

CONTEXT

Archaeology in the Space Age

by James R. Wiseman

Remote-sensing technology may represent a scientific breakthrough as significant for archaeology in the second half of this century as radiocarbon dating was in the first half. It is, in any case, certain to affect radically the way archaeologists plan and carry out archaeological reconnaissance, and is likely to have a much broader effect on the overall designs of multidisciplinary projects concerned with the study of ancient societies in their environmental settings.

The kind of remote sensing referred to here is made possible by devices mounted both on spacecraft (that is, satellites and the shuttle) and aircraft. These de-

vices, which we may call collectively sensors, are able to detect, or "sense", on wavelengths that cannot be detected by the human eye or by conventional photography. The human eye, in fact, can "see" only a very small part of the electromagnetic spectrum, and even infrared photography normally records only slightly within the spectral region of near or mid infrared, as illustrated in Figure 1. The remote sensors, then, are able to "see" not only in bands of visible light and near infrared, but also in bands within other spectral regions, as in the cases, for example, of the Multi-Spectral Scanner (MSS) or the Thematic Mapper (TM), as indicated in Figure 1. What is more, imaging radar carried on shuttle flights and aircraft make possible the recording of images carried by microwave (see Fig. 1, where SAR = side angle radar).

The data collected by these machines are automatically recorded,

during flight, as digitized information on magnetic tape. The digitized images can then be analyzed with the aid of a highly sophisticated computer software package developed by NASA's Earth Resources Laboratory (ERL). This software, known by the acronym ELAS, enables researchers to create an image that we can see on a computer screen. ELAS also has a variety of analytical programs to enhance the image and to diagnose the information. The image can then be photographed in black and white or in color, in negative film or transparency for slides. We then can see what otherwise could not be seen.

The potential of this new technology, developed in large part by NASA, has only begun to be tapped for archaeological research, although scholars in geology, geography, and other disciplines have been making some use of the technology for several years. A

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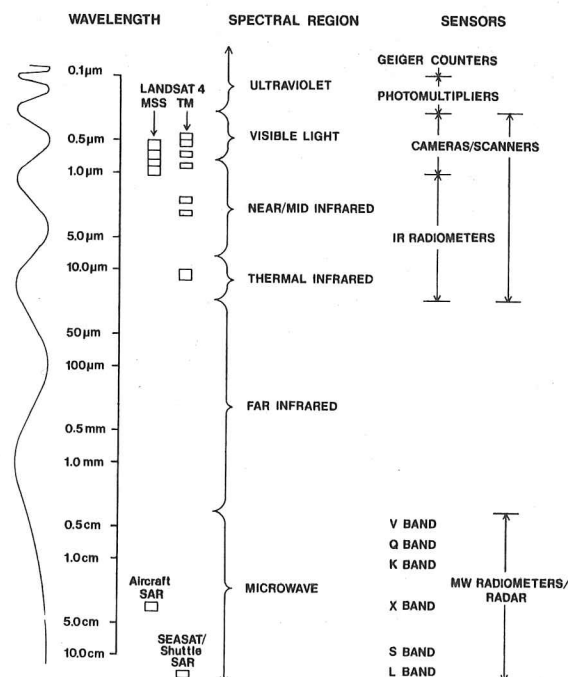


Figure 1. Diagram showing the electromagnetic spectrum and some of the capabilities of selected sensors. Illustrations for this article are published through the courtesy of the Earth Resources Laboratory.

few examples of what the sensors can detect are given here to illustrate some aspects of that potential.

Tom Sever, Staff Archaeologist at ERL, was able last year to detect prehistoric roads and walls in Chaco Canyon, New Mexico, by using computer-enhanced images of data gathered by a Thermal Infrared Multispectral Scanner (TIMS) mounted on an aircraft (Fig. 2). That sensor measures and records the amount of radiant energy reflected and produced by features of the terrain. The Thematic Mapper (TM), transported by satellites, records images in a similar manner over immense regions of the earth. At present, however, the smallest visual unit that can be recorded by the TM is limited to 30 m. square, while aircraft-borne sensors, since they are much closer to the terrain, are capable of considerably finer resolution. The TIMS data used to create the photograph in Figure 2, for example, provided a 5-meter resolution. The advantage of extensive coverage, then, is sacrificed for finer resolution when the latter technique is employed.

Clouds, which often cover much of the surface of the earth, and certain other types of obstructions, however, can hinder the functions of such sensors. Radar, on the other hand, sends out microwave signals that penetrate not only cloud layers, but, in certain bands, will penetrate, to as yet undetermined depths, some types of more immediate surface cover, such as jungle canopy or desert sand. The radar wave is reflected by various features on or near the surface and a digitized image can then be created with the aid of a computer.

Data gathered by aircraft-borne radar recently was used by R.E.W. Adams (University of Texas at San Antonio) and his colleagues to detect ridged agricultural fields that had been made and used by the prehistoric Maya in Central America. But perhaps the most dramatic example of the potential remote-sensing by radar holds for archaeology is provided by Figures 3 and 4. Figure 3 shows a Landsat image of a portion of the Sudanese desert; only clouds and sand can be seen. The diagonal

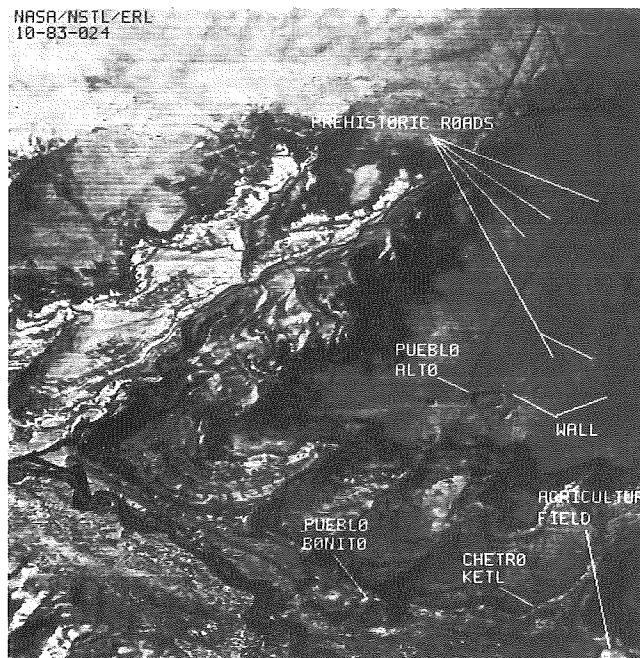


Figure 2. Prehistoric roads and other archaeological features in Chaco Canyon defined on a computer-enhanced image derived from TIMS data.

swath across Figure 3 represents a 50-kilometer-wide area recorded by shuttle imaging radar (SIR-A), and in Figure 4 the images detected by SIR-A are shown: they are prehistoric river beds long buried deep beneath the sands of the Sahara.

A few other projects have made use of remote sensing, but in general the technology, until recently, has had little impact on the discipline of archaeology. During the past eighteen months the archaeological community has taken a number of steps to integrate the new technology into the archaeologist's tool kit. A small committee created by the united action of all the national archaeological organizations met in December, 1983, with Dr. S. G. Tilford, Director of NASA's Earth Science and Applications Division, and other representatives of NASA, including Mr. D. W. Mooneyhan, Director of ERL. The meeting resulted in several positive joint actions.

Archaeological research received an immediate boost: NASA agreed to fund the remote-sensing aspects of a few trial projects. Two projects that were already receiving basic funding by NSF subsequently received NASA funds for remote-sensing research to be carried out jointly with the Earth Resources Laboratory. The two projects selected involve work in a semi-arid region of East Africa under the direction of Glyn Isaac (Harvard University) and Frank

Brown (University of Utah), and in the tropical jungle of a volcanic region of Costa Rica, directed by Payson Sheets (University of Colorado). The shuttle flight in September, 1984, gathered radar data (SIR-B) of the Lake Turkana region that is now being analyzed as a part of the Isaac/Brown archaeological project, and a variety of other types of remote-sensing data are serving the aims of archaeological research in both projects.

During the December meeting Mr. Mooneyhan offered the facilities of ERL at the National Space Technology Laboratories in Mississippi for a conference of archaeologists who would then have the opportunity to see and hear presentations by NASA scientists of research that was believed to hold methodological significance for archaeology, as well as to discuss among themselves the implications of the new technology for the discipline. The Committee accepted the invitation and immediately set to work to plan the Conference and to find the additional necessary funding. Tom Sever and the author of this report prepared the proposal on behalf of the Committee, which resulted in grants to Boston University from NSF and the National Geographic Society for the Conference at ERL.

The Conference, which was held on March 1 and 2, 1984, was attended by 22 archaeologists, including scholars working both in the Old World and New World

and concerned both with prehistoric and historical times. The archaeologists spent the first day hearing/seeing a series of presentations that provided an overview of the new technology, details on the sensors themselves, and current research in archaeology, small feature extraction (surface mines), categorizing and quantifying the volcanic eruption of Mt. St. Helens, data-base analysis using Olympic National Park in Washington, geobotany, corridor analysis, and data-base development for soil erosion modelling. The latter two presentations involved important approaches to predictive modelling that might readily be applied in archaeological research, and all presentations were not only informative, but also demonstrated techniques that can be applied in archaeology.

Lively discussions followed each presentation, and the discussion to which the second day of the Conference was devoted was equally spirited and thoughtful. Much of the discussion on the second day was aimed at developing a policy that might provide guidelines for the Committee, which was asked to continue to represent the discipline in discussions with NASA. The same statement was expected also to serve as a guide for the immediate future of remote sensing in archaeology



Figure 3. Landsat image of a portion of the Sudanese desert. Note the diagonal band and compare it with the same band in Figure 4.

both for NASA and for the archaeological discipline. It was the consensus of the participants that the most immediate applications of remote-sensing technology and related computer analysis would most properly be in the analysis of the environments of human societies and the interrelationships of the societies and environments. Concern was also expressed for utilizing the technology's predictive capabilities to generate and test models of human behavior and environmental change, and for bringing these applications to bear especially on endangered cultural resources.

In other action the participants endorsed the previous actions of the Committee, resolved itself into an Advisory Council for the Committee, and resolved to disseminate the results of the Conference as broadly as possible. That report, written by Sever and Wiseman at the request of the other Conference participants, has now been completed and is being published as a volume by the Earth Resources Laboratory. In addition to a full report on action taken at the Conference, the book includes a section on the fundamentals of remote sensing, a summary of the presentations at the Conference, a glossary of terms, and a select bibliography on remote sensing. The book is expected to be available by



Figure 4. Prehistoric riverbeds buried beneath the sands of the Sahara as detected by SIR-A.

December 1984.

