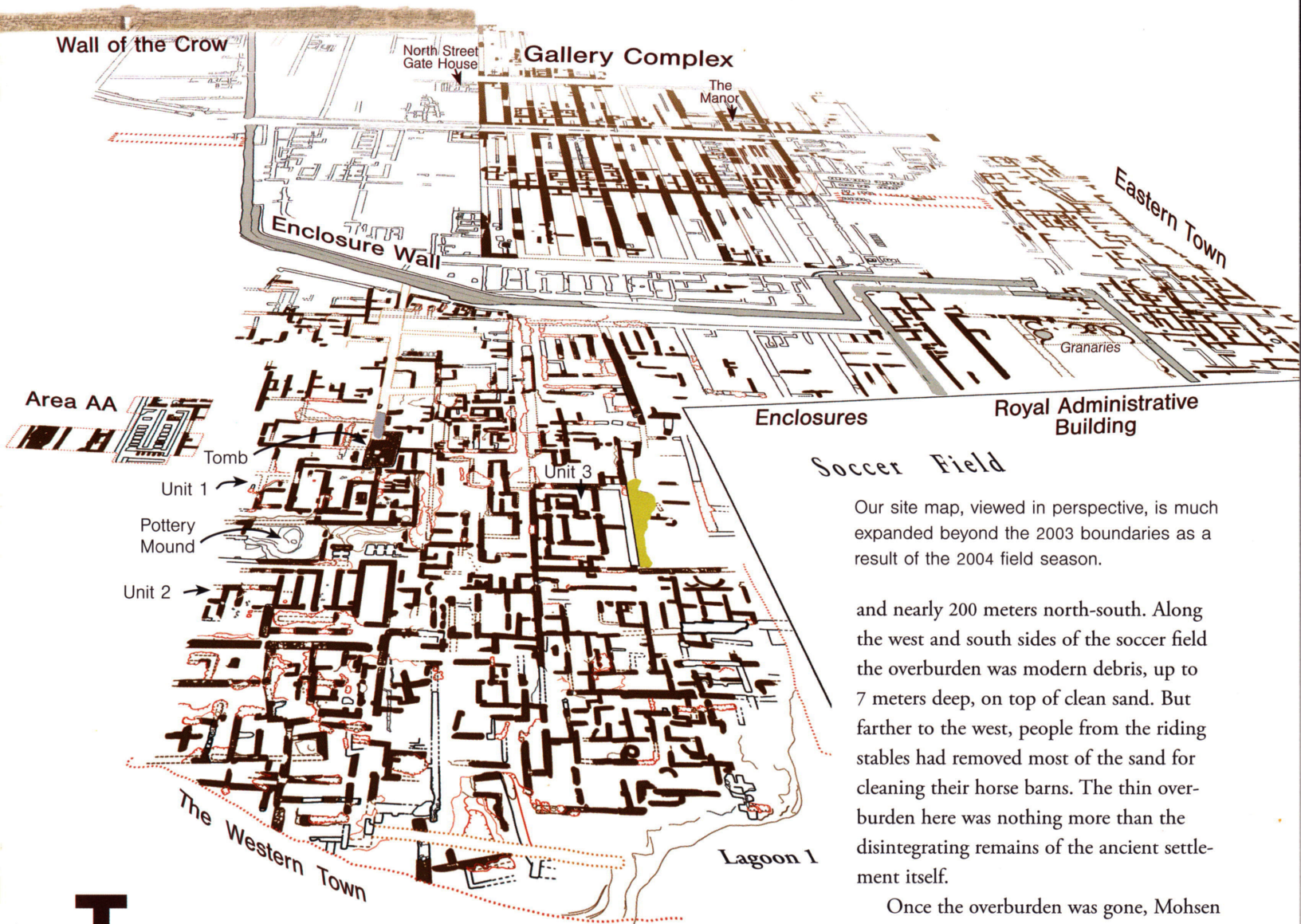


# AERAGRAM



Newsletter of the Ancient Egypt Research Associates ♦ Volume 7 Number 2 ♦ Fall 2004

## Season 2004: A New Neighborhood



Our site map, viewed in perspective, is much expanded beyond the 2003 boundaries as a result of the 2004 field season.

and nearly 200 meters north-south. Along the west and south sides of the soccer field the overburden was modern debris, up to 7 meters deep, on top of clean sand. But farther to the west, people from the riding stables had removed most of the sand for cleaning their horse barns. The thin overburden here was nothing more than the disintegrating remains of the ancient settlement itself.

