



The Big Leap Forward... What Did We Get?

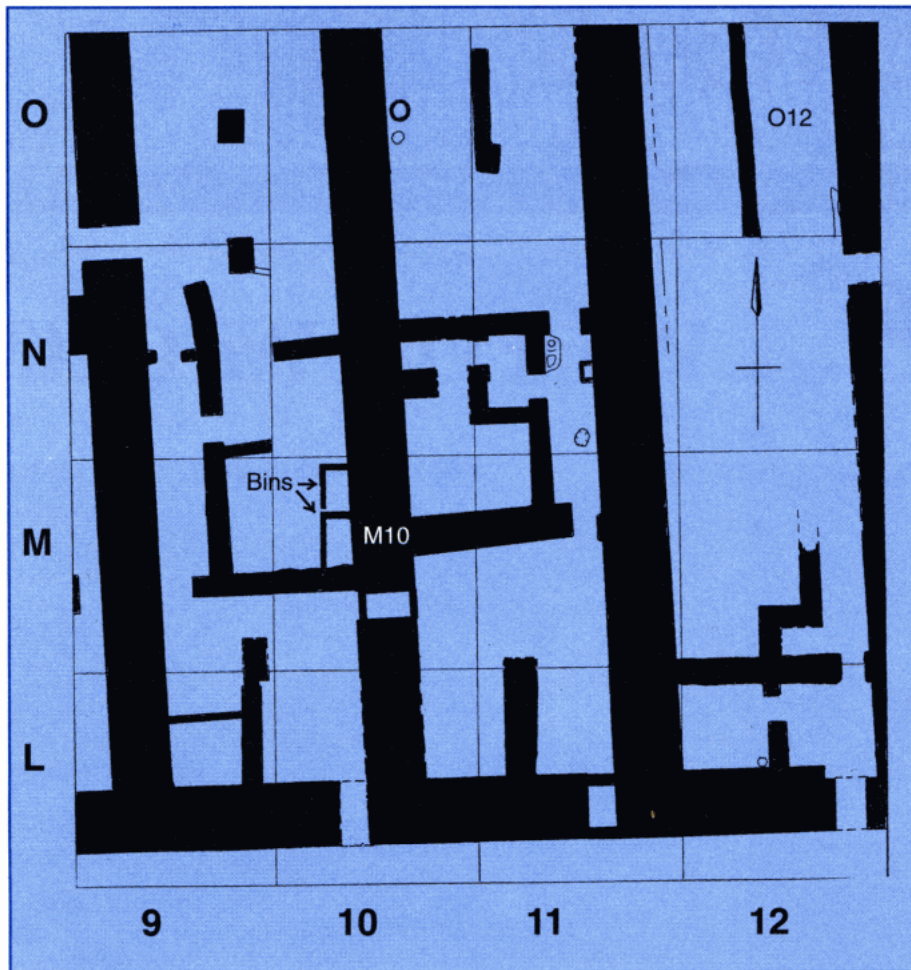
Neither three blinding sandstorms nor unexpected scorching temperatures of 45°C (ca 113°F) could stop our 1998 field season, February-April, from being one of our most productive. Despite the difficult working conditions, including too few excavation square supervisors this season, we managed to move an enormous quantity of dirt and make some intriguing discoveries. In this issue of AERAGRAM we focus on the many things that went right for us this season and what we learned from our difficulties, especially the lessons imposed on us by the weather.

This season we decided to reach well beyond our previous excavations. To the northwest we opened a significantly larger exposure, a 20 x 20 meter area, we called TBLF, "The Big Leap Forward" (see map page 6). In another advance we cleared a 10 X 10 meter square, which we called LNE, "Leap to the Northeast." We also excavated another 10 X 10 meter square, A6-7/ZZ6-7, southwest of our previous excavations, and two additional 5 x 5 meter squares, E9 and D17x. Altogether we intensively excavated a total of fifteen 5 x 5 meter squares.

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Looking northwest over TBLF toward the Khafre and Khufu Pyramids. A workman emerges from TBLF with a sack of pot sherds.





TBLF...What did we get?

Continued from Page 1

One of our goals in 1998 was to test the hypothesis that the bakeries and other production facilities discovered in earlier seasons might lie in an enclosure around a large household or core institution, perhaps even a royal

residence, to the north and northwest in the direction of the large stone Wall of the Crow. We selected an area 35 to 55 meters north of our east-west D-row squares, where in earlier seasons we found evidence of food production, pigment grinding, and copper working.

It required three different front loaders

Map of TBLF ("The Big Leap Forward"), our large 20 X 20 meter square exposure. This shows the basic plan of a repeating, modular series of long corridor-like enclosures, separated by massive walls about 1.5 m thick. These long enclosures are spaced about every 10 cubits (5.25 meters).

working over two weeks to clear the four meters of modern overburden down close to the level where we expected to find Old Kingdom ruins. The modern layers consisted of dumping from the nearby riding stables and from Selim Hassan's excavations in front of the Sphinx in 1936. He ran his rail lines out and around the east end of the Wall of the Crow to dump in what had been a low area where TBLF is located.

Once we were close to the approximate level of Pyramid Age architecture in our previous squares, we sent the loaders away and had *Reis* (Overseer) Abd al-Wahab and his men clear the rest down to the amorphous mud mass so familiar to us from our other excavation areas. Then we brought in David Goodman to lay out an excavation grid, positioned to his usual "gnat's eyelash" accuracy on the overall Giza Plateau Mapping Project grid. While our standard excavation unit remains the 5 x 5 meter square, we laid out a 20 x 20 meter area (sixteen 5 x 5's) and intensely excavated seven of the squares in a checkerboard. We were able to capture the pattern of the main walls in all the TBLF squares by limited excavation of the mud "fill" in the nine squares that we did not excavate deeply.

The footprint of the TBLF complex is that of long north-south galleries, arranged in rows east to west, separated by massive mudbrick walls about 1.4 meters thick, and spaced about every 10 cubits (about 5.25 meters). In the south end of the galleries our detailed digging exposed thick, black ash accumulations separated by marl clay floors, concentrations of bread molds, hearth platforms and egg-carton shaped floor pits — all features familiar to us from the bakeries we found in 1991. However,


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Thanks to Our Supporters

Our 1998 excavation season at Giza would not have been possible without the major financial support provided by David Koch, the Ann and Robert H. Lurie Family Foundation, Jon Jerde, and Bruce Ludwig.

Also contributing to the project were Matthew McCauley, Glen Dash, David Goodman, Robert Lowdermilk, Fred and Suzanne Rheinstein, the Max and

Marjorie Fisher Foundation, Sandford and Betty Sigoloff, and Victor and Nancy Moss. Additional support was provided by Donald Kunz, and Arthur and Bonnie McClure.