Another recent development that will be of particular interest to readers of *Context* is the planning that is now well underway for the establishing of a Center for Remote Sensing at Boston University. Departments involved in the planning stage are Archaeology, Geography, and Geology, but the Center will be open to other disciplines as well. There is hope that the new Center will be in operation before the end of the academic year. The next issue of *Context* will carry a report on the proposed Center and on update on its status.

Participants in the Conference were Robert McC. Adams (then Provost of the University of Chicago, now Secretary of the Smithsonian Institution), William Hampton Adams (Colonial Williamsburg Foundation), Larry Banks (Army Corps of Engineers), Carole Crumley (University of North Carolina at Chapel Hill), William Fitzhugh (National Museum of Natural History, Smithsonian Institution), George C. Frison (University of Wyoming), Danial Gross (Anthropology Program, National Science Foundation), Cynthia Irwin-Williams (Desert Research Institute, University of Nevada), Glyn Isaac (Harvard University), Thomas W. Jacobsen (Indiana University), Richard S. MacNeish (Boston University), Charles R. McGimsey, III (Arkansas Archeological Survey), James Muhly (University of Pennsylvania), J. Wilson Myers (Michigan State University), George Rapp, Jr. (University of Minnesota at Duluth), Bert Salwen (New York University), Joe D. Seger (Cobb Institute of Archaeology, Mississippi State University), Eugene Sterud (Research Division, National Endowment for the Humanities), Patty Jo Watson (Washington University), Gordon Willey (Harvard University), and John Yellen (Anthropology Program, National Science Foundation), in addition to Thomas Sever of ERL and the present author. The Committee on Remote Sensing in Archaeology is at present composed of Fitzhugh, Rapp, Sever, Wiseman, and Yellen, along with James Judge (National Park Service, Chaco Canyon) and George Stuart (National Geographic Society), who were unable to attend the Conference.

Readers of Context may obtain a free copy of Thomas L. Sever and James Wiseman, Remote Sensing in Archaeology: Potential for the Future. Report on a Conference, March 1-2, 1984, by writing to ERL Publications, Earth Resources Laboratory, NSTL Station, Mississippi 39529.

Cuervo Archaeological Digital Imaging Project

by Laura Leach-Palm and Richard S. MacNeish

This past August in the high deserts northwest of Albuquerque, New Mexico, Dr. Richard S. MacNeish, Professor of Archaeology at Boston University, and Rus Gant, Research Fellow at M.I.T., with a crew of six, initiated the Cuervo Archaeological Digital Imaging Project.

This multidisciplinary project has three purposes. The first is to test the feasibility of a "digital imaging tool kit," that Rus Gant had been requested to develop. This would be a generic kit that could be easily accessible and applicable for any archaeological project. The second objective was to supplement Dr. Cynthia Irwin-Williams' research in the Arroyo Cuervo region, which is the cultural backdrop to the well known Pueblo cultures. And the third purpose is to collect data to test Dr. MacNeish's secondary development hypothesis on the origin of agriculture.

Equipment and services of the Boston University Center for Archaeological Studies; Massachusetts Institute of Technology, which generously provided most of the computer equipment; University of Nevada, Reno; and University of New Mexico, Albuquerque, all contributed to the success of the project.

The crew for this excavation included Jane Dineen, who recently received her M.A. from Boston University; Laura Leach-Palm, a graduate student at Boston University; Bruno Marino, previously of Boston University; and Richard Duncan and Robert Swain, both of Cynthia Irwin-Williams' Desert Research Center.

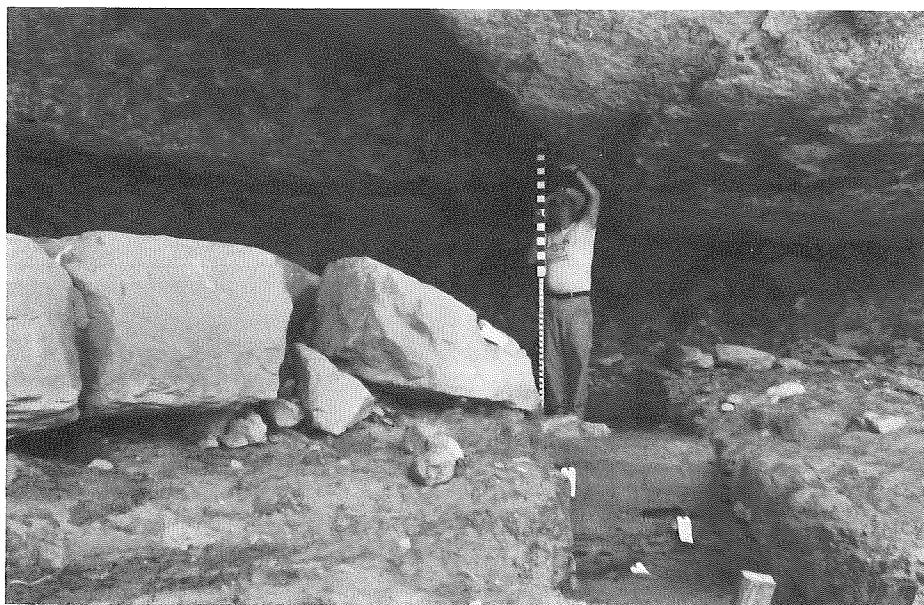
The excavation was at Cuervo Cave, Arroyo Cuervo, in the northern southwest. This semiarid land ranges between 5,000 and 7,000 feet in altitude and consists of a number of micro-environments with varied vegetation and

resources. The research done by Irwin-Williams, between 1964 and 1970, resulted in the location of over 600 sites in this area. Her preliminary investigation was aimed at the often neglected question of the adoption of domestic plants and the actual evolution from a hunting and collecting way of life to one of sedentary agriculture, which in turn developed into the sophisticated Anasazi culture. Her work in the Arroyo Cuervo region indicates that the complex factors that effect these processes go back at least 7,000 years in the northern southwest. At Cuervo Cave, 28 stratified layers with a limited number of plant remains and artifacts from each of the various floors were dated from 1200 B.C. to 1400 A.D. This site provided an excellent context for testing the tool kit: a stratified and productive site, but one that would not overwhelm the project with an overabundance of data.

The excavation itself was a 2 x 2 m. unit adjacent to Irwin-Williams' original test trench, which after 20 years was intact with the original labels indentifying the strata still in place. Sandstone boulders from an old roof-fall in the cave were removed by sledge hammer and hand. Prolific pack rat nests were cleared away, and finally the 2 x 2 unit was stacked out. Around the unit an aluminum frame was erected which

provided an overhead mount for lights, a 35 mm camera, a video camera, and an 8 x 10 color camera. The frame also supported a catwalk around the pit from which the cameras could easily be moved over the 1 x 1 m. section of the excavation that was being recorded at any particular time. The computer equipment was housed in a recreational vehicle, which provided a protected, air-conditioned environment for the equipment, as well as power from the vehicle's extra generator. The lights that were needed for the photography were powered by an auxiliary gasoline-engine generator.

The excavation procedure was simple: using Irwin-Williams' test trench for reference, the 2 x 2 unit was excavated in 1 x 1 m. sections, following the natural stratigraphy of the cave midden. Artifacts and plant and animal remains were left *in situ* and pedestaled for easy identification and to maintain the original context. Besides excavation notes, other traditional recording procedures, such as artifact drawings and maps of the floor of each natural level, were used. Afterwards, 35 mm photographs and video recordings of each 1 x 1 m. section of the unit were taken. Using the video image of each section, a floor plot was created on the computer terminal screen, and a catalog number was given to each arti-



Richard MacNeish in Cuervo Cave, standing on the upper levels of Cynthia Irwin-Williams' trench dug twenty years previously.

fact as the map was drawn. The computer operator, viewing the video image on the screen, could outline the unit and then, within that square, mark the location of each artifact as it appeared in the image. A particular symbol indicated the material or artifact type (lithic, bone, ceramic, etc.), and each such symbol received a catalog number. Immediately upon completion of this task the completed floor plot was printed out and given to the excavators, who removed each artifact from its *in situ* location, and bagged and labeled it with its new catalog number. Materials recovered during screening were cataloged separately. At the completion of the excavation, wall profiles were drawn and were also photographed with the 8 x 10 color camera.

Each of these steps, the traditional drawing, mapping, and photography, and the experimental computer/imaging process, was timed to check for the efficiency of the new system. Even though the equipment and the process were unfamiliar to the crew, the comparison between procedures supports the efficiency of the newer system. All relevant field data, diaries, square descriptions, feature descriptions, etc., were transferred to the computer. The end result was an extensive data base for the excavation, including textual and graphic material as well as a videotape. This documentation facilitates in-field analysis, is easily accessible for scholarly interpretation, is easily transportable, and provides objective records of the excavation. What is more, the artifacts and ecofacts, now with a designated computer bank number, will be susceptible to augmentation as analysis proceeds, and new computer programs for interpretation will be possible.

The results promise a significant contribution to the updating and improvement of archaeological interpretation and methods of data collection. Additionally, this information will be integrated into a three-year research plan to be conducted in the southwest near Las Cruces, New Mexico.

Meetings of the Society for Historical Archaeology to be Held in Boston

On January 9-13th, 1985, the Boston Park Plaza Hotel and Towers will be the site for the eighteenth annual conference of the Society for Historical Archaeology, which meets jointly with the Conference on Underwater Archaeology. The SHA/CUA has a combined membership of over 2,000 professional and avocational archaeologists from around the world. The program for this year's conference, sponsored by the Center for Archaeological Studies at Boston University and the North Atlantic Regional Office of the National Park Service, features a wide range of presentations that reflect the broad interests held by members of the Society.

Opening events for the meetings include an Early Bird Tour of archaeology laboratories at the Peabody Museum at Harvard and the Afro-American Museum in Roxbury, on Wednesday, January 9, and a reception at the Park Plaza from 8 to 10 on Wednesday evening. Sessions will be held from Thursday morning through Saturday afternoon, and a book room, employment table, and exhibits will be open each day of the conference. On both Thursday and Friday, a series of Luncheon Roundtable Workshops will be held; participants will be able to choose from a number of topics: Archaeology in the Caribbean; Sportdivers and Nautical Archaeology, City Archaeology Programs; and so forth. Each workshop will be led by a person who is an expert in the field. Other special events include a seafood banquet at the Charlestown Navy Yard (Friday night), a Colonial Tavern Tour (Saturday night), and an Underwater Film Festival (Saturday night). On Sunday, conference registrants may elect to go on one of a variety of tours to local museums or historical sites, such as Saugus, Lowell, Salem, Lexington, Concord, or Old Sturbridge

Village. These tours will focus on archaeological aspects of the historical sites.

As in any conference, the SHA/CUA meetings will consist primarily of papers presented by members of the Society. The program for the Boston meetings contains over 40 sessions. Papers in thematic symposia will last 20 minutes, and current research presentations will be 10 minutes in length. Most presentations will be illustrated with slides.