Once the overburden was gone, Mohsen Kamal directed the team of Mark Kincey, Tim Evans, Justine Gesell, and Yukinori Kawae in clearing, grid staking, and mapping at 1:50. Working intensely they “captured” the wall patterns over an area 40 meters north-south and 55 meters east-west, adding 2,250 square meters to our site map.

About half way down the length of the soccer field they had to stop short at the

(Continued on page 2)

**T**he Western Town (above) is the prize of the 2004 field season, which ran from January 8th to May 31st. You are viewing the site from the south, west of the soccer field. This dense mass of walls, chambers, and courtyards was *terra incognita* until this season, save for a little outlier, Area AA, which we uncovered during our very first field season in 1988-’89. The area was a

blank on our map nearly all the way up to the Enclosure Wall.

Two test trenches that we dug along the west side of the soccer field during our 2003 field season hinted at 4th dynasty settlement, but we had no idea we would find occupation over such an extensive area.

Our clearing exposed a broad swath of ancient settlement, 60 meters east-west

## Season 2004: A New Neighborhood (Continued from page 1)

depression that we called Lagoon 1 because it filled with ground water as soon as our workers removed the overburden. But near the far end of the soccer field, an “island” poking up out of the depression proved to have more settlement remains. (See map on facing page.)

The Western Town runs from the Enclosure Wall south to Lagoon 1, east under the soccer field, and west beyond this season’s excavations. Oriented slightly west of north like the Gallery Complex, the Western Town is a dense network of walls made of mudbrick and fieldstone. The walls appear to belong to large houses flanked by small courts and chambers. If these large wall ensembles are houses, they are on a grander scale than any we have seen thus far. At this point, we recognize three sizeable units, shown in plan view on the left along with the plan of a smaller, simpler house from the Eastern Town. (For more on the Eastern Town see page 6.)

### Upscale Housing?

We wonder if these large units were the homes of high administrators, like the mansions in the 12th dynasty pyramid town of Senwosret II at Illahun. Two of the units are on the western edge of this season’s work and continue beyond the limits of our excavation. The third is on the eastern side near the soccer field. At this point we are not certain of the boundaries of the units. Since we have only mapped the walls and do not

know the complete extent of the structures, we can only offer preliminary, somewhat speculative observations.

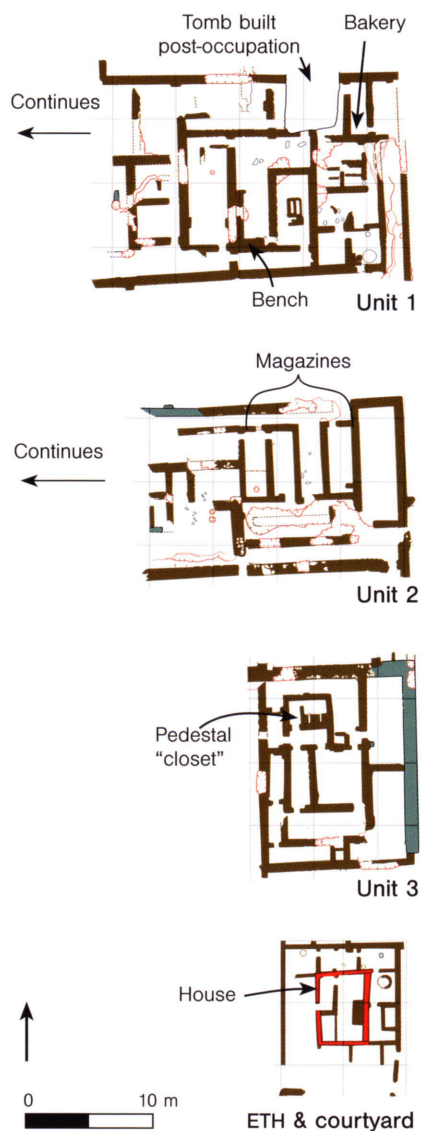
The house units appear to have a residential core surrounded by work and storage areas. All of them have at least one or two large chambers that might have been reception rooms connected to smaller chambers. The only room that we have excavated, a large central chamber in Unit 1, was furnished with a mudbrick bench that runs against two walls, similar to the mastaba benches in village houses today. Black paint still adheres to the plaster at the base of the walls (see photo below).