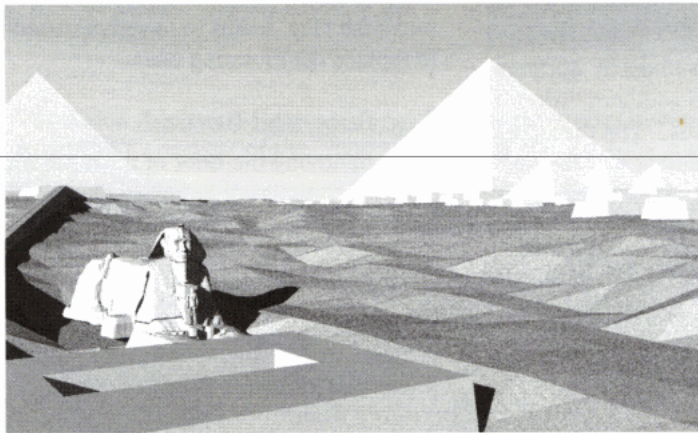
AERA's activities, including fielding the GPMP, are made possible with the assistance of James Allen and George Link, the law firm of Brobeck, Phleger, and Harrison, and the SOKKIA Corporation of Overland Park, Kansas. 

Initiative for the Millennium

With the generous support of the David H. Koch Foundation, the Ann and Robert H. Lurie Family Foundation, and Jon Jerde, AERA launches its "Initiative for the Millennium," our program to make the results of our research and expeditions available to the widest possible audience. Our initiative includes a publication series, a web site, and a cutting-edge computer model.

Virtual Giza

Our three-dimensional computer model of Giza, prepared by Peggy Sanders of Archaeological Graphic Services, is based on the massive amount of survey



Virtual Giza computer model prepared by Peggy Sanders of Archaeological Graphic Services. Looking west northwest.

data collected by Mark Lehner from the Sphinx Project, as well as several seasons of the Giza Plateau Mapping Project. "Virtual Giza," as we call it, is steadily growing in our computers. The interactive computer model will allow visitors to walk through five itineraries or "tours," stopping along the way to explore points. Using 360-degree Quick Time movies they will be able to compare the present day view with Pyramid Age Giza!

Giza Reports

A series of monographs, *Giza Reports* will present the results of AERA's past field work to an academic and profes-

sional audience. *Giza Plateau Mapping Project Excavations* will publish the results of a decade of field work at Giza. *The Pyramids Radiocarbon Dating Project* will present the data and analysis from the work carried out in

1995. *Giza Architectural Studies* will make available to the public detailed, scale drawings of the major monuments on the Giza Plateau, compiled over 20 years by Dr. Zahi Hawass and Mark Lehner.

AERA Web Site

This will be the fastest way to keep our supporters and others up-to-date about our on-going research. The web site will have all current and past issues of AERAGRAM and information about other AERA projects. When excavations are in progress there will be news from the field. Our web site should be up and running this fall.



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Thanks to the Supreme Council of Antiquities

Our 1998 excavation season of the Giza Plateau Mapping Project was very successful thanks to the Supreme Council of Antiquities. We are grateful to Dr. G. A. Gaballa, Secretary General of the Supreme Council of Antiquities, and Dr. Zahi Hawass, Director General of Giza and Saqqara.

We thank Mr. Sabry Abd al-Aziz, and Mr. Ahmed al-Hagar, Directors of Giza, for their kind assistance. We are grateful

to Mr. Mahmoud al-Afifi, Chief Inspector for Giza, and Mansour Radwan, Senior Inspector, for their assistance.

We thank Ms. Sana'a Fouad and Ms. Heba Ragab who represented the Supreme Council of Antiquities at the excavation site. We would like to thank Mr. Mohammed Youseff and Mr. Essam Bibers, who served as our inspectors in the storeroom.



The Complicated Life of a Workman's House: A Careful Reading of the Details



Prof. McGuire Gibson offers some lessons in "reading" mudbrick.

deteriorating mudbrick. Underneath he discovered thick parallel mudbrick walls running north to south. These ended on the south at the thick wall running east to west that Mohsen el-Sayed cleared in 1997. The space between the north-south walls was divided into two chambers by northern and southern "wing walls." The southern chamber was the one previously dug in 1997.

This pattern of a long narrow building divided into two parts

was exciting and very intriguing. It

resembles houses from the New Kingdom workmen's town of Deir el-Medineh which housed the families of the men who built the royal tombs in the Valley of the Kings at Luxor. Could our rooms have housed Giza workmen? We suspect this was a domestic structure because of the small hearths tucked into corners and a larger cooking installation built into the back (south) wall.

Ancient Repair Records

As John continued his work in Square E9, another story began to emerge. The alterations to the walls had been complex, presenting a puzzle that defied any effort to assign a simple, discrete function such as "house." On one side of the "central" north-south wall along the eastern side of the excavation square

he found abundant signs of baking — much ash build-up and several layers of floors with a bread pot still in position in one of the egg-carton-like baking holes. On the other side of this same wall the floor had been kept clean.

The thick north-south walls both showed evidence of repairs, which we discovered with the help of Professor McGuire Gibson from the Oriental Institute at the University of Chicago. As Prof. Gibson carefully outlined the bricks, he noted that they were not uniform in size or color. A much larger type of brick, which we dubbed "bubble-gum" because of its dark grey, puddyish clay, seems to have been used to replace deteriorating ones.

The floor and beyond

After removing the floor of the northern "house" chamber, John and his team discovered that the southern wing wall was contemporary with a lower, older floor that was covered by dark ash. In the center of the square near the "central" north-south mudbrick wall, he found a set of fourteen egg-carton

shaped holes for baking, just like all the other baking installations we had found at Giza. These had been used before the

Without very careful attention to details ...we could easily miss the complex history... of these structures.

"central" north-south mudbrick wall was constructed; the wall's foundation trench had cut through the baking pits.

In the floor of this earlier phase John also found evidence of a small square enclosure or bin which had been partially dismantled in later remodeling. All that remained of its eastern wall was a row of bricks and a plaster line where the wall once stood. The floor inside this small enclosure had been carefully paved with *tafla* around a circular feature made of mudbrick. Plastered inside with alluvial mud, this


In January John Nolan, our assistant director, took up the task of exploring a structure we had opened in 1997 in Square D9 (see map, page 6). Our interest had been piqued by dolerite hammer stones and pigments that we uncovered in the southern chamber of the structure. We wondered if this could be a workshop. We were also curious about what lay in the northern chamber. To answer these questions, John excavated the adjoining square, E9, where the ground plan of the rooms continued to the north. He expected to find one discrete structure, but instead found that walls had been added and others removed to transform the room's configuration, and probably its use, over time.

A Workman's House?

With the help of his crew, John first cleared away more than half a meter of "tumble"—the debris left from

was very possibly the remains of a small granary. The paved bin may have been built to hold the excess grain that spilled when it was removed.