A list of a few of the symposia topics for the conference testifies to the broad scope of both historical and underwater archaeology: "Acadian Settlement in the Seventeenth Century"; "On The Trail of Columbus"; "The Dating of Ceramics in New England Archaeological Sites"; "Time, Space, and Trade on Galways, A West Indian Sugar Plantation"; "17th-Century Maryland and Virginia"; "The Ancient Mediterranean"; "The Archaeology of Dominance and Resistance"; "Legislation and Marine Archaeology"; and "The Best in State Historic Shipwreck Programs." The Center for Archaeological Studies, in co-sponsoring the conference, is playing a major role in planning for the program and special events. In addition, a number of faculty members as well as graduate and undergraduate students from the Department of Archaeology at Boston University will present papers on their research.

Registration fees for 1985 SHA/CUA meetings prior to the conference will be \$20 for members, \$30 for non-members, and \$15 for student members. Registration at the conference will be \$25, \$30, and \$18, respectively. A special rate for non-members who wish to attend the conference for one day only has been set at \$10. The luncheon workshops, banquet, tours, and film festival involve a small additional fee. For further information about the 1985 SHA/CUA meetings, or for SHA membership information, contact Prof. Mary Beaudry, 1985 SHA/CUA Conference Organizer, Department of Archaeology, Boston University, 232 Bay State Road, Boston, MA 02215.

Reconstructing the Lost Arch of Nero in Rome

by Fred S. Kleiner and Frederick P. Hemans

When Nero died in A.D. 68 the unpopular emperor was declared by the Senate to be an enemy of the state, and many of the monuments of his reign were destroyed. There is considerable evidence, e.g., that a large number of Nero's stone portraits were recut under Vespasian and we know that his fabulous Golden House was eventually buried beneath the Baths of Trajan. One of the most important Neronian monuments that was probably torn down in 68 as a political statement, or burned down in a great fire in 69, was the arch set up in the emperor's honor on the Capitoline hill in Rome in 62 to commemorate Roman military successes against the Parthians in Armenia.

The appearance of Nero's lost arch is known to us from a series of large bronze coins (*sestertii*) struck in Rome and Lyon between 64 and 67. As has already been discussed by Kleiner in a previous issue of *Context* (2:4 [1983] 4-5), the earliest of these coin issues - those struck in Rome, probably at the mint on the Capitoline hill, not far from the arch - give a consistent and reliable picture of what was clearly an extraordinarily precocious monument. The numismatic designs are miniature masterpieces in their own right and are unprecedented not only in the bold three-quarter view of the monument, but also in the realistic proportional relationship between the attic statuary and the arch proper and in the detailed representation of the decoration of the arch. Numismatic reproductions of the arches of Nero's predecessors consisted exclusively of frontal representations where the statues that the arches supported were of exaggerated size, while the arches themselves were small and schematically sketched. The new numismatic approach was dictated by the necessity of representing a new kind of arch on a coin. Certainly the unprecedented

three-quarter view of the arch is to be explained by the presence of a colossal statue in a niche on each short end of the monument and by the hitherto undocumented use of freestanding columns on projecting pedestals, easier to record in a three-quarter than a frontal view. The new balanced proportions of the Neronian numismatic design were also probably motivated by the subject. Only by devoting more space to the arch itself could the abundance of figural sculpture on Nero's arch be indicated. Because of the specificity of the numismatic representations, it has been possible for Kleiner to reconstruct Nero's lost arch in considerable detail, even though no remains of the monument have ever been identified.

Like most Roman honorary arches, the attic of Nero's Capitoline arch was dominated by a large statuary group. Nero stood in a *quadriga* (a chariot drawn by four horses), dressed in the triumphal toga and carrying a palm

branch in his right hand and an eagle-tipped scepter in his left hand, standard attributes of the *triumphator*. To the left of the team of horses stood Victory, holding a palm branch in her left hand and a wreath in her raised right hand, ready to crown the victorious emperor. Peace stood to the right, holding a *cornucopiae* (horn of plenty) in her left hand. This group marks the first time that divine beings appear beside a mortal on an honorary arch in Rome and the first recorded instance in all of Roman art that a personification other than Victory appears in or beside the chariot of a victorious general or emperor. Moreover, on the Arch of Nero it is not the emperor alone who is in the presence of personifications. One step below, atop the columns at the four corners of the arch, stood Roman soldiers. These soldiers are the first documented examples of statues of nameless Romans on an arch. All earlier arches seem to have supported only statues of de-

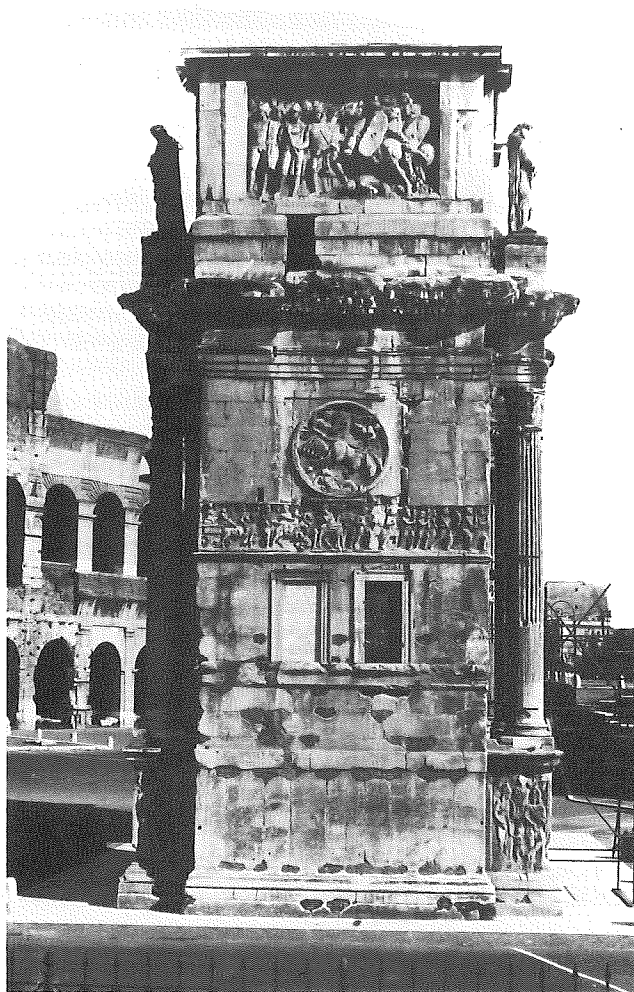


Sestertius of Nero struck in Rome in A.D. 64 with representation of the lost Arch of Nero on the Capitoline hill. (Photo: Hirmer Verlag, Munich)

ities or portraits (occasionally with vanquished barbarians) of those in whose honor the arch was erected. The Neronian soldiers are appropriately separated from, and on a lower plane than, Peace, Victory, and the emperor. Their position is analogous to that of the Dacian prisoners on small bases above the columns on the Arch of Constantine in Rome, constructed 250 years later.

The sides of Nero's arch were also adorned with statuary, although this too was without precedent. Each end of the monument had a large niche housing a colossal statue. The one statue visible on the coins portrays Mars. The choice was an appropriate one. Not only was Mars the Roman god of war, but it was in his temple that Augustus had deposited the standards recovered from the Parthians in 20 B.C. and in which a colossal statue of Nero - the same size as that of Mars himself - was placed after the emperor's initial success against the Parthians in Armenia. The insertion of statuary in niches on the sides of Nero's arch in concert with the placement of statues above each of the columns had an important effect on the character of the monument as a whole. For the first time, one or more statues faced forward on all four sides of the arch and, although the chariot group established one side as the front, heightened interest was given to the rear and sides of the structure.

Between the soldiers on the attic of Nero's arch was a central dedicatory inscription (omitted on the coins for lack of space, but present on all comparable extant monuments) flanked by striding Victories carrying *vexilla* (banners). The inclusion of framed panel reliefs on the attic of the Neronian arch is another new feature paralleled only on later arches, e.g., the Arch of Trajan at Benevento, built a little over 50 years later. The spandrels and piers of each façade of Nero's arch were also covered with relief sculptures of a richness unmatched at the time anywhere outside Gaul. Even the keystone was adorned with a full-length figure of the *Genius Populi Romani*,



Side view of the Arch of Constantine in Rome showing statues atop freestanding columns resting on relief-clad pedestals. (Photo: Deutsches Archäologisches Institut, Rome)



Country facade of the Arch of Trajan at Benevento with figural panels on the attic and piers and reliefs of river gods in the spandrels. (Photo: Fratelli Alinari, Florence)

Continued on next page.

shown semi-nude and carrying a *cornucopiae*, as on one of the keystones of the Arch of Titus in the Forum Romanum, erected two decades later. The spandrels were filled with semi-nude reclining river gods with drapery billowing around them. The use of river gods in the spandrels is also without precedent, but such figures become standard on Roman arches from the second century on, as on the country façade of Trajan's Benevento arch. Below, in the area between the impost pilasters and the corners of the monument, the façades of Nero's arch were also covered with figural reliefs. Like the Victory reliefs on the attic, the reliefs on the piers seem to have consisted of framed panels enclosing single figures. To judge from the earliest Neronian coin representations and the format of other surviving arches, there were two stacked reliefs on each pier of Nero's lost arch. In each of the lower panels a Victory was shown in profile, facing the passageway, in the act of crowning a trophy of Parthian spoils. The identity of the figures in the upper panels is uncertain.

The coins also uniformly indicate that reliefs adorned the pedestals beneath the freestanding columns at the four corners of the arch. In this respect too, Nero's arch stands at the beginning of a long line of monuments. The reliefs on the pedestals of later arches in Rome depict captives bound to trophies, Roman soldiers and prisoners, and Victories. This may have been the case on Nero's lost arch as well, but the identity of the pedestal relief figures on the coins cannot be discerned.

The use of freestanding columns and a bracketed entablature on Nero's arch, as on the later Arches of Septimius Severus and Constantine in Rome, is perhaps the most extraordinary aspect of a design that is revolutionary in so many respects. Although a projecting entablature over engaged columns is documented as early as 27 B.C. on the Arch of Augustus at Rimini, freestanding columns had never before been used on an arch. Indeed, the Arch of Nero constitutes the first example anywhere of freestanding columns

and a bracketed entablature on an external wall. The idea was taken up fairly quickly by Flavian and Trajanic architects and has, in fact, heretofore been thought to be an innovation of the later first century. On Nero's arch the freestanding columns were already combined with deep niches, thereby creating a colorful effect that one associates more frequently with stage and fountain designs than with arches and gates.

Because of the importance of the Arch of Nero as reconstructed by Kleiner, based on the numismatic representations and the evidence of extant Roman arches, it was desirable that the monument be restored on paper so that the revolutionary character of the lost arch could be conveyed readily. The project of "translating" the information provided by the coins into a drawn reconstruction was undertaken by Hemans, who was able to produce the two drawings illustrated here by comparing the *sestertius* representations with surviving arches and applying the basic principles of Roman architectural design as set forth in the treatise of Vitruvius from the late first century B.C.