The courts and chambers around the core houses were probably for work and storage. In Unit 2, four large magazines line up against a narrow corridor running along the northern wall. A bakery and/or kitchen occupied a series of chambers in the eastern end of Unit 1. A small room on the northern end of Unit 3 contains a set of three pedestals, similar to ones we have found elsewhere on the site and probably used to support storage bins. More pedestals occupied a courtyard between Units 1 and 2.

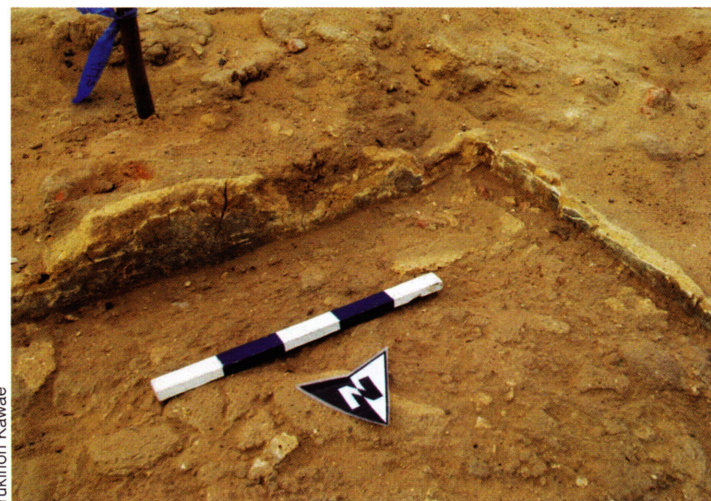
Adjacent to this courtyard is a rubbish dump—the “Pottery Mound.” Possibly the trash heap for Units 1 and/or 2, it is filled with mostly crude red ware jars, so called “beer jars,” bread molds, ash, and animal bone. There were also sealings with Khafre’s and Menkaure’s names.

A sea of walls spreads across the Western Town between the three units. We do not know if these belong to additional, contiguous large houses, or to courts and chambers for supporting industries, or small houses like those around the large villas in 18th dynasty Amarna.