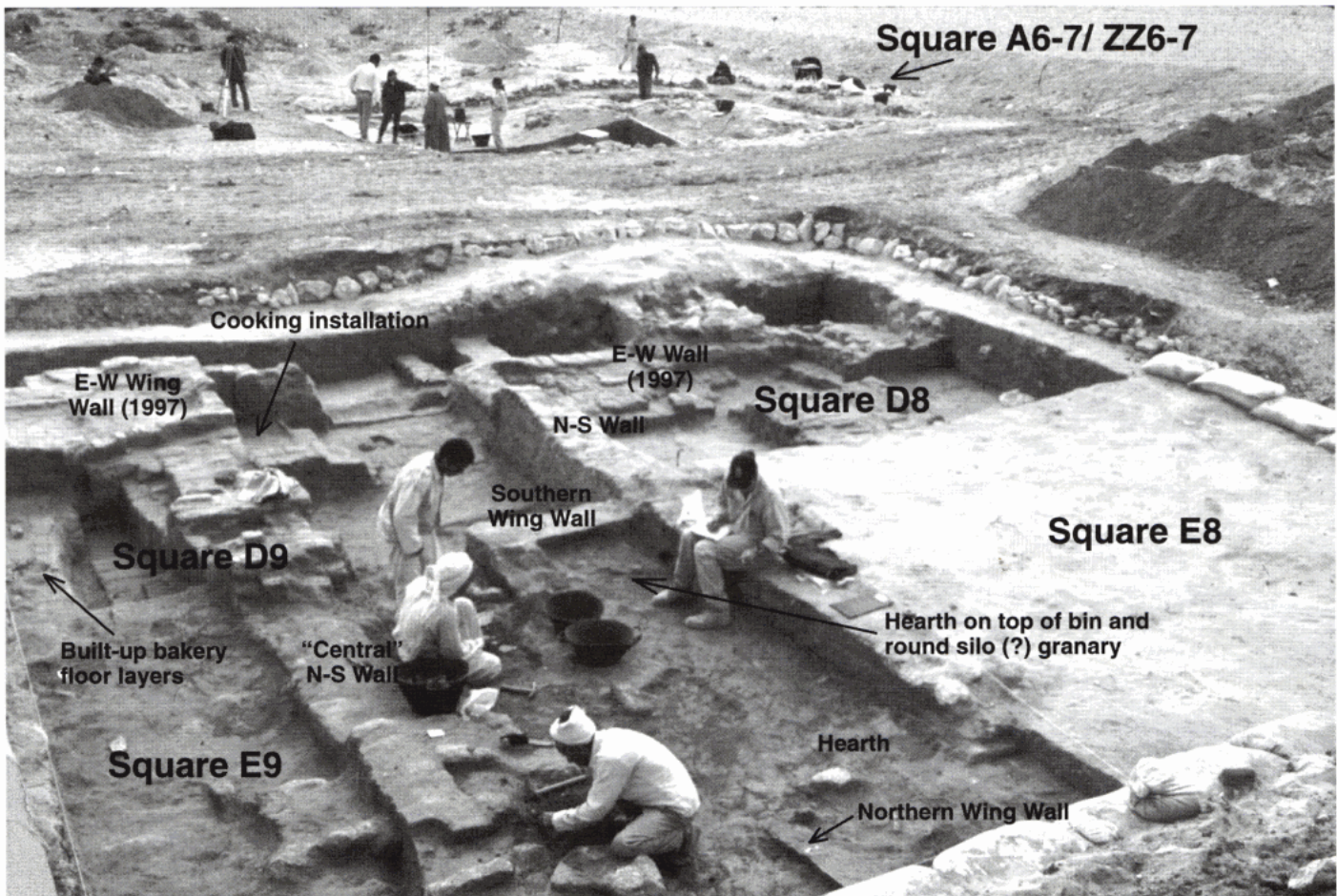
John believes the original construction and its renovation happened in less than a century. Based on mud sealings previously found at the site, he estimates these structures were occupied for about 70 years before they were abandoned, probably at the end of Menkaure's rule.

Square E9 taught us an important lesson: Without very careful attention to details and documentation of these details, we could easily miss the complex history and daily use of these structures. We found this complexity to be the case in almost every square we excavated. 

GPMP 1998 Field Crew

Director...Dr. Mark Lehner, Harvard Semitic Museum and the University of Chicago
 Archaeologist and Assistant Director...John Nolan, AERA and the University of Chicago
 Faunal analyst...Dr. Richard Redding, University of Michigan Museum of Anthropology
 Archaeobotanist...Mary Anne Murray, University College, London
 Lithics analyst...Dr. Nicholas Conard, University of Tübingen
 Assistant lithics analyst...Cordula Werschkun, University of Tübingen
 Ceramicist...Dr. Peter Lacovara, Boston Museum of Fine Arts (now at Emory University)
 Assistant ceramicist ...Dr. Salima Ikram, The American University in Cairo
 Surveyor...David Goodman, California Highway Department (Retired)
 Data base manager and photographer...Carl Andrews, Northeastern University
 Archaeologist ...Prof. McGuire Gibson, University of Chicago
 Archaeologist...Mohsen El-Sayed, University of California, Los Angeles
 Archaeologist...Fiona Baker, Firat Archaeological Services
 Archaeologist...Justine Way, University of Chicago
 Artist...Ms. Noha Lila, Egyptian Supreme Council of Antiquities
 Bioanthropologist...Teri Tucker, Ohio State University

John Nolan (seated, in the center of the photo) supervises workmen removing mud fill from the collapse of the ancient walls in the northern chamber of the "house" in Square E9. Looking south-southwest.



TBLF...What Did We Get?

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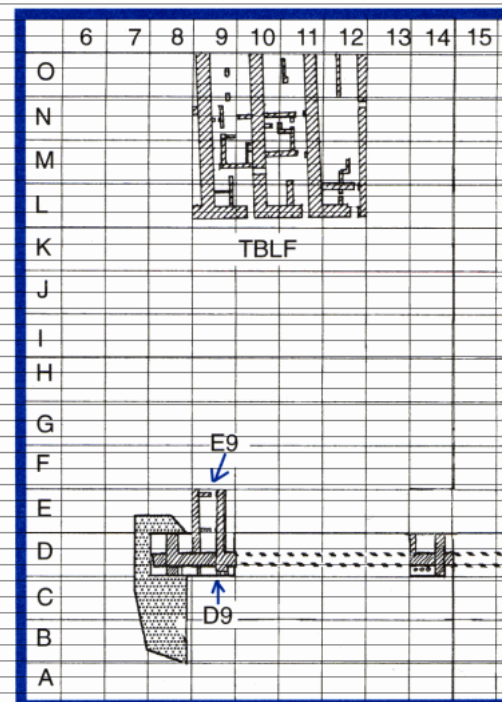
some slag-like material might be evidence of metal working in these ashy deposits.

