dr. Mariah Wade, *Director of Ceramic Studies*, ICA
Don Wade, MS, Geologist
Dr. Kara Nicholas, *Research Associate*, ICA
Dr. Vincenzo Cracolici, *Consultant*, Metaponto
Cesare Raho, *Draftsman*, Metaponto
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Justin Walsh, MA, Art History, University of Virginia

SURVEY TEAM
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Christian Hartnett, *Assistant Survey Leader*, ICA
Kevin Bain, *Field Walker*, UT
Michael Fronda, *Field Walker*, Ohio State University and
American Academy in Rome
Cindy Young, *Field Walker*, University of Virginia and
American Academy in Rome
Alexander Alderman, *Field Walker*, Brown University and
American Academy in Rome
Anna Cavallo, *Fieldwalker*, University of Turin

PHYSICAL ANTHROPOLOGICAL STUDY
Prof. Maciej Henneberg, University of Adelaide
Dr. Renata Henneberg, University of Adelaide
Ms. Sarah Sheikh, Oxford University
Ms. Mimi Sheikh, University of Edinburgh

The Ceramics group at work in Metaponto.
Left to right: James Collins, Dr. Vincenzo Cracolici, Dr. Mariah Wade, and Bronwen Wickkiser.
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2000 Campaign

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Asele Surina, MA, Assistant to the Director

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Mikhail Molchanov, Moscow
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Roman Stoyanov, Ukraine University
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Anton Valento, Sevastopol
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GEOPHYSICAL PROSPECTION
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Elena Shakuro, Nizhny Novgorod

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Taissa Bushnell, Pottery Lab Manager, McGill University
Dr. Cosima Castronovi, Draftsperson, University of Lecce
Antonietta Shevchenko, Catalogue, NPTC
Denis Zhuravlev, Consultant, State Historical Museum, Moscow

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Nikolai Andrushenko, Architect, Kyiv
Tatiana Bazhanova, Architect, Kyiv
Seth Bossung, Architect, UT School of Architecture
Dr. Steve Gavel, Consultant, Yemese, South Carolina
Martha Kennan, Architect, Austin
Alma Maldonado, Landscape Architect, MArch, Austin
Stan Pipkin, Architect, UT School of Architecture
Stanislav Ryzhov, Archaeologist, Director, Chersonesos Excavation, National Preserve

POLYCHROME STELAI PROJECT
Prof. Paula Perlman, Epigraphy, UT Classics, Austin
Dr. Richard Posamentir, Ultraviolet Study, University of Bochum
Christopher Williams, Photographer, ICA

TRANSLATION
Svetlana Telenkova, Simultaneous Interpreter, Kyiv
Alisa Lozhkina, Translator, Kyiv-Mohyla Academy, Kyiv

DRIVERS
Orest Yavtushenko (and Translator)
Vassily Kiritchenko

CONSERVATION
Vera Nikolaenko, Leader, NPTC
Lilia Bondareva, Nikitski Botanical Garden, Yalta
Sergei Demyanchuk, Sevastopol
Anna Kovaleva, Sevastopol
Sergei Kutykin, Sevastopol
Roman Smirnov, Sevastopol
A gathering of crewmembers in front of Dacha Two, June, 2000
PUBLICATIONS OF THE INSTITUTE
2000

PUBLICATIONS AND ARTICLES
APPEARING IN SCHOLARLY JOURNALS
OR COLLECTIONS
BY STAFF MEMBERS

Joseph Coleman Carter, Melba Crawford, Paul Lehman, Galina Nikolaenko, Jessica Trelogan
“The Chora of Chersonesos in Crimea, Ukraine,”

J.C. Carter

PUBLICATIONS OF ICA

WEBSITES
www.utexas.edu/research/ica
www.chersonesos.org

AWARDS & RECOGNITIONS
Professor Carter delivered the Jerome Lectures at the University of Michigan, November 2000, and was made a Corresponding Member of the German Archaeological Institute, Berlin, December 9, 2000.