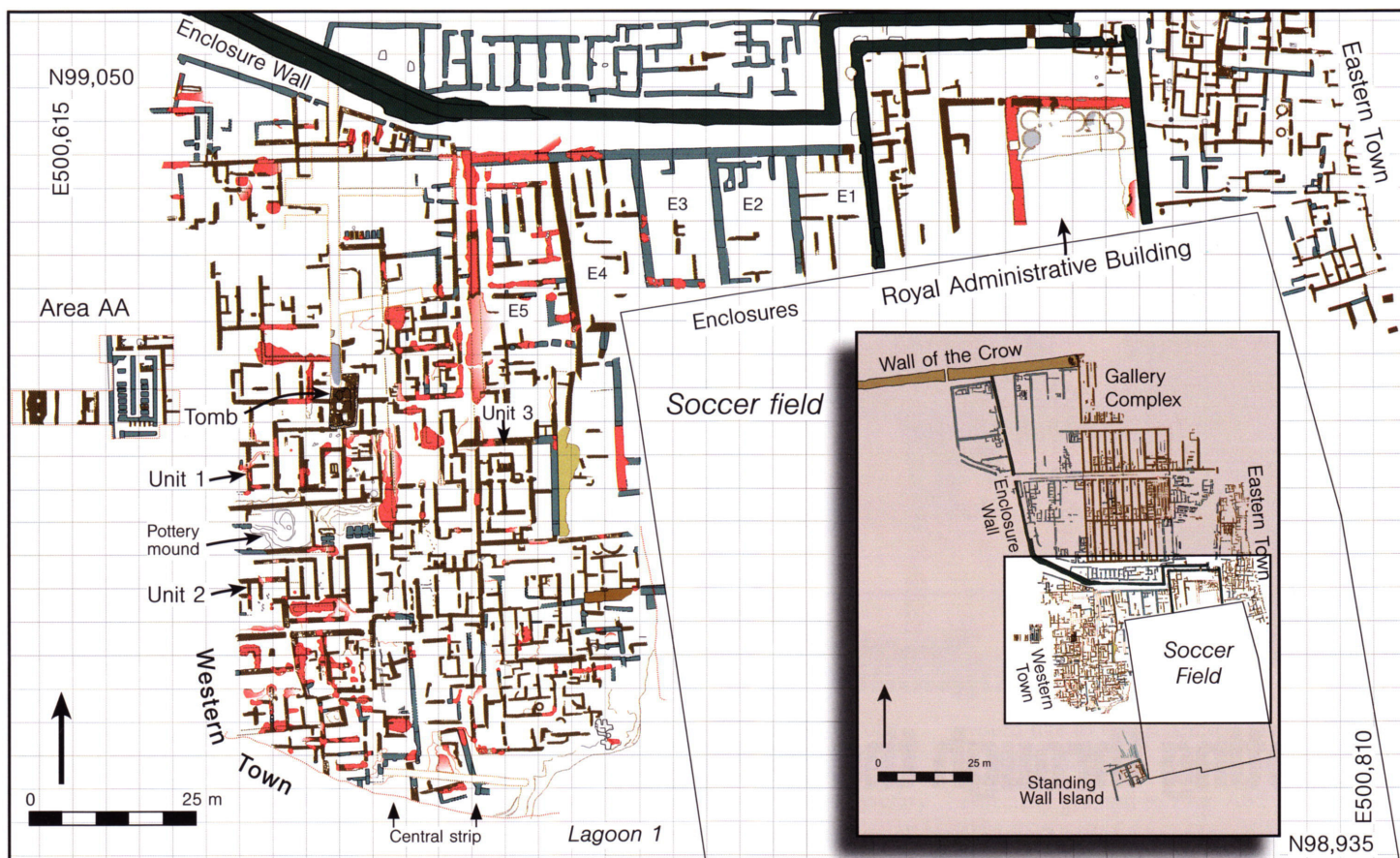
Additional large units may occupy the northern part of the Western Town up to the Enclosure Wall. We did not completely expose the area because we left intact, for future study, post-occupational deposits of gravel and *tafla* (marl desert clay) formed in this area by ponds. But the Old Kingdom walls that we could map here are thick and aligned to the cardinal directions like those in the large house units.



Three large house units shown with the little Eastern Town House (ETH) (house walls red) and its surrounding courtyards. Units 2 and 3 extend beyond the limits of our excavation. The fine red lines show robbers’ trenches.



A corner in a central chamber in Unit 1, the only room we excavated in the large house units of the Western Town. The walls have been cut or eroded down to stubs a few inches high. Plaster and black paint still adhere to them.



Areas cleared around the soccer field this season. Robbers' trenches are shown in pink, mudbrick walls in brown, and stone walls in gray.

Inset: Overall site plan showing the areas of the large map highlighted in white.

### Low Income Neighborhood?

At the southern end of the Western Town, the structures appear to be much smaller, with thin walls less aligned to the cardinal directions than the large houses. These could be small residential units, like those in the Eastern Town, but even more crowded.

### A Partially Planned District

At this point we have only an overview of the Western Town—the plan as revealed by walls and other features that appeared when we cleared down to the Old Kingdom surface. We traced many walls in this area on the basis of trenches left by widespread robbing (the pink areas on the map above) that probably occurred shortly after the settlement was abandoned. The robbers removed the bricks so deftly that they often left the marl plaster intact, marking the location of the ancient wall faces.

Even though we have only a limited window onto this new neighborhood, it is still tempting to speculate on what it says about Giza's pyramid town. One issue is how the households were provisioned. We see within some of the houses and throughout the Western Town traces of small granaries and bakeries, suggesting that these households may have been self-sufficient, like estates anywhere else in Egypt at the time. Other large houses here, such as the Manor at the eastern end of the Gallery Complex (see map on page 1) and the North Street Gate House on its western flank,

also had their own bakeries. We see small granaries in the modest houses of the Eastern Town as well. We have to wonder then who received the grain stored in the large central granary of the Royal Administrative Building (RAB) or the bread baked in the large bank of bakeries east of the galleries? Were these foodstuffs for the laborers who rotated through the site? Or were the smaller granaries in the houses stocked with grains from the large one in the RAB?