In the middle of each gallery there are rooms and chambers paved in clean desert clay (*tafla*). These were cleaned out and better maintained than the baking areas where the ash was allowed to accumulate. The middle chambers may comprise parts of houses or "offices." The north end of each gallery appears to have been an open court. Evidently, the whole arrangement was for systematic production. The naturally lit open courts were probably good for

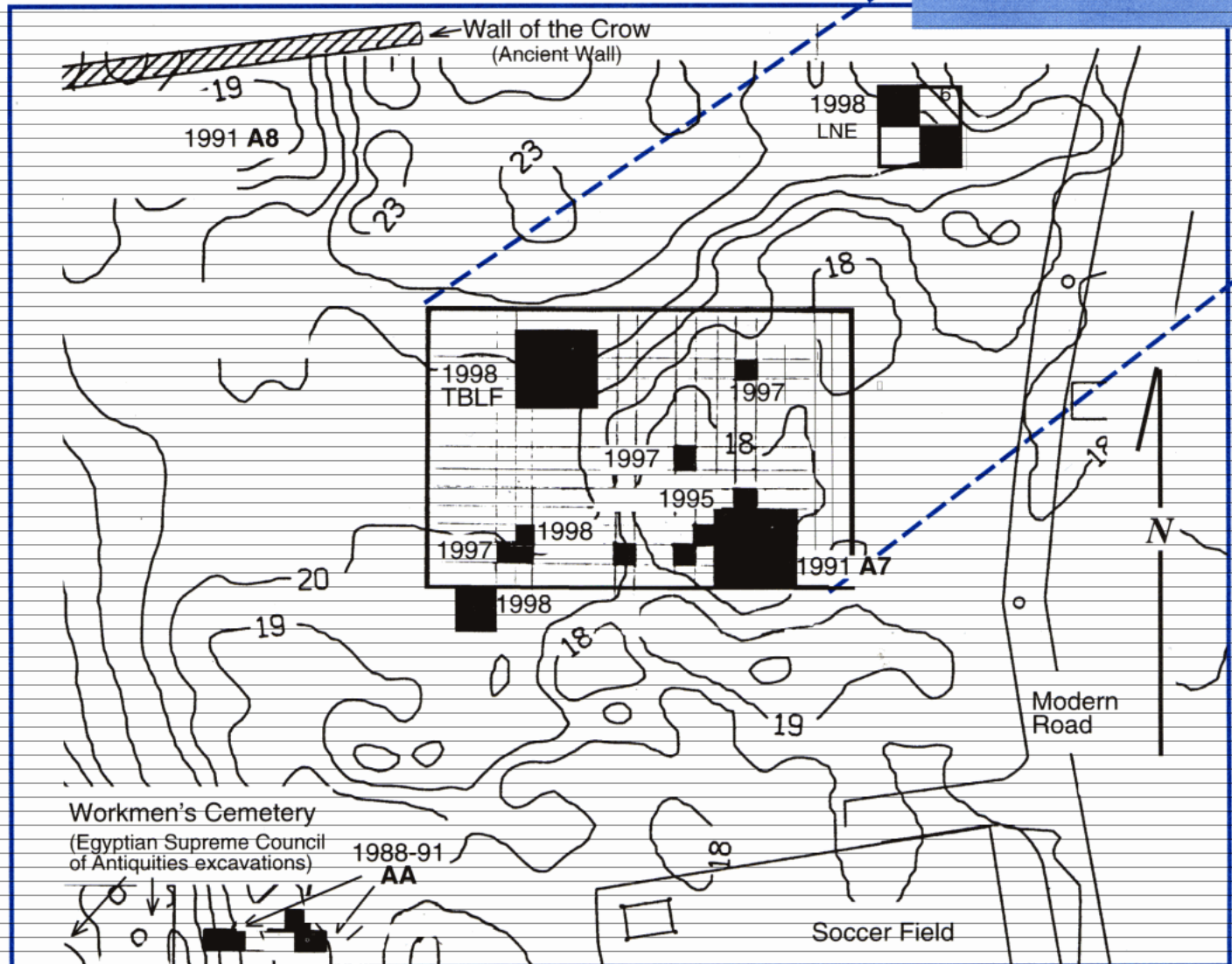
craft work; we found many flints in one of them. It may be that raw material, accounted for in the cleaner central rooms, was brought into these open courts for processing. Here in the southern ends of the galleries, which are downwind much of the year, these materials were transformed into food or other useable products by means of the smoky, ashy pyro-technology.

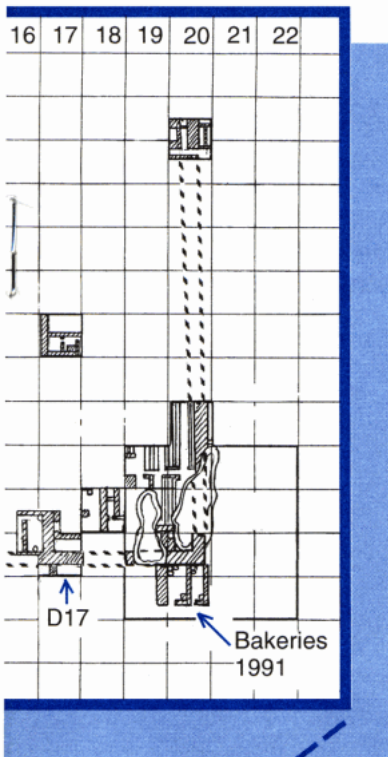
LNE: another leap — to the northeast

In order to get a sense of the extent of the Old Kingdom



The large topographic map below shows the location of the GPMP (Giza Plateau Mapping Project) excavation squares. The small map to the right shows the Area A 1991-98 excavations.





settlement and architecture, we decided to look in yet another direction, the northeast, where we had not yet explored. We staked out our “leap to the northeast” far beyond previous excavations — 110 meters north and 20 meters east of the bakeries we found in 1991.

After removing deep modern overburden with a front loader, we surveyed a 10 X 10 meter square and excavated the northwestern and southeastern quadrants, each a 5 x 5 square. In both squares we exposed a massive caked mud layer under the clean sand. The few sherds from the mud layer, which was 40 centimeters thick at maximum, included fragments of ribbed necks from Graeco-Roman amphorae. The mud is almost certainly from the annual Nile flooding, no older than the Graeco-Roman period — more than 2,000 years after the Pyramid Age. By this time the alluvial mud apparently

David Goodman lays out our survey control using the Sokkia Total Station.

had built up high enough so that the Nile flood waters reached this far westward.

Underneath the mud is another sand layer, below which we found an Old Kingdom trodden surface with numerous flints and pottery sherds but no architecture. LNE seems to be outside of the main Old Kingdom settlement or architectural zone — perhaps close to the edge of the Nile valley, and possibly close to the Nile itself, which we believe flowed near the western desert 4,600 years ago.

