ORIENTAL INSTITUTE COMPUTER LABORATORY

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Introduction

This year's annual report inaugurates a format change for both the Computer Laboratory and the Research Archives. In recognition of the increasingly important role of the Institute's various electronic resources, such as our World-Wide Web (WWW) database, the Ancient Near East (ANE) discussion list, and our File Transfer Protocol (FTP) server, a new section has been added to this annual report entitled Oriental Institute Electronic Resources. Accordingly, discussions of these computer resources, which previously appeared in the Computer Laboratory's and the Research Archives' yearly summaries, will now be included in this new, *Electronic Resources* section of the annual report. We encourage one and all to look at this material for a fuller understanding of how these computer resources are being put to use at the Oriental Institute to investigate and report on the ancient Near East.

Laboratory Projects

The Nippur Expedition

During the past year work continued developing a strategy for interpreting the massive amounts of geomorphological and cultural data contained in the fourteen

Landsat multispectral satellite images of central and southern Iraq purchased by the Nippur Expedition in 1993. This new technology holds great promise for analyzing the ancient landscapes of Iraq. Acquiring the requisite computer skills to unlock these secrets, however, is both a time consuming and costly proposition. We have learned that the public domain computer software we have been using to this point, the X-IMAGE program from the National Center for Supercomputing Applications, does not possess the analytic or graphic tools that will be required to exploit fully the Landsat data. The Computer Laboratory has started to investigate alternative, Geographic Information System (GIS) software programs, and this process will continue during the coming year.

Peggy Sanders completed a series of hand drawings of Parthian seals for inclusion in the article "Parthian Seal Style: A Contribution From Nippur," by McGuire Gibson, published by the Università di Torino in the journal *Mesopotamia* 39 (1994).

Giza Plateau Mapping Project

Because Mark Lehner was on a leave-of-absence throughout most of this past year, work on the Giza Plateau and Nile Valley computer models was greatly reduced. Nonetheless, the Computer Laboratory continues to develop both of these important computer databases. In fact, when Lehner returned to Chicago in the spring of 1995 he brought with him a significant number of additional Nile Valley map segments that we will "digitize" (trace into the computer) in order to increase the area of coverage in our Nile Valley computer model. This work will be performed in the coming months.

We can report on the first use of the Nile Valley computer model even though the database is still in the process of being completed. In the fall of 1994 National Geographic Magazine contacted the Computer Laboratory concerning use of our Nile Valley computer model to produce an illustration for an article that Lehner was writing on ancient Egypt. We spent several weeks manipulating the model, producing a number of views of the Nile Valley area from Giza on the north to Dashur on the south. The magazine editors finally selected one particular view which we then rendered in color on the Laboratory's Sun SPARCstation LX computer using the ARRIS graphics program, and sent them a copy of this image along with contour drawings that allowed their artists to produce the final illustration. The article, entitled "Egypt's Old Kingdom," was published in the January 1995 issue of the *National Geographic Magazine*.

Göltepe / Kestel Mine Project

Additional contour data was gathered around the entrance to the Kestel Mine by project staff during the 1994 field season. Upon returning to the Institute, Aslıhan Yener brought this survey data into the Computer Laboratory and asked that we add these data to the overall site database and generate a new three-dimensional surface terrain map for the area. Once completed, several discrepancies between the original and new data became apparent, and areas that still need additional survey coverage at the site were discovered. These minor adjustments will be dealt with during a future field season, and the resulting database should provide future publications with excellent contour drawings and illustrations of the area surrounding the Göltepe / Kestel sites.