Even though no fragments of Nero's arch survive, the dimensions of major components can be determined, at least in relative terms, because the constituent parts of Roman arches and other standard building types are mutually dependent. For example, in the Corinthian order, as on the Arch of Nero, Vitruvius prescribes that the column base height should be one-half the lower diameter (D) of the column; the column eight to nine times D; the architrave height one-half D; and the frieze approximately equal in height to the architrave (depending on whether or not it contains reliefs). The sum of these parts creates an order approximately 12 diameters high. Other proportions can be determined by reference to the coins and other standing arches. Keeping in mind that the column diameter is the basic point of reference, the width of the piers can be ascertained by allowing one D for the space between the column and the end of the

monument and three D for the area between the column and the arch opening. The arch bay should be equal to the width of each pier or one-third the overall width. Thus the entire width of the arch would have been 15 column diameters and the ratio between the width and height 3:4 (excluding the chariot group). In a similar manner the depth of the arch can be approximated: eight column diameters (excluding the pedestals) would be sufficient to accommodate the chariot group on the attic and statuary niches on the sides of the monument.

In the absence of any remains, absolute dimensions cannot, of course, be determined. Nevertheless, a column height of 20 Roman feet (one Roman foot equals 0.295 meters), a height consistent with that of similar arches, would produce a Neronian arch 50 feet tall, with an attic statuary group just over life size. By basing his reconstruction on the proportions of actual arches and canonical Roman practice, Hemans was able to prepare a more accurate drawing than if he had mechanically enlarged the somewhat distorted designs on the coins, where small liberties were regularly taken for the sake of greater clarity.

The boldness of the design of the Arch of Nero as reconstructed here is truly remarkable, and the loss of this extraordinary monument is especially unfortunate. The advanced nature of the design should not, however, come as a surprise to any student of Roman art and architecture, for innovation in the arts was a hallmark of Nero's reign. It was at this time that the Fourth Style of Roman mural painting was born, a style in which fantastic architectural vistas were the norm and in which figures were commonly placed in stage-like settings or shown perched on projecting entablatures. It was also under Nero that pioneers like Severus and Celer made enormous strides toward the formulation of a new Imperial style of vaulted concrete architecture in their designs for the emperor's Golden House. Highly creative use of the traditional elements of classical columnar architecture can also be documented

in Neronian Rome, e.g., in the nymphaeum court of the emperor's Domus Transitoria. The lost Arch of Nero, far ahead of its time, and too often ignored today, is further evidence that the short reign of Nero was one of the most exciting, innovative, and influential periods in the history of Roman art and architecture.

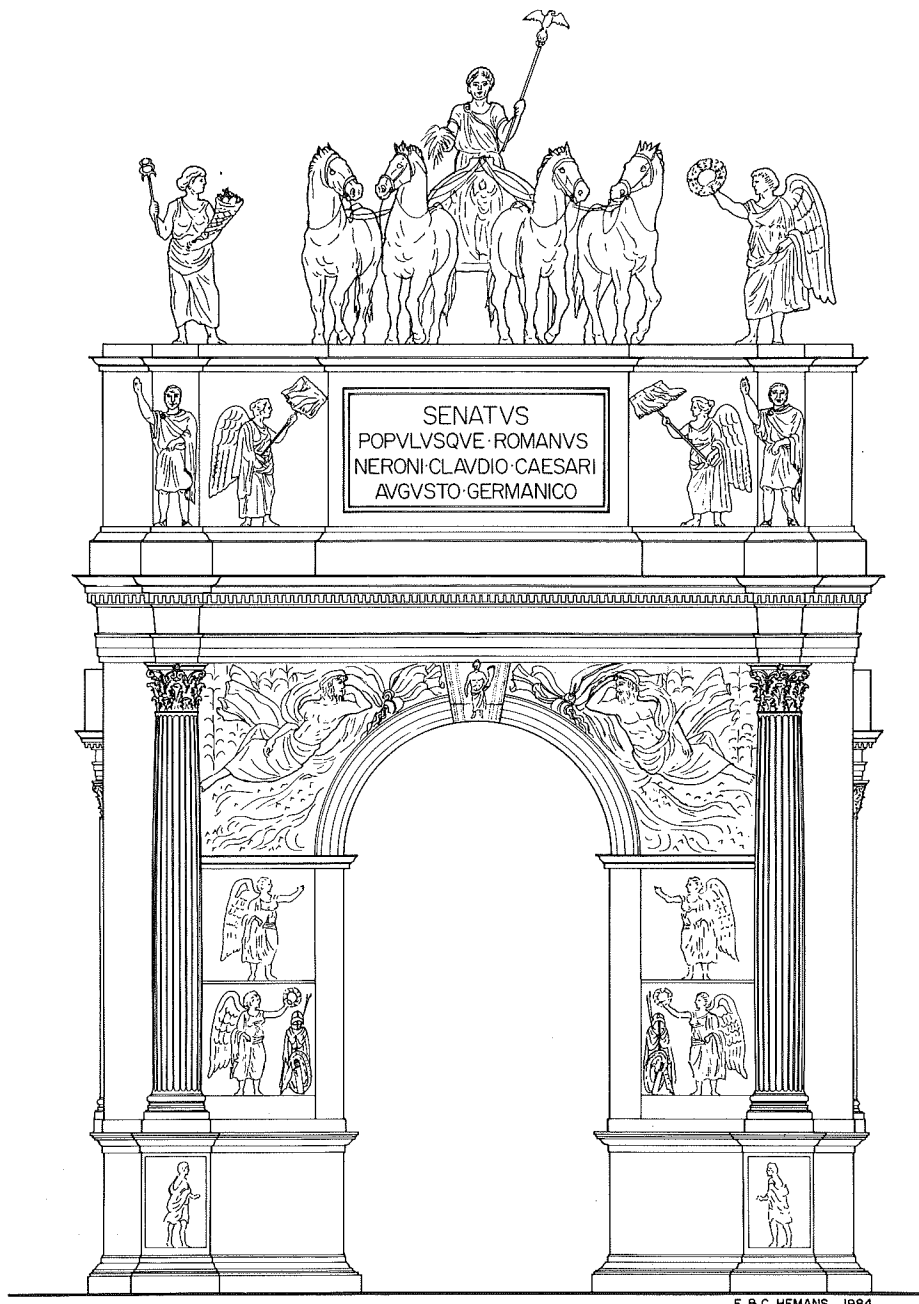
Fred S. Keiner is Associate Professor of Art History and Archaeology and Chairman of the Art History Department

at Boston University. His most recent book, The Arch of Nero in Rome: A Study of the Roman Honorary Arch before and under Nero, will be published later this year in Rome by Dr. Giorgio Bretschneider Editore as a volume in the series Archaeologica.

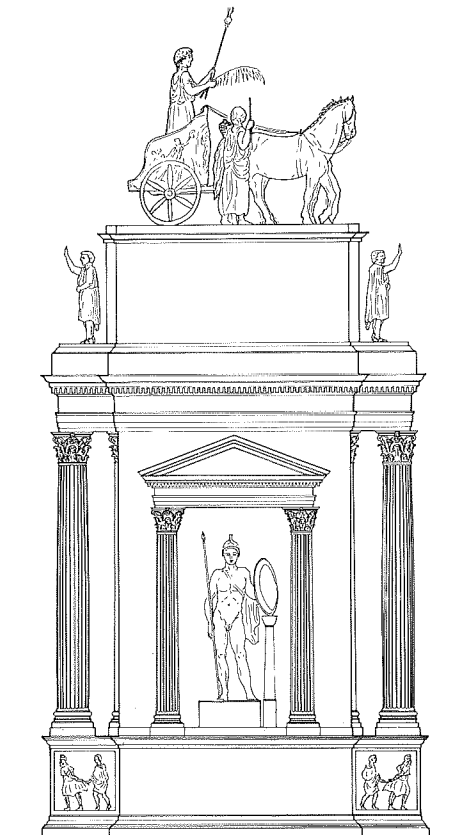
Frederick P. Hemans is a doctoral candidate and Research Fellow in the Department of Archaeology at Boston University. He is currently preparing his dissertation on the Late Antique Residences excavated at the site of Stobi in Yugoslav Macedonia.



Detail of a Neronian sestertius showing the lost arch erected in A.D. 62 to commemorate Roman victories over the Parthians in Armenia. (Photo: Frank Sternberg, Zurich)



Reconstruction of the façade and side of the lost Arch of Nero by Fred S. Kleiner; rendered by Frederick P. Hemans assisted by Caroline Hemans.



Center Students Excavate on Three Continents

by Donald Jones

Whether in search of evidence of early man, ancient agricultural practices, or a Revolutionary War battle, archaeologists find field work perhaps the most rewarding aspect of their discipline. This past summer graduate and undergraduate students from the Department of Archaeology at Boston University traveled near and far to pursue their various research interests. The diversity of projects on which these students worked reflects the principles and aims of the Department and the Center for Archaeological Studies: the development and coordination of interdisciplinary archaeological projects on local, national, and international levels. A short synopsis of each of these projects is presented below.

New England

Fort Griswold, Connecticut
The Office of Public Archaeology conducted a one-month intensive survey of Fort Griswold State Park in Groton, Connecticut. Fort Griswold was the site of Connecticut's only Revolutionary War battle, the 1781 massacre of some 150 patriots by a British force led by Benedict Arnold. Today the fort and associated river battery are owned and maintained as a state park by the State of Connecticut. A separate article, by Ricardo Elia, on the Fort Griswold project can be found in this issue of *Context*.

High School Education Program in Lexington, Massachusetts
Roberta Newman of Lexington High School and Judy Dolan co-directed a week-long cooperative education program for high school students during April. This program, involving Lexington High School, the Museum of Our National Heritage, and the Center for Archaeological Studies, was designed to introduce high school students to the techniques of archaeological investigation by allowing them the opportunity to participate in a real excavation. Ms. Dolan prepared the students with several lectures concerning archaeological methods of site survey, excavation, and analysis.

Fieldwork was conducted at the nineteenth- to early twentieth-century Poor Farm or Almshouse site in Lexington.

Portsmouth, New Hampshire
Ms. Dolan also served as crew chief at the Deer Street site in Portsmouth, New Hampshire. Under the direction of Aileen Agnew of Strawberry Banke, Inc., this mitigation project was designed as a study of the development of Portsmouth's North End neighborhood from 1750 through the nineteenth century.

Brookline, Massachusetts
Boston Edison Company contributed funds to the Center for the archaeological reconnaissance of the site of Edison's experimental solar house in Brookline, Massachusetts. This parcel of land was the location of a late-seventeenth-century sawmill and house/tavern owned and operated by Erosamon Drew, a prominent citizen of Brookline. Both the sawmill and the house were constructed in 1693.