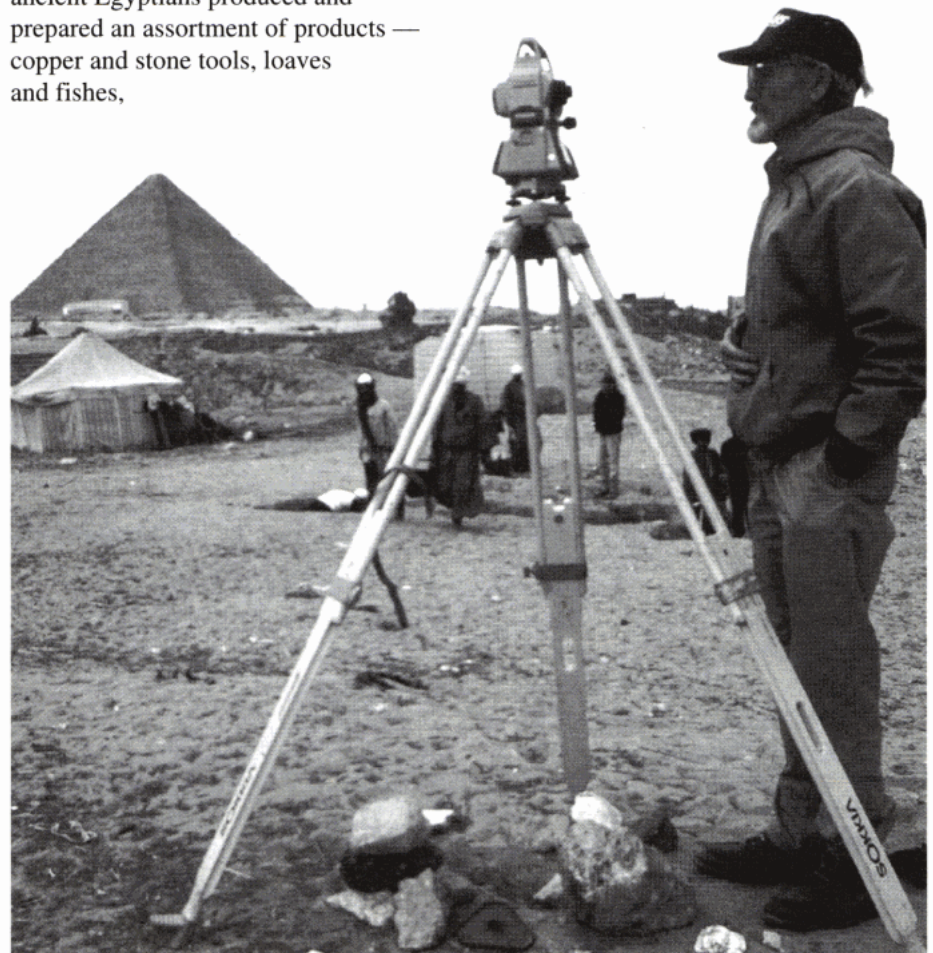
The Palace Hypothesis

Extrapolating from all our excavation squares so far, I now think it likely that a huge, systematic facility — which probably includes workers’ houses — lies buried over an area extending 250 meters south from the Wall of the Crow and running east-west 200 meters. Here, during the time the pyramids were being erected and the Sphinx hewn to the north on the Giza Plateau, the ancient Egyptians produced and prepared an assortment of products — copper and stone tools, loaves and fishes,

meat and other food, paints and other craft material.

What we saw in the big leap forward was *not* the signature of an actual royal residence. Rather, it was a complex made of massive walls for systematic production, whose overall pattern, size, and wall thickness was on a larger scale than the walls and chambers we found to the south in previous seasons (see map blow-up). It may signify one of the world’s earliest forms of industrial production. To the west, between our excavation squares and the plateau slope where Zahi Hawass, Director General of Giza and Saqqara, is excavating the workers’ cemetery, there is as much unexplored space as the entire width of the area where our main excavation squares have so far been located. Next season we need to “leap” westward, where we do not yet have a “window” down onto the ancient settlement, as well as expanding areas already opened.

Mark Lehner




The Great Sphinx Restoration Celebrated

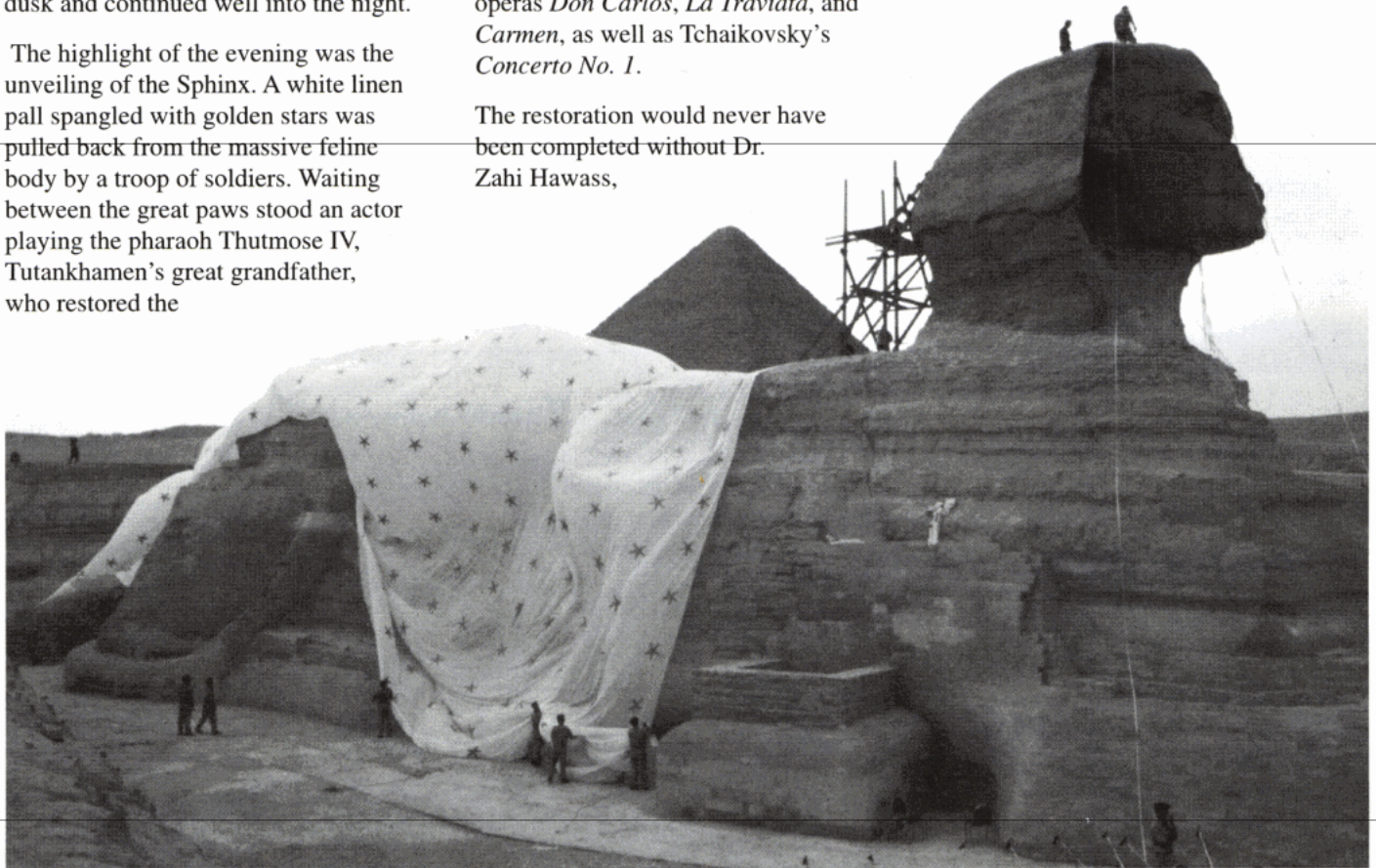
At the invitation of the Egyptian Ministry of Culture, Mark Lehner attended the official celebration marking the completion of the Great Sphinx restoration project. On May 27th about 150 guests, including President Hosni Mubarak, watched the elaborate festivities which began at dusk and continued well into the night.