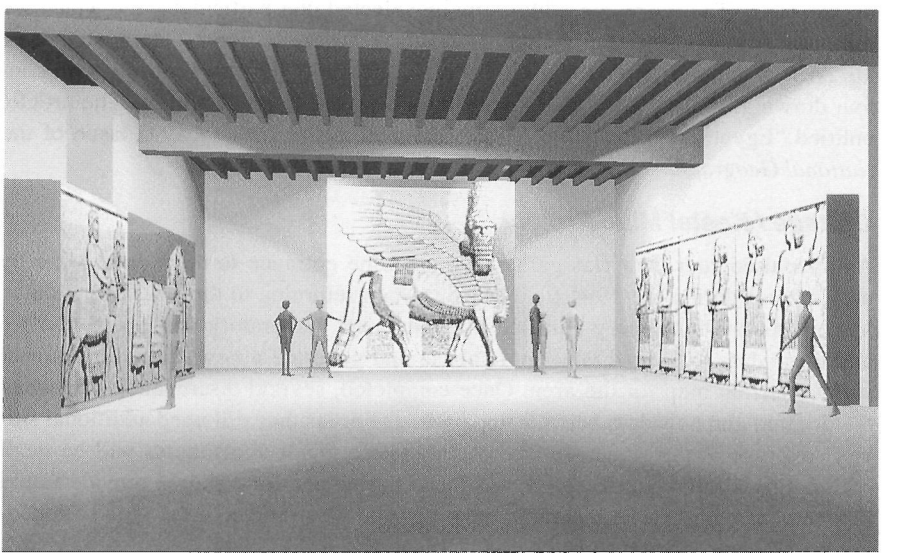
Tal-e Malyan Project

William Sumner, Director of the Oriental Institute, asked the Computer Laboratory to digitize a contour map of the ancient mound of Tal-e Malyan, Iran. Excavation areas, magnetometer survey regions, and pottery collection areas were added to produce an overall site plan. Sumner intends to use the computer drawing to illustrate a forthcoming publication on the University of Pennsylvania's excavations at Malyan during the 1970s.

Oriental Institute Museum Renovation Project

Working on a small piece of the Museum renovation project provided the Computer Laboratory with some of the best computer imaging we produced this past year, and gave us an opportunity to use for the first time a computer software technology we have possessed for years. Museum Curator Karen Wilson wanted to have several images created to illustrate one possible configuration for the Institute's Assyrian reliefs, including our monumental human-headed winged bull sculpture, in the redesigned Mesopotamian Gallery. These images would accompany the Museum's grant proposal to the National Endowment for the Arts for the reinstallation of the galleries after the building renovation program is completed.

After considering hand-drawn illustrations, it was decided to use the Laboratory's ARRIS computer graphics program to produce several lifelike renderings of the proposed gallery reinstallation. Use of the ARRIS computer program not only shortened the time required to produce the final images, but it also allowed us to incorporate existing, detailed hand drawings made during the last century of the Assyrian reliefs from the Palace of Khorsabad into the actual computer renderings without having to redraw them on the computer. A computer graphics technique known as "texture mapping," a capability built into the ARRIS graphics package, but one which the Laboratory had not yet made use of, made it possible for us to digitize the drawings directly from the Botta and Flandin publication, *Monument de*



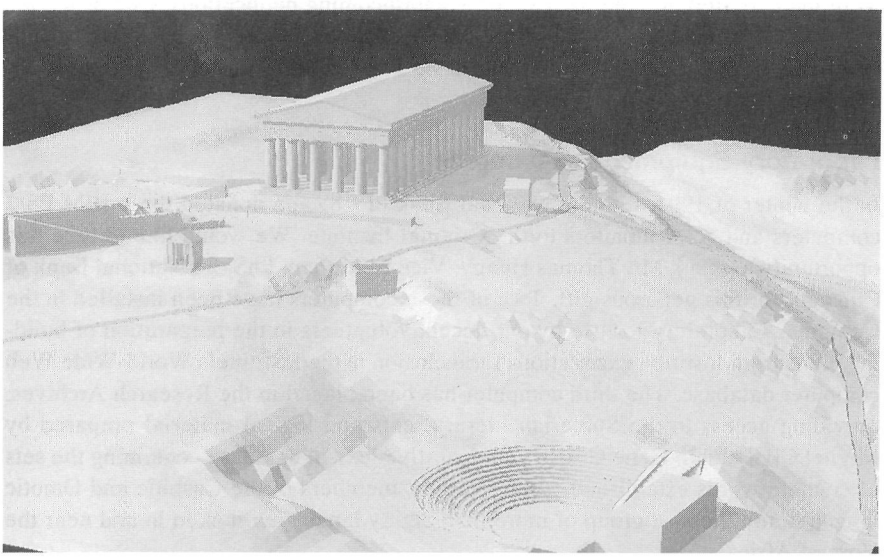
Computer rendering of a possible reinstallation of the Assyrian Gallery produced with the Computer Laboratory's ARRIS graphics program

Ninive, published in 1849–50, using the Laboratory's scanner. Once the drawings were scanned into computer image files, Peggy Sanders created a three-dimensional computer model of the proposed Mesopotamian Gallery with the ARRIS program. Using the "texture mapping" process, Peggy then instructed the ARRIS program to apply the computer image files of the Assyrian relief drawings onto the appropriate surfaces of the three-dimensional computer model of the gallery. Think of this process as the electronic equivalent of making a scaled, cardboard model of the gallery space, and then literally pasting cutout paper drawings of the Assyrian reliefs onto the walls of your cardboard model. Once you know how to do it, however, the computer process is much simpler to accomplish. All that remained was to add lighting to the computer model, and the ARRIS program produced a series of accurately rendered, color images of what the reinstalled Assyrian reliefs would look like to a museum visitor in the renovated Mesopotamian Gallery.