Archaeological testing of the parcel was conducted during April under the direction of Dr. Mary C. Beaudry, Assistant Professor of Archaeology at Boston University, and Donald Jones. Nancy Seasholes conducted the historical research; the field and laboratory crew consisted of Irene Good, Conrad Goodwin, Keith Adams, John Shea, Charles Lambiotte, and Anne Yudowitz. The results show that the house/tavern foundation has survived virtually intact, but the mill remains have been greatly disturbed. Recommendations were made to Boston Edison to insure the preservation of the surviving house foundation and to prevent further disturbance to the mill remains.

Barre, Massachusetts
Several students participated in summer field schools in New England to further increase their archaeological skills. Lorinda B. Rodenhiser worked in Barre, Massachusetts, under the direction of John Worrell and David Simmons of Old Sturbridge Village excavating Emerson Bixby's house and blacksmith shop. Both

structures date to the first half of the nineteenth century.

Long Island, Boston, Massachusetts
Suzanna Forster-Castillo participated in a field school conducted by the Department of Anthropology at the University of Massachusetts at Boston. Under the direction of Dr. Barbara Luedtke of UMass-Boston, the field crew conducted a prehistoric site survey of Boston Harbor's Long Island.

The Southwest

Cuervo Cave, New Mexico
Dr. Richard S. MacNeish, Professor of Archaeology at Boston University, and Eugene Gant, currently a research fellow at the Massachusetts Institute of Technology, headed the Cuervo Archaeological Digital Imaging Project at Cuervo Cave near Albuquerque, New Mexico. The project was supported by the Center, MIT, the Desert Research Center of the University of Nevada at Reno, the Department of Anthropology at the University of New Mexico State, and Mr. Langdon Clay of Boston.

Laura Leach-Palm, Jane Dineen, and Bruno Marino worked for one month on the excavation of Cuervo Cave. The main objective of the investigation was to develop and test the feasibility and effectiveness of a "digital imaging tool kit." This experimental procedure could ultimately facilitate the dissemination of raw data as well as aid in interpretation. Additional objectives included supplementing information on the cultural sequences dating to ca. 1200 B.C. to 1400 A.D. and testing Dr. MacNeish's hypothesis on the origins of agriculture using archaeological data from the U.S. Southwest.

The West Indies

Galways Plantation, Montserrat
The Galways Plantation Project conducted its fifth season of field research this summer on the island of Montserrat in the British West Indies (see *Context* 3:3 [1984] 6-7, for the most recent report on the Galways project). This project, under the direction of Dr. Lydia M. Pulsipher, Visiting Research Scholar of the Center and Assistant Professor of Geography at the

University of Tennessee, and Conrad M. Goodwin, is an interdisciplinary study of an eighteenth-century sugar plantation. A four-week field school was held in conjunction with a work-study program for Montserratian secondary school students.

Irene Good, Sara Mascia, Gail Sawtelle, and Michael Litvak participated in the summer field school. Ms. Good received a travel grant from the Graduate School to attend the field school and initiate a palynological study for the project. She is currently conducting analysis of the Galways material at the Department's palynological laboratory. Sara Mascia assembled a ceramic type collection utilizing samples from various sites around Montserrat. The type collection will be used as a guide for the Montserrat National Trust in their development of a national site inventory. Gail Sawtelle supervised the stone-by-stone drawing and excavation of the south room of the boiling house. Her drawing will be used to aid in the interpretation of technological alterations in sugar processing represented at Galways.

Conrad Goodwin received support from the Kaypro Corporation and the Graduate School, to introduce micro-computers to the Montserratian work-study students. These students were instructed in such areas as word processing and statistical analysis using Galways data. Mr. Goodwin also received a travel grant from the Graduate School to attend the Ninth Annual Meeting of the Caribbean Studies Association on the island of St. Kitts. Mr. Goodwin presented a paper entitled "Galways Plantation, Montserrat: A Case Study in Archaeological Research and Economic Development." Using the Galways Project as an example, he discussed how the research designs of American projects conducted in foreign countries should be developed with benefit to the host country.

Donald Jones received a travel grant from the Graduate School to visit the islands of St. Kitts and Antigua. Mr. Jones used these visits to meet and talk with members of the archaeological societies of both islands to determine the po-

tential value of the archaeological and historical collections of St. Kitts and Antigua to his dissertation research concerning New England-West Indies trade.

Results of the Galways Plantation Project will be presented at the Annual Conference of the Society for Historical Archaeology to be held in Boston in January 1985. The symposium will include papers by Mr. Goodwin, Mr. Jones, and Ms. Good. For further details see the article on the SHA conference in this issue of *Context*.

Western Europe

Gruta de Caldeirao, Portugal
William Barnett received a travel grant from the Graduate School and additional support from the Alice M. Brennan Humanities Scholarship fund to initiate his dissertation research in Portugal. He has worked for three months excavating at the Gruta de Caldeirao near Tomar under the direction of Dr. Joao Zilhao of the Museu Nacional de Arqueologia y Etnographica. Dan Finamore, Teresa Mariaca, and Therese Alexander joined the project in excavating Neolithic and Upper Paleolithic sediments in Caldeirao Cave. Mr. Barnett will travel to France and Italy before returning to Lisbon to meet with scholars and examine their collections of Cardial ware pottery.

Abri Dufaure, France
Nuno C. Santos, a Fulbright student from Lisbon and master's student in the Department, worked with the Abri Dufaure Prehistoric Project in the excavation and analysis of an Upper Paleolithic rock shelter in Lorde, Lander, France. He also worked in the Unidade de Arqueologia do Centrade de Historia da Faculdade de letras de Lisboa, analyzing recently excavated materials from Tholos of Eina de Polheinos, Algarve, Portugal.

Great Bedwyn, England
Cathy Alexander worked with the Castle Copse Excavation in Great Bedwyn, Wiltshire, England. Dr. Eric Hostetter of Indiana University directed the excavation of this fourth-century Roman villa. Later in the summer Ms. Alexander vol-

unteered for work at the Graham Webster site, a Roman market hall in Wroxeter, England.

The Mediterranean: Italy, Greece, and Turkey

Ostia, Italy
Elizabeth Shapiro, a University Fellow in the Department, excavated at Castel Parziano, a first-century villa complex located near the ancient Roman port of Ostia. The complex, now used as a presidential estate, is being excavated by the British School at Rome under the direction of Dr. Amanda Claridge, Assistant Director of the school. Ms. Shapiro directed in conducting a survey of the Vicus Augustanus, a bath complex that served neighboring villas including the alleged villa of Pliny.

Argos, Greece
Dino Zamanis participated for two months in an excavation in Argos, Greece, conducted by the Museum of Nafplion and directed by Helen Paleologos, chief archaeologist at the Museum. The site had a long duration of occupation dating from the Early Bronze Age to the Geometric Period. Two burials were excavated this summer, as well as materials such as black obsidian imported from the island of Melos and several ceramic idols, all dating to the Mycenaean Period.

Sardis, Turkey
Frederick Hemans joined the Sardis Excavation Project for six weeks in July and August as senior architect. The Harvard-Cornell excavations are in their third decade of field research, now under the directorship of Dr. Crawford Greenewald of the University of California at Berkeley. Sardis is the well-known city of Croesus, and recent excavation has concentrated on what may prove to be a Lydian fortification wall of the sixth-century B.C.

In September, Mr. Hemans participated in the meetings of the Association Internationale des Études du Sud-Est Européen held in Belgrade, Yugoslavia. His travel was supported by the Graduate School and the Replogle Founda-

Continued on next page.

tion. While there, he gave a paper entitled "Fourth-Century Residential Buildings at Stobi, Yugoslavia," which is part of the subject of his dissertation research.

The Middle East

Tell 'Ain Dara, Syria

Charles Pennington worked for two months on the Tell 'Ain Dara excavation. This project is directed by Dr. Elizabeth Stone, SUNY-Stony Brook, and Dr. Paul Zimansky, Assistant Professor of Archaeology at Boston University (see *Context* 3:3 [1984] 8-9). The aim of this summer's excavation was to investigate a stratified sequence dating from the Bronze Age through the Iron Age and to investigate transitional changes in pottery, architecture, and technology.

Africa

Imerina, Madagascar

Jerry Macomber received a travel grant from the Graduate School and additional support from the University of Michigan to travel to Madagascar to initiate his dissertation research. Mr. Macomber worked with Dr. Henry Wright of the University of Michigan under the auspices of the Musée d'Art et d'Archeologie. They conducted a site survey in the central Imerina region of Madagascar north of Antananarivo, locating two sites thought to be the oldest known in that region.

For his dissertation research, Mr. Macomber is conducting a palynological study using soil samples he collected from areas near Antananarivo. He hopes to determine differences between slash and burn agriculture and paddy agriculture in the archaeological record.

Center Activities, 1984-1985

Workshops

The Center for Archaeological Studies has many interesting events and activities scheduled during the next several months. John Shea will hold a workshop on "The Making of Stone Tools."

John, who majored in Archaeology at Boston University and is now in graduate school at Harvard University, is a lithics use wear specialist and is one of New England's most skilled stone tool makers. The workshop will be held in the Archaeology Research Laboratory, 236 Bay State Road, on two Saturdays and Sundays, December 1-2 and 8-9 between 1 and 4 p.m. The fee is \$75 for Center members; \$95 for nonmembers.

In January and February, Al Wesolowsky will introduce students to the human skeleton in a workshop titled, "What Bone Is This?" Al, who has an M.A. in Anthropology from the University of Texas, has worked for many years in both the New and Old Worlds on the study of human remains. The workshop will cover the techniques of recognizing major human bones and skeletal indices of age and sex. Animal bones will be examined for contrast. The workshop will be held in the Archaeology Research Laboratory, 236 Bay State Road, on two Saturdays and Sundays, January 26-27 and February 2-3, from 1 to 4 p.m. The fee is \$100 for Center members; \$120 for nonmembers.

Colloquia

On Tuesday, December 4, at 5 p.m., the Archaeology Department's Colloquium Series will have a panel discussion, "Contract Archaeology vs. Research Archaeology: Is There a Conflict?" Panelists include: Marley Brown, Director of Excavation and Conservation at Colonial Williamsburg; Dr. Barbara Luedtke, Associate Professor, Department of Anthropology, University of Massachusetts, Boston; Brona Simon, State Archaeologist from the Massachusetts Historical Commission; and Steve Mrozowski, Archaeologist for the City of Boston. Dr. Mary Beaudry will be the moderator and Dr. Dena Dincauze, Associate Professor of Anthropology at the University of Massachusetts, Amherst, will offer concluding remarks. Center members are invited.