The highlight of the evening was the unveiling of the Sphinx. A white linen pall spangled with golden stars was pulled back from the massive feline body by a troop of soldiers. Waiting between the great paws stood an actor playing the pharaoh Thutmose IV, Tutankhamen's great grandfather, who restored the

Sphinx, the first time, when the statue was a mere 1,200 years old. As the pall fell away, he emerged from the paws to bestow the key of life on the Sphinx. A spectacular show of lasers and strobe lights then lit up the Giza Plateau and its monuments. A formally-attired orchestra followed with arias from the operas *Don Carlos*, *La Traviata*, and *Carmen*, as well as Tchaikovsky's *Concerto No. 1*.

The restoration would never have been completed without Dr. Zahi Hawass,

Director General of Giza and Saqqara, whose dedication kept the project alive over many years. President Hosni Mubarak officially recognized Dr. Hawass for his work with a state award, Science and Culture First Class. 




Egyptian paratroopers prepare a star-studded shroud for the unveiling of the restored Sphinx.

Ancient Pigments Muddy Simple Explanations

While working in Square M10 (see maps, pages 2 and 6) in TBLF, Mohsen El-Sayed noticed an unusual layer of speckled bright red and yellow inside a rectangular bin built against a north-south mudbrick wall. The layer was below several other "floors" that filled the bin. After two days of scraping, mapping, and photographing, layer by layer, Mohsen finally laid bare a deposit of ancient pigments — red, yellow, and orange.

Most ancient pigments are naturally occurring minerals. Red pigment was probably made from haematite (an opaque iron oxide), red ochre, and burned yellow ochre, all of which owe their redness to the action of iron oxidation. Yellow was most likely made from natural yellow ochre and the action of iron oxidation.

It was Mohsen in 1997 who found a similar patch of pigment in the floor of

the southern chamber of the "house" in square E9, along with dolerite hammer stones. The presence of pigment in both places complicates once again the image of a simple discrete function for the chambers and structures we are discovering. Why would pigment be found near features that strongly suggest a bakery? Were a variety of items produced in each TBLF gallery? During future field seasons we will be searching for the answers. 

Trial by Sand, Wind, and Heat: *Lessons from the Weather*

In March and early April we were thrashed by severe sandstorms of headline proportions across several Middle Eastern countries. On these days the air would be heavy with particulates when we started at 7 AM and then the wind would pick up, blowing grit and flapping our measuring tapes. By mid-morning our faces were sandblasted as we hunched over in our trenches, scraping, measuring, or trying to draw.

On the worst days, when we stood to survey the scene through the grains in our eyelids, the giant pyramids had disappeared behind a veil of blasting sand. We could literally not see Khafre from Khufu. On three days we had to suspend work, though sometimes our courageous crack troops would tough it out. On her last day of work, March 26th, Justine Way elected to go back into the maelstrom. We dropped her off at square D17x and watched her disappear in the dust so she could “capture” the stratigraphic layering in the western side of her square in a last section drawing.

Lessons from the Sandstorms

The sandstorms taught us a lesson about our site. Over several seasons we have remarked on how the mudbrick tumble from the collapse of the walls of the ruined buildings fills the lower parts of the ancient rooms right down to the floor. In the sections, like the one Justine drew in the sandstorm, we see whole bricks “frozen” in the tumble when they fell from the walls. But there are no layers or “lenses” of sand separating the mudbrick tumble, which we might expect in a desert-edge site if the walls had collapsed and deteriorated slowly over a long period.

In today’s climate, the walls might crumble and topple a little, sand would blow in, then there would be more crumbling, more sand, etc. A single sandstorm this last season dumped so much sand into the excavated ancient rooms and chambers that it covered the



Mark Lehner ponders the layers in a stratigraphic profile of Square D9.

floors and banked up against the walls. Our entire crew of workmen had to spend a good part of the following day cleaning up in order for us to continue to excavate and map in our squares.

The sandstorms reinforced the idea that our site seems to have been quickly, and therefore purposefully, filled and practically levelled. If so, perhaps it was the final task of the royal workforce to clear the site after pyramid building was suspended at Giza and these vast production facilities were no longer used.

Taxing labor

Close on the heels of the sandstorms came unseasonable heat. During almost the entire second week in April temperatures soared as high as 45° C. By noon on these days, heat waves shimmered through the distances from one excavation area to another. Everyone on the team seemed out of focus, moving in slow motion, now and then feeling woozy.