Everyone concerned with the project thought the computer images were a great success, and that they would be very beneficial in communicating our design scheme for the Institute's Assyrian reliefs to the committee at the National Endowment for the Arts considering the grant proposal. Though only the Laboratory's first attempt at "texture mapping," these images demonstrate the potential of this technique for use with other Institute projects, such as the Epigraphic Survey and their detailed drawings of Egyptian temple wall reliefs.

Isthmia Project

In the summer of 1994, Dr. Elizabeth Gebhard, in the Department of Classical Languages and Literature at the University of Chicago, and a member of the Visiting Committee of the Oriental Institute, asked the Computer Laboratory to assist her in developing a three-dimensional computer model of her archaeological site at Isthmia, Greece. Using survey data and architectural drawings from her recent ex-



Computer rendering of the Isthmia surface terrain and architecture, representing one moment, 300 B.C., in the thousand year history of the site of Isthmia, Greece. View from the northeast at 100 meters altitude. Theater in the right foreground, stadium embankment at far left, and the Temple of Poseidon in the center

cavations as well as previous publications, she wanted to produce a series of surface terrain models to illustrate the man-made changes to the landscape of the site from the eighth century B.C. to the second century A.D.

The Computer Laboratory made several recommendations concerning computer hardware and software that would be necessary to accomplish her goals, and Peggy Sanders was contracted to tutor Dr. Gebhard and several students in how to use the computer software and to begin the development of the Isthmia computer graphics database. Presently, models for three of the ten discrete building phases at the site are essentially completed, and a fourth phase is under construction.

Beyond the intended purposes of this computer model for Dr. Gebhard's work at Isthmia, this project is significant for the Oriental Institute because it is the first work undertaken by the Computer Laboratory for another department of the university. By all accounts this initial joint effort is progressing smoothly, everyone involved is pleased with the results to this point, and we are encouraged by the prospects of collaborations not only with the Dr. Gebhard and Classics, but other departments as well.

Computer Model of the Djoser Complex

Work continued on the three-dimensional computer model of the Djoser pyramid complex at Saqqara, Egypt. Development of the model began in 1993 at Mark Lehner's request. More recently, it has been modified to produce illustrations for articles being written by Florence Friedman, Curator of Ancient Art at the Museum of Art, Rhode Island School of Design. Dr. Friedman noticed one or two of the subterranean chambers had not been included, so Peggy Sanders referred once again to *The Step Pyramid,* by Firth and Quibell, to add these passages. The primary focus of Dr. Friedman's articles is on corresponding images of the running kings on false door reliefs in chambers under both the pyramid and the south tomb. These reliefs were incorporated into the images for her forthcoming publications. One of the articles will also include images of the Narmer Palette, which Peggy Sanders digitized this year for Mark Lehner while he was examining the Hieronkompolis complex.

Laboratory Equipment / Resources

In the winter of 1994, LaSalle National Bank of Chicago donated three IBM PS/2 computers and color monitors to the Oriental Institute. We would like to take this opportunity to thank Mr. Thomas Heagy, Vice Chairman, LaSalle National Bank of Chicago, for this generous gift. Two of these computers have been installed in the Computer Laboratory for use by our docent volunteers in the preparation of building plans from Institute excavations for inclusion in the Institute's World-Wide Web computer database. The third computer has been placed in the Research Archives, providing access to the Sumerian literary texts and lexical material prepared by Miguel Civil and to Gene Gragg's comparative lexical database containing the sets of cognate words established among various members of the Cushitic and Omotic language families—a group of more than eighty languages spoken in and near the Horn of Africa.

The Computer Laboratory purchased an Apple Macintosh Performa 636CD computer and color monitor in October 1994 to function as the Institute's World-Wide Web file server. Because of this purchase we were able to move the Institute's

WWW database to the Computer Laboratory from its original location on a server in the University of Chicago's Department of Computer Science Macintosh Laboratory. We thank the James Henry Breasted Society for their generous funding of this new computer equipment; Don Crabb, Director of Instructional Laboratories in the Computer Science Department, for the use of their server during the initial stages of our WWW database development; and John Casler, former Supervisor of the Macintosh Laboratory, for his encouragement and generous help in setting up our database.

For further information concerning our World-Wide Web database refer to the section of this report entitled *Oriental Institute Electronic Resources.*

A Closing Thought

We are aware that at present the Legacy Campaign is the Oriental Institute's first priority. Work in the Institute continues, however, and faculty, the Museum, and research projects rely on computers as an integral part of their job. Long-term funding for the maintenance and upgrading of the Institute's computer equipment is a significant concern that needs to be addressed as soon as possible. Unlike office furniture or library books, which may last for many years, the desire for faster computer performance and more software capabilities, and the built-in obsolescence planned for by the computer industry, require that computer equipment be updated or replaced on a regular basis. It is essential for us to establish a reliable source of funding for the electronic infrastructure of the Institute that will not compete with the funding for research projects.