Lectures

Dr. Vincent Scully, an internation-

ally known architectural historian, will be lecturing the first three Wednesdays in April, on the 3rd, 10th, and 17th. His subject will be the meaning of sacred Greek architecture, in lectures entitled "Context in Human Societies." Dr. Scully's visit is sponsored by the Humanities Foundation of the College of Liberal Arts. Please check the next issue of *Context* for more details.

Another new Center program this year is a speaker's bureau being organized with the Department of Archaeology's Graduate Student Association. Being developed primarily to provide guest speakers for primary and secondary schools, the bureau also may be able to provide speakers for other groups in the local community. If you are interested in having someone talk to your group, contact the Center Coordinator, Mac Goodwin at 353-3415.

Awards and Honors

Karl M. Petruso, Assistant Professor in the Department of Archaeology, has received a Fulbright Senior Research Award for study in Cyprus this academic year.

Dr. Petruso will be affiliated with the Cyprus American Archaeological Research Institute in Nicosia (a branch of the American Schools of Oriental Research) and the Department of Antiquities of the Republic of Cyprus. His general research interests concern the economic prehistory of the eastern Mediterranean. He reported on his long-term research project in *Context* 3:4 (1984) 8-9. While in Cyprus, Dr. Petruso will study Cypriot systems of weight in the Bronze Age and their affinities with Syrian, Palestinian, Anatolian, and Egyptian systems, with a view to explicating economic relationships among those regions.

James R. Wiseman, Director of the Center, who was a Fellow of the Center for Byzantine Studies at Dumbarton Oaks in Washington, D.C., last year, was recently elected a Corresponding Member of the Deutsches Archäologisches Institut in Berlin.

New Appointments at the Center

Visiting Associate Professor

Jean-Pierre Sodini, who received the Licence de Lettres Classiques in 1965 and the Docteur d'Etat in 1975, is a well-known scholar of the Late Roman and Byzantine periods, and will be Visiting Associate Professor in the spring term. While here, he will be teaching AR 531: Studies in Late Antique Archaeology. Dr. Sodini has published widely in the field of Early Christian archaeology, including a recent book on the ancient marble quarries of Thasos, entitled *Aliki, I, Les carrières de marbre à l'époque paléochrétienne*, Paris 1980.

Senior Research Associate

Elizabeth R. Gebhard, who holds a Ph.D. from the University of Chicago, is Associate Professor of Classics at the University of Illinois at Chicago, and in the spring will be Visiting Professor of Classics at Wellesley College. Dr. Gebhard has been a member of the Stobi (Yugoslavia) Excavation Project since its inception in 1970. She is well known for her research on ancient Greek and Roman theaters and is the author of *The Theater at Isthmia* (University of Chicago Press, Chicago, 1973). Dr. Gebhard is currently preparing the definitive publication on the theater at Stobi.

Research Associate

Paul F. Johnston, who received his B.A. from Middlebury College and his Ph.D. in Classical Archaeology from the University of Pennsylvania, is a leader in the field of underwater archaeology. He is curator of Maritime History at the Peabody Museum of Salem and a faculty member of the University of Massachusetts at Amherst. This fall Dr. Johnston is also a Lecturer in the Department of Archaeology and is teaching an interinstitutional course on Nautical Archaeology here at Boston University (AR 580: Nautical Archaeology). He is the author of numerous publications on nautical archaeology and ancient seamanship in both the New and Old Worlds, including *The Ship and Boat Models of*

Ancient Greece (The Naval Institute Press, Annapolis, in press).

Visiting Research Scholar

Busnagi Rajannan, who is founder and director of the Institute of Kongu Studies in his native Salem District of India, has been appointed Visiting Research Scholar for Fall of 1984. He received his M.A. and Ph.D. from the University of Kansas and last year was a Research Associate in the Center for Asian Development Studies here at Boston University. Dr. Rajannan and Dr. Karl Petruso, of the Department of Archaeology, are developing a research proposal for an archaeological reconnaissance of the Salem District, to begin in 1986.

Research Fellow

Thomas Sever, who received his M.A. in Archaeology from Sangamon State University in Springfield, Illinois, is a remote-sensing expert at NASA's Earth Resources Laboratory in the application of remote-sensing in archaeology. Mr. Sever is currently working with members of the Center to establish a remote-sensing laboratory here at Boston University. Dr. Wiseman, Director of the Center for Archaeological Studies, and Mr. Sever are co-authors of a book to be published by the ERL entitled *Remote Sensing in Archaeology: Potential for the Future, Report on a Conference, March 1-2, 1984*.

CMRAE Announces Summer Institute

The Center for Materials Research in Archaeology and Ethnology (CMRAE) announces its fourth annual Summer Institute course. This one-month intensive investigation of ancient agricultural technology and its reconstruction from archaeological and paleoenvironmental data will be held from June 10 to July 5 at Massachusetts Institute of Technology. It will be taught by Frederick M. Wiseman, Principal Research Scientist, CMRAE, M.I.T.

The course is limited to 15 participants and is open to graduate students, faculty, and post-doctoral staff. Credit must be arranged at the students' home in-

stitutions. The cost is \$500, which covers registration and course materials. Lodging in the M.I.T. dormitories can be arranged for an additional cost of approximately \$800. Financial assistance is available.

For further information and application forms, write to: Professor Suzanne DeAtley, Director, CMRAE Summer Institute, Massachusetts Institute of Technology, Room 8-138, Cambridge, Massachusetts 02139. The deadline for receiving applications is February 15, 1985.

Are You Interested in Digging?

The Center for Archaeological Studies is developing a new and exciting program in experimental archaeology. Several years ago Boston University archaeologists created an archaeological site on the grounds of Sargent Camp in the foothills of New Hampshire. A New England log cabin, with all its accoutrements, was set on fire, and then covered with layers of earth. It is now time to excavate the site. Not only will you be able to learn archaeological field methods working with faculty and staff of the Center, but you will also be able to participate in special mini-workshops such as flint-knapping, artifact processing and analysis, surveying and mapping. Bring your entire family. All age groups are welcome and no experience is necessary.

The Workshop in Experimental Archaeology is scheduled for two successive weekends on Saturday and Sunday, April 13-14 and April 20-21, 1985. Sargent Camp is near Peterboro, New Hampshire and is about a two-hour drive from Boston. The fee, \$100 per person for Center members and \$125 per person for nonmembers for each weekend, includes a cabin bunkbed and four meals. Special family rates for three or more persons are available. Please reserve your space for this unique opportunity by sending a deposit check of \$50 made out to the Center for Archaeological Studies. For additional information contact the Center Coordinator, Mac Goodwin, at 617-353-3415.

Crisis in Archaeological Publication

by Mary C. Beaudry

What do the sites of Pilgrim Edward Winslow's home in Plymouth, Massachusetts, and the Revolutionary War huts of George Washington's Continental Army at Valley Forge, Pennsylvania, have in common? Very little, you may well say. But there is something that characterizes these as well as countless other sites dating to the historical period in North America: a long history of interest and excavation that has never resulted in publication of site reports. Often, even the artifacts have not been studied for site interpretation or exhibits. These circumstances point out a situation in North American archaeology that many feel has reached crisis proportions. The sad truth is that archaeologists, professional and amateur alike, have seldom reported their findings either to their colleagues or to the general public.

The problem is simple: artifact collections and field notes from literally hundreds of sites have long lain dormant in museum basements, unsecured archaeology labs, dusty attics, or worse. Occasional efforts to make use of the materials from such sites have not altered the fact that, as the years go by, both the artifacts and site records steadily deteriorate. As more and more information about these early excavations is lost to us forever, it is increasingly difficult to reconstruct what may have been readily apparent to the archaeologists who actually investigated the sites.

The crisis has been dubbed, rather ponderously, a "crisis in collections management." We are finding ourselves faced with dusty or moldy artifact collections as well as fading site plans, dog-eared field notes, and sketchy, perhaps inaccurate, artifact catalogs. For the most part, archaeologists have been unwilling to face the issue of how to approach these white-elephant collections, feeling that their value is limited at best and that it is better, given

modern advances in archaeological technique, to go out and dig 'fresh' sites.

Recently, however, awareness of the potential for long-neglected archaeological collections to contribute to our knowledge of important aspects of early American history has been steadily growing. The National Park Service, which cares for some of the most famous sites in American history, has spearheaded the movement to bring old archaeology back to life by beginning to conduct systematic evaluations of its collections. NPS archaeologists and others involved in similar 'collections management' projects are attempting to halt the decay of objects that never received proper conservation, to interpret or reinterpret archaeological data, and, whenever possible, to publish reports that give the public as well as other archaeologists an opportunity to learn more about what life was like for our forefathers. The North Atlantic Region of the NPS, for instance, has recently completed recataloging collections from Salem Maritime Historical Park in Massachusetts and from Morristown Battlefield in New Jersey. This work has resulted in publications that describe the collections and evaluate their potential for future research.

The Department of Archaeology at Boston University has recently undertaken two collections management projects. In cooperation with the Mid-Atlantic region of the National Park Service, the Valley Forge Collections Management Project was begun in September, 1984. This will result in the publication of brief site reports and full artifact catalogs for a wide variety of sites that have been excavated at Valley Forge National Historical Park over the last 40 years. The second project involves the reanalysis of three early Pilgrim sites in Plymouth, Massachusetts (see *Context* 2:3 [1982] 2): the homes of Edward Winslow, John Howland, and the R.M. site. The R.M. site was possibly the Clark Garrison destroyed in the Eel River Massacre during King Philip's War (1675-76). This work is funded by the National Endowment for the Humanities, in cooperation with

Plimoth Plantation.

In our study of Plymouth Colony site materials, graduate assistants Douglas George and Donald Jones were continually impressed, as was I, by the quality of the fieldwork conducted in the 1940s by Henry Hornblower II and his colleagues. This group, calling itself the Harvard Excavators Club, consisted of a number of individuals who were trained in the archaeology of the southwestern United States. Although they did not understand all of the features that they uncovered nor correctly identify every artifact from the seventeenth-century sites they dug, the Excavators Club did keep careful records that made our task much easier than it otherwise would have been. We only wish that all archaeologists left behind such thorough records of their excavations.

We have already found that reiving musty collections and field notes can produce unexpected rewards. As we recataloged artifacts from the R.M., Winslow, and Howland sites, we found that many intriguing items, especially gun parts and gun-related paraphernalia, had not been recognized for what they were. Recent excavations in the Chesapeake region, however, have turned up numerous items such as bandolier caps (small lead caps for wooden powder flasks) that helped us to identify the Plymouth military artifacts by providing comparative examples. Douglas George has made a special study of the gun parts from these early sites that, when published as part of the Plymouth project final monograph, will add greatly to our knowledge of the types of firearms that the Pilgrims employed for their personal defense.