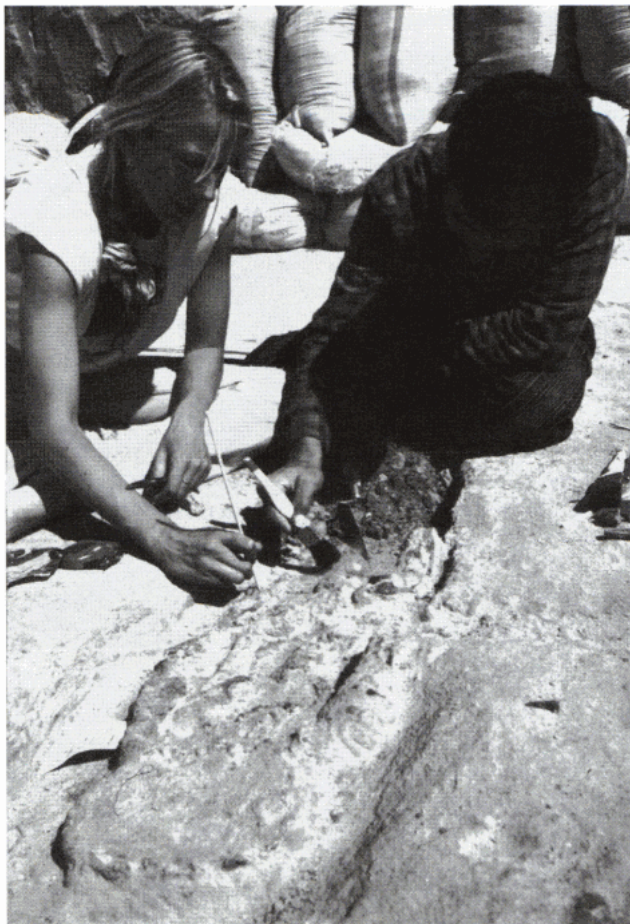
I was mapping the back southern chambers in the long TBLF galleries

where pure black ash (“black velvet”) accumulated knee-high and more, probably from ancient baking. Even with *the hat* (which prompts the accusation I’m an Indiana Jones wannabe), I often felt the sun scorching the back of my neck, while noisy flies insisted on their rights to land on my face. Familiar with “black velvet” from the 1991 season bakeries, I thought about the activities that would have left such homogeneous ash so deep.

In any home hearth the occupants would have swept out the dead embers and ash. But here they seem to have let it accumulate, as they turned it over whenever they yanked the bread pots out of the baking pits. They probably brushed the ash aside, and simply spread tan desert clay (*tafla*) to keep the dust down. When the floor rose to a certain height, they dug out the baking pit again to get some depth. This allowed them to embed the sealed bread pots, one upside down on top of another, in more hot ash and charcoal. So this production certainly seemed industrial, large scale, and —like the

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2,000 Years Later: *Slipper Coffins and Amphorae Buried in TBLF*



Teri Tucker and Sayed Salah carefully clean around the bones of a Late Period burial uncovered in TBLF.

dental picks, and brushes. As the skeletons emerged, she prepared descriptions and detailed drawings at a scale of 1:5. When the operation was done she packed each individual bone with great care for storage in the Giza magazine where our collections are held.

Cheap Burials

The skeletons had been laid out in modest graves in an east-west orientation with the heads to the west, hands resting on the lower torso. The bodies had been placed in thin mud

“slipper coffins” which were now badly decomposed. A cheap form of burial, these graves simulated a painted coffin but involved little material or labor. A hole prepared for the body was lined with mud and plastered. The corpse was then placed in the hole and covered with sand. A very thin layer of mud was smeared over the mound of sand and plastered and painted. One of our burials had been further adorned with inlaid eyes of which only one was preserved. There were no accompanying grave goods.

Dating the Burials

Our initial assessment that the burials were from the Roman period was

dispelled when, shortly after the first two graves were discovered, we uncovered a cache of amphorae near them. We are still studying the date ranges of this type of jar, but they are probably from the Late Period (712-332 B.C.), or more specifically the Persian period (525 - 332 B.C.). Two more caches of large amphorae were subsequently discovered nearby. In one cache, the jars had all been placed upside down, looking like a cluster of rockets ready for take-off. The amphorae and associated burials are about 2,000 years younger than the deposits we are excavating. Yet they are still ancient — about 2,400 years old!


More Burials

The two burials Teri dug turned out to be the first of many. By the end of the season, the outlines of more than 40 burial pits were mapped across the 20 X 20 meter TBLF square. They were discernible, even without exposing the skeletons, as long oval pits filled with sand or loose mud fill, sometimes in the shape of bath tubs or coffins. Nine more of the burials blocked our way to the Old Kingdom architecture and

deposits that we planned to excavate. So we dug down around them, leaving the graves for Teri who later returned to excavate them.

The amphorae and ... burials are about 2,000 years younger than the deposits we are excavating. Yet they are still ancient — about 2,400 years old!

The other burials, located in squares where we did not dig, were left undisturbed. Now resting under a thick layer of back-filled sand, they lie intact awaiting future scholars.

Thanks to Teri Tucker we were able to both properly excavate the burials that we had to remove, and continue on below to the third millennium B. C. layers that are our real interest. 

Although our focus is the Pyramid Age, it is not surprising that we occasionally encounter materials from other periods. Early in the excavations of TBLF we uncovered two skeletons in Square O12 that we thought were Roman. Since they blocked our access to underlying deposits, they had to be removed. Excavating them properly required special expertise, which was graciously supplied by Teri Tucker, a bioanthropologist from Ohio State University. Teri, a Fellow at the American Research Center in Egypt, is currently excavating and studying Roman burials in Baharia Oasis.

Excavation

Over the course of a week Teri meticulously cleaned around the bones, working with small wooden probes,

A Copper Workshop at Giza: Another Chapter in the Saga of Bread Molds

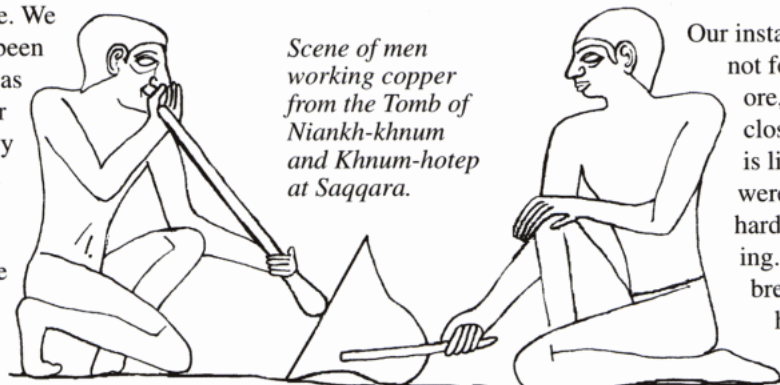
Last season we found hints of copper working in Square D17, dug by Justine Way from the University of Chicago. In the southeast corner of a room she uncovered a hearth that had scorched the walls and nearby deposits to a bright orange. We suspected the hearth had been used for copper working, as many fragments of copper slag turned up in the heavy fraction from flotation. In the hopes of uncovering more evidence of copper working, we expanded the excavation diagonally into the adjoining squares, which we designated D17x.

Our efforts were rewarded. Here we found a chamber, measuring roughly 2 X 4 meters, where copper working appears to have been a principal activity. There were abundant traces of metallurgy, particularly two unusual hearths consisting of bread molds that had been plastered in place against the walls of the chamber. One was at the center of the south wall, and another, in the northeast corner. They were held in place by "collars" of large sherds and mud that had been fired like brick from the heat.