INVITED PAPERS AT MEETINGS
BY STAFF MEMBERS

J.C. Carter
“Discovering the Greek Countryside at Metaponto” Thomas Spencer Jerome Lectures, University of Michigan (Nov. 2000) and The American Academy in Rome (May 2001). To be published as a book by the University of Michigan Press.
“Archaeologists and Scientists in Search of the Ancient Greek Farmer” (Nov. 6, 2000)
“The Early Settlers” (Nov. 8, 2000)
“Dividing the Land” (Nov. 10, 2000)
“Life, Worship, Death, and Rebirth in the Chora” (Nov. 13, 2000)
“Chora and Polis” (Nov. 15, 2000)

J.C. Carter
“La Chora di Metaponto: Venticinque anni di ricerca,” 40 Convegno di studi sulla Magna Grecia, Taranto, October 1, 2000 (to be published)
“Color at Chersonesos (on the Black Sea): Funerary Monuments from the Early Hellenistic Necropolis,” in the international conference, Color in Ancient Greece, Getty Museum and Aristotle University, Thessaloniki, April 14, 2000 (to be published)

J.C. Carter, S.M. Thompson, J.Trelogan
“The Systems of Land Division in the Chorai of Metaponto and Chersonesos (Crimea),” in the “Chora and Polis” Kolloquium des Historischen Kollegs, Munich April 6, 2000 (to be published)

S.M. Thompson
“Problemi e principi delle ricognizioni archeologiche,” 40 Convegno di studi sulla Magna Grecia, Taranto, September 30, 2000 (to be published)
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The Honorable Carlos Pascual, U.S. Ambassador to Ukraine, Kyiv
The Honorable Konstantyn Hryschenko, Ukrainian Ambassador to the U.S.
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Dr. Galina Nikolaenko, Deputy Director, National Preserve of Tauric Chersonesos
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Dr. Marilyn Perry, President, The Samuel H. Kress Foundation, New York
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**DIRECTOR**  
Professor Joseph Coleman Carter

**ADMINISTRATIVE ASSOCIATE**  
Asele Surina, MA

**RESEARCH SCIENTISTS**

- Publications, *Chora of Metaponto* series  
  Dr. Mariah Wade, Ceramic Analysis  
  Dr. Stephen Thompson, Survey

- Remote Sensing and GIS  
  Jessica Trelogan, MA (Chersonesos and Metaponto)

- Geomorphology  
  Paul Lehman, MA (Chersonesos)

**RESEARCH ASSOCIATES**

- Alberto Prieto, MA (Metaponto)  
- Irina Harris, MA (Chersonesos)

**RESEARCH ASSISTANTS**

- James Collins (Metaponto)  
- Christian Hartnett, BA (Chersonesos and Metaponto)

**COMMUNICATIONS COORDINATOR**  
Glenn Mack, MA

**TRANSLATION AND RESEARCH**

- Evgeniy Tkachuk, BA (Russian & Ukrainian)

**PUBLICATIONS**

- Christopher Williams, BA

**OFFICE MANAGER**  
Pat Irwin

**Centro di Agroarcheologia Pantanello (CAP)**

**DIRECTOR**  
Professor Joseph Coleman Carter

**ADMINISTRATOR**  
Dr. Rosetta Torraco

**OPERATIONS**  
Giuseppe DiTaranto

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**Collaborators**

**Chersonesos**

- Dr. Leonid Marchenko, Sevastopol, Director, NPTC
- Dr. Galina Nikolaenko, Sevastopol, Deputy Director, NPTC
- Mikhail Nikolaenko, Sevastopol, Chief of Technical Department, NPTC
- Vera Nikolaenko, Sevastopol, Conservator, NPTC

**Metaponto-Pantanello**

- Cosimo D’Anzi, Cooperativa Pantanello (Maintenance of archaeological site)
- Rocco Torraco, Azienda Pantanello (Technical support)

**Austin & other locations**

**REMOTE SENSING**

- Prof. Melba Crawford, Co-principal investigator, NASA Project, Center for Space Research (CSR)
- Amy Neuenschwander, Aerospace engineer, CSR
- Larry Teng, Aerospace engineer, CSR
- Ing. Enrico Pieragostini, Telespazio, Rome (Remote sensing data acquisition and analysis)
- Dr. Gianfranco Pandiscia, Telespazio, Matera (Remote Sensing)

**POTTERY STUDY**

- Prof. Paul Arthur, University of Lecce (Roman and Medieval Ceramics)
- Dr. R. J. Cashwell, Director and Dr. Robert Agasie, Associate Director, Nuclear Reactor Laboratory, University of Wisconsin-Madison

**PALEOECOLOGY**

- Prof. Carlos Cordova, Oklahoma State University (Palynology, Paleoecology) Stillwater, Oklahoma

**PHYSICAL ANTHROPOLOGY**

- Prof. Maciej Henneberg, University of Adelaide
- Dr. Renata Henneberg, University of Adelaide

**PLANNING AND ARCHITECTURE**

- Carl Holiday, MArch, MS
- Alma Maldonado, MArch
- Nikolai Andrushenko, Kyiv
- Tatiana Bazhanova, Kyiv

**TRANSLATION**

- Svetlana Telenkova, Kyiv