We have also been led to reinterpret the types of houses that the first settlers in New England built. Quite a few of the homes of "First Comers," as *Mayflower* passengers were called, have been described as 'longhouses': a type of English medieval house in which the 'byre' for animals occupied one end of the building. The long rectilinear foundations discovered in excavations at the home sites of John Alden, Miles

Standish, and Edward Winslow, as well as at the R.M. site do, indeed, resemble that type of house. More recent study, however, by architectural historians of vernacular building types in Great Britain leads us to believe that wealthier Pilgrim settlers preferred a house plan known as a 'cross passage' house. These homes featured a large open hall with a hearth at one end separated by a narrow passage from an unheated servants' chamber at what was termed the 'lower' end of the house. These homes did not pos-

sess a byre that sheltered animals (the traditional definition of the longhouse), but did provide, through their physical layout, a means of establishing social separation between master and servants. Similar houses were built by the first English colonists to settle the Chesapeake region. There, the replacement, by the end of the seventeenth century, of a labor force of white indentured servants by enslaved Africans caused the cross-passage house to be abandoned in favor of plantation houses with detached slave

quarters. The brief popularity of the cross-passage plan among New England builders remains something of a mystery. Perhaps as we pursue our research into this question, we will begin to understand better the adaptations of Englishmen to New World conditions and the development of distinct material expressions of an Anglo-American society.

Our work on the collections from Valley Forge has only just begun. Douglas George and research assistants Lauren Cook and Sara Mascia are poring over old field notes and recataloging materials from the sites of Washington's headquarters during the winter encampment at Valley Forge, as well as those of his officers. The most intriguing sites at Valley Forge, however, are the huts constructed by the regular soldiers. The hut sites number in the thousands, but only a few have been excavated. Our work is aimed at producing a complete catalog of the finds from all of the sites as well as summary site reports for excavations throughout Valley Forge Park by more than a dozen archaeologists over four decades. In addition to identifying artifacts that require treatment by conservators, our work will permit the archaeologists at the Mid-Atlantic Regional Office of the National Park Service to make careful plans for further archaeology at the park. Thus our 'collections management' document for past excavations at Valley Forge will be crucial to developing a management plan and research design for future archaeologists to follow.

Although the term 'collections management' may seem as dusty and unprepossessing as a file of fading fieldnotes or a box of long-neglected artifacts, it is time for archaeologists to take a hard look at what has happened to all of those materials excavated by themselves or by others since the birth of interest in our below-ground historical heritage. Only by correcting the errors of the past can we hope to excavate responsibly in the future. It goes without saying that if archaeologists can't learn from their own past, they can never hope to teach others the lessons of history.



A seventeenth-century engraving by Jacques de Gheyn illustrating a musketeer equipped with musket, gun rest, lighted fuse, and bandolier belt. Lead caps for bandolier charge cylinders have been found at Pilgrim sites in Plymouth along with other weaponry similar to that shown here.

History and Tradition at a Connecticut Fort

by Ricardo J. Elia

Battlefields hold a special place among historical sites. Preserved as memorials, revered as hallowed ground, battle sites direct our focus to a particular, often brief, moment in time. But battlefields rarely remain unchanged. Some, like the Bunker Hill battleground, were completely consumed by urban or industrial development. Of those that survived, many owe their existence to the fact that they continued to be used as military installations long after the battle. These sites were often later transformed into commemorative parks by people who wished to preserve the memory of those who struggled and died in that place.

From an historical and archaeological perspective, studying a battlefield involves much more than reconstructing "the way it was" on the day of the battle. At fort sites, there are always features and buildings that are an integral part of the site but have little or nothing to do with the way the fort looked during a particular battle. In addition, there are also the battle memorials and monuments themselves, some old enough to be historical structures in their own right.

A recent study of Fort Griswold State Park in Groton, Connecticut, conducted by the Office of Public Archaeology, has shed new light on the archaeology and history of one of the most famous battlefields of the American Revolution, the Battle of Fort Griswold. The OPA survey has also contributed to a greater understanding of the attitudes and processes that transform places of conflict into commemorative space.

The Battle of Fort Griswold was part of an attack on New London and Groton by the British late in the war. For years, the harbor at New London had been a thorn in the British side, chiefly because it was a center for American privateers, piratical patriots who preyed on British supply ships

and split their booty with the Colonial government. On September 6, 1781, a British force, commanded by turncoat Benedict Arnold, attacked New London, while a second force assaulted Fort Griswold, which protected New London harbor from the opposite side of the Thames River.

At first glance, Fort Griswold seems an unlikely spot to be preserved as a commemorative battleground. After all, the site of one of the most disastrous American defeats during the entire Revolutionary War seems an odd place for a state park. A consideration of the battle, however, clarifies the issue.

The Battle at Fort Griswold lasted about an hour. Only about 150 Americans defended the fort against 800 British. This was an extremely small number, considering that an official report had earlier recommended 550 as an adequate number of men needed for the defense of the fort. The Americans fought bravely and fiercely, inflicting extensive casualties on the attacking force, but the British soon gained command of the fort. Up until this point, only six or seven Americans had been killed; after the British entered the fort, despite attempts at surrendering, some 80 Americans were killed, another 35 seriously wounded. As one survivor recalled, "never was a post more bravely defended, nor a garrison more barbarously butchered."

The reason for the preservation of the Fort Griswold battlefield is thus very clear. The site commemorates not a defeat in battle, but the sacrifice of a small number of men, more than 60 from Groton alone, who stood their ground and were killed by "traitor Arnold's murdering corps," as many of the gravestones of the fallen remark.

The site today is an interesting mixture of early and later features. The earth ramparts of the upper fort retain the shape of the original fort, begun in 1776. Inside the fort were the barracks, powder magazine, central blockhouse, well, and, of course, the parapets for cannon atop the ramparts; the well and the powder magazine are the only extant structures. A sally

port gives access to the Covered Way, a sunken pathway that provided a sheltered route from the upper fort down to the River Battery, where cannon commanded the heights above New London harbor. The present River Battery, of a slightly different configuration than the original battery, was constructed from 1841 to 1843 for the emplacement of heavy seacoast artillery. At the same time, the army built a brick furnace for heating cannonballs, and a granite powder magazine, both of which survive intact.

To the north of the upper fort stands the Groton Monument. This memorial, commemorating the 1781 battle, is an obelisk in form, like the Bunker Hill Monument. Next to the monument is the museum, which houses documents, artifacts, and memorabilia relating to Fort Griswold and the 1781 battle.

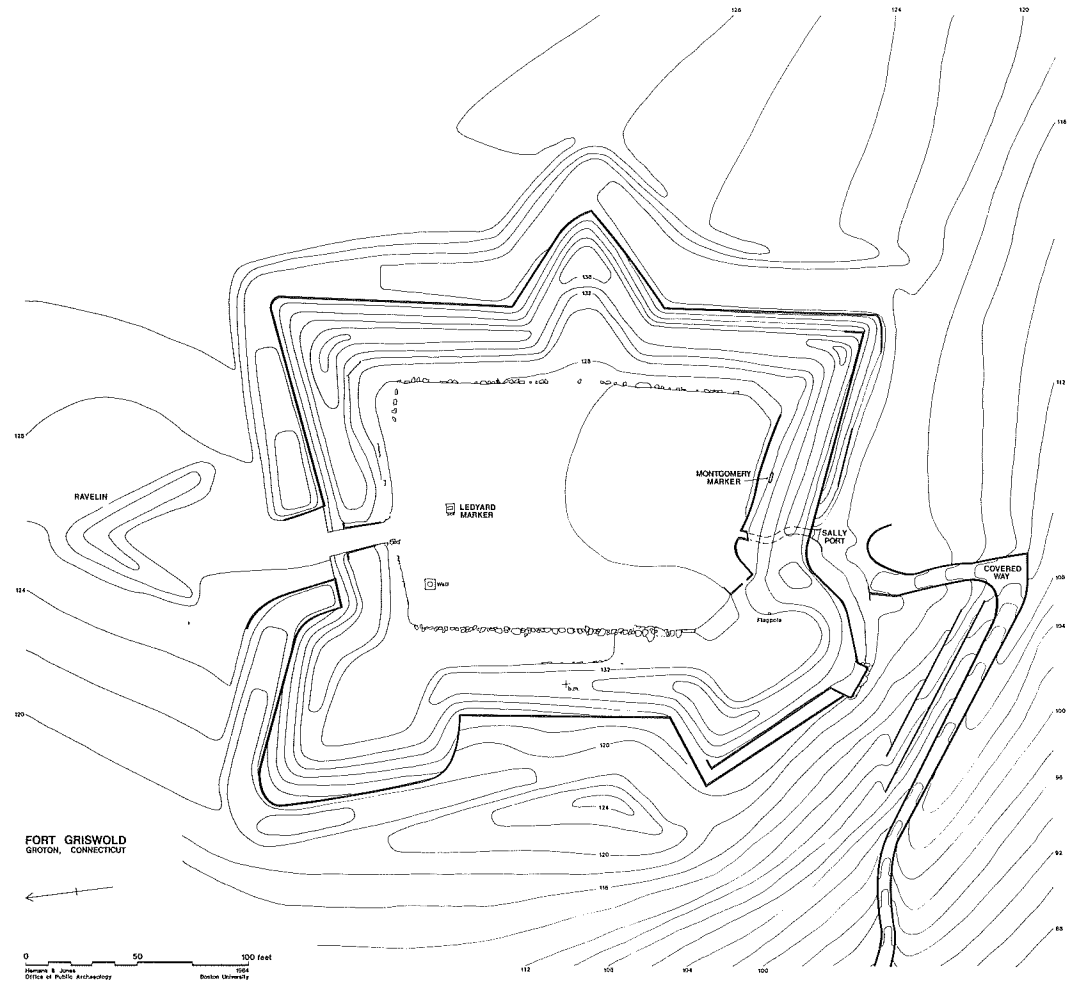
The OPA survey at Fort Griswold State Park was conducted for the Connecticut Department of State Parks and Recreation. The purpose of the survey was to document the historical development of the site and to identify and evaluate all archaeological and historical resources in the park. In order to accomplish this goal, the OPA team obtained data from a variety of sources, including contemporary and later documents, oral history, analysis of old photographs of the site, field mapping, geophysical remote sensing, and archaeological testing. Each of these components contributed to an understanding of the site from its beginnings as a militia fort to its present status as a memorial park.

The study of documents provided the historical context for the fort. Public records, diaries, letters, and historical maps revealed what the fort looked like at the time of the 1781 battle, how it eventually became a U.S. Army fort, how it was garrisoned during the War of 1812, how the new River Battery was constructed in the 1840s, and how it remained a military installation until 1903, when it was restored as a park.