There was other evidence that bread molds had been used as crucibles to hold the molten metal. We found sherds that had been heated to the point at which the ceramic was vitrified (melted), and small bits of corroded green copper were embedded in the bread mold walls. There were also parts of spouts and little tubes of clay which would have been used to blow air into the furnace. The southern hearth was placed strategically to capture the northern wind, which would have fanned the embers with oxygen.

Three complete or nearly complete jars, filled with ashy dirt were found *in situ* in the floor. One of the jars held a

nearly complete flint knife. Amidst the ash in the jars there were also small bits of copper slag. We found more copper slag in the floor deposits, as well as a corroded copper fish hook and part of a thin copper pin, rod, or needle.




Scene of men working copper from the Tomb of Niankh-khnum and Khnum-hotep at Saqqara.

As in many of the rooms we excavated at Giza, there was evidence of several floor levels and phases of activity. In the later phases of the chamber, a cross-wall divided it into two similar sized rooms. On the west side of the chamber's west wall we found another series of egg-carton-like sockets or depressions, like our bakery installations. But stuck in one of these sockets was a nearly complete jar *in situ*, showing that these kinds of floor features were not used solely for bread molds and baking.

Bread Mold Crucibles?

It is an old idea that Old Kingdom bread molds were crucibles for molten copper. This idea was discarded when it was realized that their true function was to bake a kind of bread. There is no doubt that this was indeed the main function of this type of vessel. But the excavations in D17x have demonstrated that the bread mold could be used for copper work as well. The hearths made from bread molds do not resemble the crucibles shown in the Old Kingdom tomb scenes, which have a kind of double saddle shape. But in the Tomb of Niankh-khnum and Khnum-hotep at Saqqara, there is a scene (shown in the

line drawing at left) of a man holding a large bread mold at an angle (with sticks?) while another man uses a blow pipe to heat whatever is inside the bread mold. Nearby is a scene of men using blow pipes at a typical crucible.

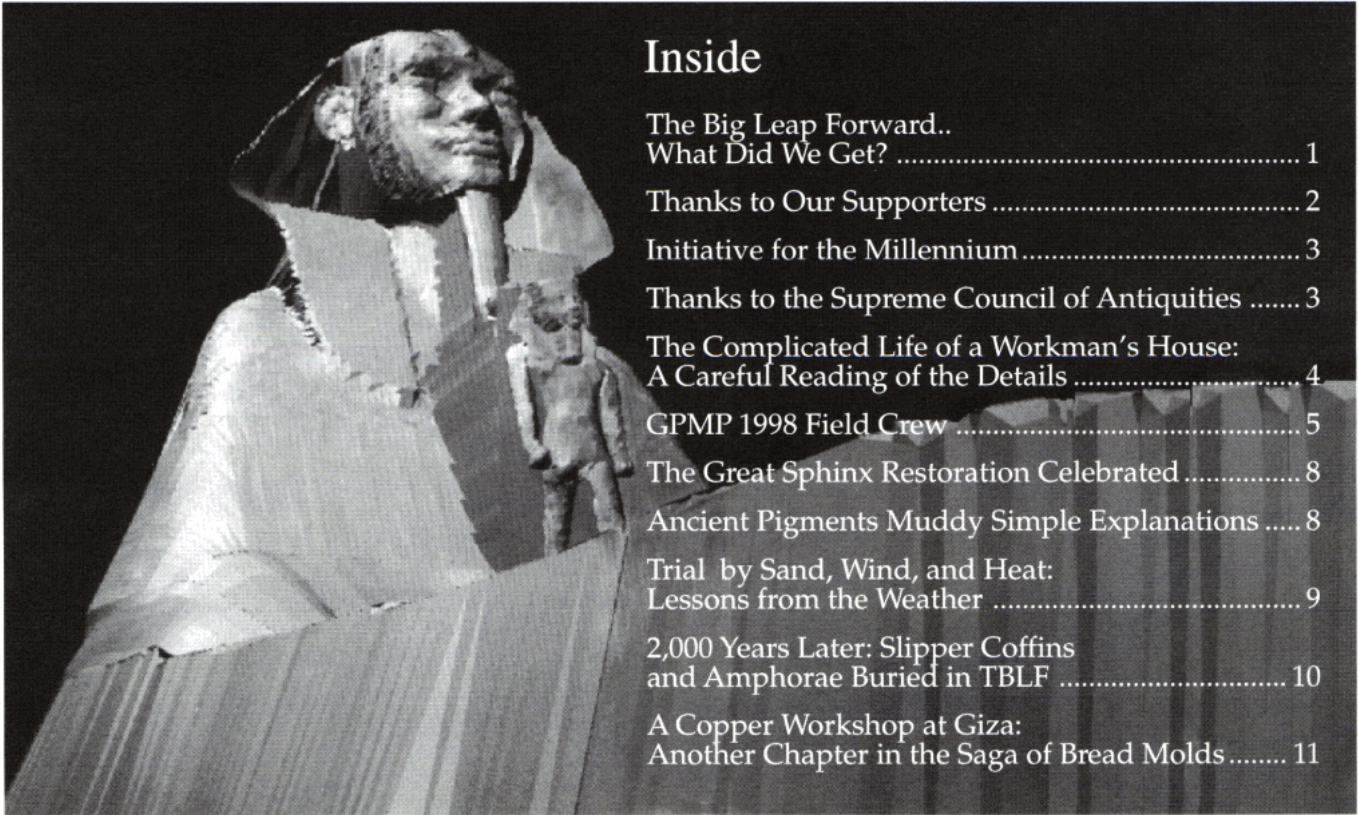
Our installations in D17x were probably not for producing copper from raw ore, which would have been done closer to the source in the mines. It is likely that small implements were made or that tools were hardened by tempering or annealing. Once they were heated in the bread mold crucibles, tools could have been quickly cooled for pounding by dunking them in water in the large jars implanted in the floor. It is possible that crucibles of the kind more typically shown in tombs scenes were used in the large ash-filled trench along the eastern side of the room. 

Trial by Sand, Wind, and Heat

continued from Page 9

footprint of the TBLF galleries — systemic.

This, then, was the lesson of the heat: Rather than happy household baking, this work could seldom have been pleasant. Here I was suffering in 45°C heat just to *map* these oven-rooms. What must it have been like when the baking pits and the hearth platform for preheating the pots were glowing with live embers? (Have you ever leaned too close to a barbecue grill to check the franks and burgers?) The people who worked in these back chambers were in all probability barefoot. And if the baking went on year round (it could have been seasonal, but probably not for a staple like bread), sometimes they must have put up with heat from the hearths and baking pits on abnormally hot days like that of April 15, 1998. Thankfully, we do not pay *our* taxes in such labor. Mark Lehner



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View of the Sphinx, as it appeared in the 18th Dynasty, generated by our computer model. Read about "Virtual Giza" in the article on the "Initiative for the Millennium" on page 3.



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