According to the documents,

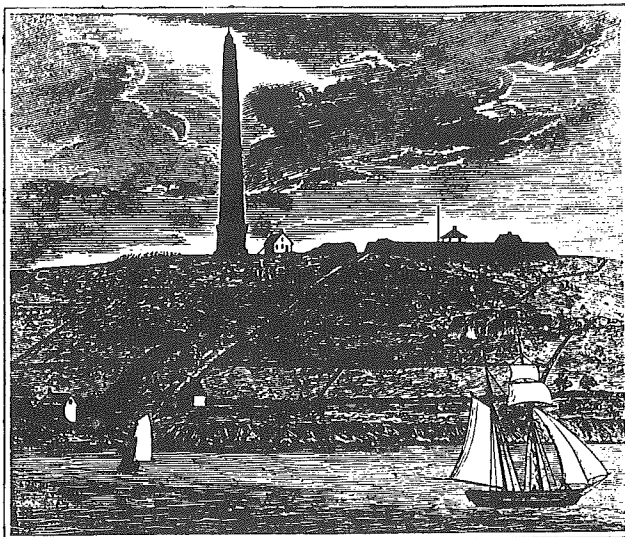
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Site map of the upper Fort, produced by Frederick Hemans and Donald Jones. The map documents the condition of the fort at the present time and, with historical maps of the fort, helped determine a strategy for archaeological testing.



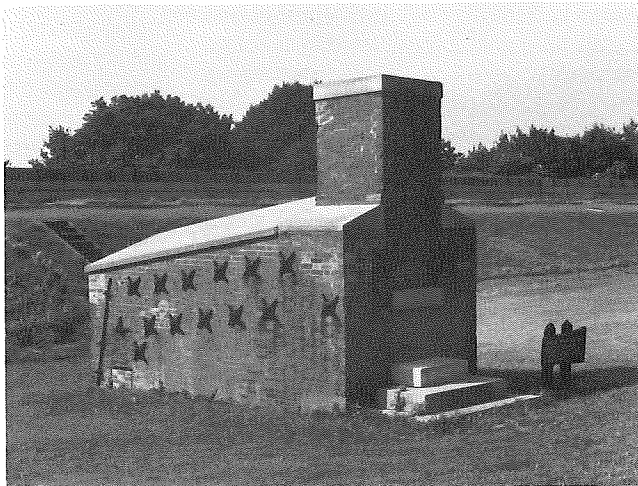
View of the Upper Fort, photographed from the top of the Groton Monument, showing the condition of the parade ground and ramparts shortly after restoration in the early twentieth century.

A view of the Groton Monument and Fort Griswold ca. 1836. The roofs of the central blockhouse and powder magazine are visible above the ramparts (Connecticut Historical Collections, J. W. Barber, New Haven, 1836).



Groton Monument and Fort Griswold.

The hot shot furnace at Fort Griswold, constructed in 1843, was used for heating cannonballs to fire at enemy ships on the Thames River. Such furnaces were standard features at U.S. coastal installations during the first half of the nineteenth century.



Aerial view of Fort Griswold State Park, showing the Groton Monument, the star-shaped earthen fort, and the covered way leading from the fort to the river battery.

Continued from previous page.

the upper fort was out of use by about 1820; no new buildings were constructed here, and the old structures were allowed to decay. In 1826, the cornerstone of the Groton Monument was laid; it was completed in 1836. In 1881, a new section was placed on the top, bringing the height of the monument to 135 feet. From its top, one gained an excellent view of the fort and the river nearby.

The dramatic view was not lost on early photographers in the area, and from the late nineteenth century on, the panoramic view of Fort Griswold had become a favorite subject. These early photographs are an important record because they document the condition of the upper fort prior to its restoration in the early twentieth century. Comparison with post-restoration views allows us to document the degree of restoration carried out in the fort, and by comparing modern photographs from the same vantage point, we can calculate how the restored fort has withstood the effects of time and erosion.

The early photographs show the remains of former structures inside the fort. The outline of the central blockhouse, for example, built in 1794, is clearly visible in photographs taken from the monument, as well as from modern low-level aerial photographs. Other subsurface remains, however, such as the barracks, do not appear.

In an attempt to pinpoint archaeological remains on the site, a program of geophysical remote sensing was conducted for the OPA by Dr. Bruce Bevan of Geosight, Inc. Dr. Bevan performed ground-penetrating radar, electromagnetic, and magnetic surveys inside the fort. These techniques detect subsurface anomalies, such as walls, cellars, or refilled pits, that can help the archaeologist locate buried remains.

The remote sensing identified three large rubble concentrations inside the fort. Documentary evidence and historical maps indicated that these areas coincided with the locations of the blockhouse and the barracks. Archaeo-

logical testing in the areas of anomaly resulted in the discovery of building remains with rubble-filled cellar holes. The granite foundation wall of a corner of the 1794 blockhouse was exposed in the middle of the fort, while on the east side of the fort part of the barracks foundation and cellar hole was also uncovered. Even though historical research had identified the locations of former buildings in the fort, the remote sensing proved valuable in pinpointing the deepest and most productive archaeological deposits.

Oral history proved useful in documenting changes and activities in the fort during the recent past. Local residents, for example, recalled that an anti-aircraft battery had been installed in the fort during World War II, and that the barracks for the soldiers had been built in the same place where the original barracks had been located. One of the soldiers who served in the fort described the wood building that had been erected for the troops here. Our testing in this area revealed several post holes for the World War II barracks building in this spot. Our interpretation of these features might have been very different if we had not interviewed the informant, since the post holes had been dug into historical deposits, and then backfilled with soil containing late eighteenth- and early nineteenth-century artifacts.

By the late nineteenth century, local activists were moving to create a park at Fort Griswold. The old upper fort was in a ruinous condition, and even the new River Battery was becoming obsolete as a coastal installation. People complained about the derelict state of the fort, and protested the fact that the famous Revolutionary War battleground was being used for, among other things, baseball games and a grazing place for the caretaker's cow.

In 1903, the federal government declared Fort Griswold to be obsolete, and handed over the land to the Fort Griswold Tract Commission, enjoining it to "preserve intact the ruins of the old Fort Griswold fort." Title remained in the hands of the United States, how-

ever, until 1931, when the property was deeded to the State of Connecticut. The site has been a state park since 1953, and is listed on the National Register of Historic Places.

The OPA survey of Fort Griswold State Park has been important for a number of reasons. This project provides an excellent example of the value of combining methods of research. Documentary research, remote sensing, or archaeological testing alone provides only fragments of information; together they result in a much more comprehensive evaluation of the cultural resources. The State Park itself is noteworthy because of its historical ties, and it is particularly valuable for the remarkable integrity of its historical and cultural remains, despite its long history of use.

The findings of this study will be used by the State of Connecti-

cut to manage more effectively the resources of Fort Griswold. Alterations and additions to the park can be planned to avoid disturbance of the archaeological remains, and interpretation of the site to the public will be greatly enhanced by the newly recovered information. The results of the project thus help to ensure that the history and tradition of Connecticut's Revolutionary War battle site will remain protected.

The OPA survey team was comprised of Dr. Ricardo J. Elia, Principal Investigator; Douglas George, Project Archaeologist and Historian; Frederick Hemans, Surveyor; Donald Jones, Assistant Archaeologist and Surveyor; and crew members Jane Dineen, Daniel Finamore, Keith Adams, John Shea, Gerald Macomber, Edward Bell, and Anne Yudowitz. Analysts for the project were Judith Dolan, Patricia Crawford, and Susan Marsh.



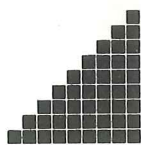
Jane Dineen recording the soil profile of an excavation unit at the southeast corner of the central blockhouse foundation.



Dr. Bruce Bevan, of Geosight, Inc., conducting a survey using ground-penetrating radar at the river battery.

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CALENDAR

Tuesday, December 4

Departmental Colloquium: Dr. Mary C. Beaudry, Department of Archaeology, Boston University, will chair a panel discussion entitled "Contract Archaeology and Research Archaeology: Is There a Conflict?" Panel members include: Marley R. Brown, Director of Excavations and Conservation at Colonial Williamsburg; Dr. Barbara Luedtke, Department of Anthropology, University of Massachusetts at Boston; Steven Mrozowski, Boston City Archaeologist; and Brona Simon, Massachusetts State Archaeologist. Dr. Dena Dincauze, Associate Professor of Anthropology at the University of Massachusetts, Amherst, will offer concluding remarks. This discussion will take place in the George Sherman Union Conference Auditorium, 775 Commonwealth Avenue, at 5 p.m.

Weekends, December 1, 2, and 8, 9

Center Workshop: John Shea, "Making Stone Tools," Saturdays and Sundays from 1 to 4 p.m. See article on Center Activities in this issue.

Weekends, January 26 and 27, and February 2 and 3

Center Workshop: Al Wesolowsky, "What Bone Is This?" Saturdays and Sundays from 1 to 4 p.m. See article on Center Activities in this issue.

Wednesday, April 3

Center Lecture: First of three lectures by Dr. Vincent Scully, entitled "Context in Human Societies." Co-sponsored by the Humanities Foundation of Boston University.

Wednesday, April 10

Center Lecture: Second of three lectures by Dr. Vincent Scully, entitled "Context in Human Societies." Co-sponsored by the Humanities Foundation of Boston University.

Weekend, April 13 and 14

Center Workshop: Experimental Archaeology Workshop at Sargent Camp, New Hampshire. See article in this issue for details.

Wednesday, April 17

Center Lecture: Third of three lectures by Dr. Vincent Scully, entitled "Context in Human Societies." Co-sponsored by the Humanities Foundation of Boston University.

Weekend, April 20 and 21

Center Workshop: Experimental Archaeology Workshop at Sargent Camp, New Hampshire. See article in this issue for details.

The Center for Archaeological Studies, which was founded at Boston University in 1980, has as its chief aim the development and coordination of interdisciplinary archaeological programs in education and research on local, national, and international levels. The Center also seeks to increase national and international awareness of the importance of understanding other cultures, and of preserving the world's cultural heritage, by involving professional archaeologists, scholars in other fields, and the general public in the activities of the Center.

Context is the newsletter of the Center for Archaeological Studies and is published quarterly. Institutions and individuals may subscribe separately to *Context* at a cost of \$10 per year. Membership to the Center is open to the public; annual dues are \$20 (\$10 for students); benefits include a subscription to *Context*, invitations to attend our fall and spring lecture series and other events, and the use of our library facilities. The Center also offers special seminars for the public during the academic year and summer field schools here in the Boston

area and abroad. Other categories of membership are: Contributing Member, \$50; Institutional, \$50; Patron, \$100; Benefactor, \$500; Corporate, \$1000; and Life Member, \$400. These categories include a subscription to the *Journal of Field Archaeology*. Please make checks payable to the Center for Archaeological Studies and send to the Center office at Boston University, 232 Bay State Road, Boston, MA 02215. Gifts to the Center are tax-deductible.

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Boston University
Center for Archaeological Studies
232 Bay State Road
Boston, MA 02215