We also wonder if the large house units dispensed foodstuffs (such as beer in the jars discarded in the pottery dump) to adjoining, smaller households. Were the small residences (if they are houses) in the southern part of the town dependent on the large units?

In addition, we puzzle over the degree of planning in the Western Town. Unlike the carefully laid out Gallery Complex, the overall layout here, based on what we have cleared thus far, seems to be an urban maze, albeit a largely orthogonal maze. We recognize, moreover, three long north-south strips. The large houses might have fronted onto the center strip, 16 meters wide, which may have been open but over time was invaded by small courts and chambers. As we continue our excavations, we will be trying to discern the initial town plan that might have been gradually preempted by a self-organized structure.

In future seasons we hope to resolve some of the many questions raised by this season's work. More stories from our 2004 field season appear on page 8.



## Shooting through the Microscope

*Last spring we purchased a Nikon Stereoscopic Zoom SMZ800 microscope with an attachment for photomicroscopy (photography through the microscope lens). Team member Yukinori Kawae, pictured above, quickly stepped into the role of project photomicroscopist. Here he explains the potential and challenges of shooting at the micro scale.*

**M**icroscopes reveal a world that the naked eye cannot see. Archaeobotanists rely on them to study seeds and other plant remains which are often no more than a few millimeters across. But even specialists who work with macroscopic artifacts discover valuable information peering down a microscope. For example, the lithic analyst gleans clues about the function and application of a tool from minute abrasion marks. The ceramist can establish the origins of a pot from the microscopic components of its clays.

What specialists see in the microscope lens, however, can be difficult to document. Drawing has been used for decades to record seeds, but many artifacts have features that do not readily lend themselves to line art, such as the fabric of a ceramic vessel (see photo above right).

### Photomicroscopy: The Solution

Photography through the microscope captures features that the researcher sees

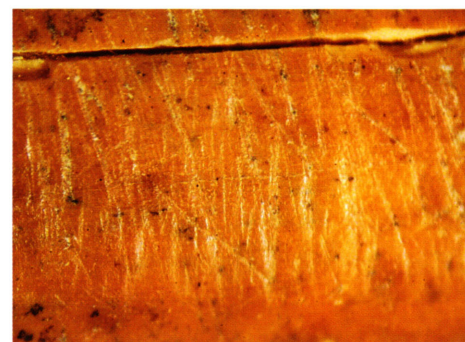
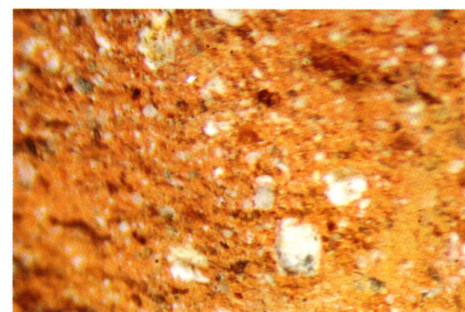
and allows others to observe them without having to peer through the same lens. This technology is particularly useful in Egypt, where the export of any archaeological remains, even a tiny piece of ceramic, is strictly prohibited.

With the introduction of photomicroscopy at Giza, our researchers can now compare microscopic structures in their samples with those of specimens in research labs anywhere. More essentially, photomicroscopy preserves visual documentation of a sample.

### Photomicroscopy Challenges at Giza

My "studio" is in a room we dubbed "Khufu" in our magazine/storeroom located just west of the Khufu Pyramid. My subjects are the microscopic structures of ceramics, faience, tools, ornaments, and seeds. In addition to the microscope, I use a Nikon D100 digital SLR camera and Nikon Capture software.

When I began photographing through



Left: Yukinori Kawae photographs the micro-structure of artifacts using a digital camera attached to a microscope (via a beam splitter attachment on the side of the scope). Above: Yuki's photographs of a cross section of a Giza ceramic (top) and striations on a bone point used for weaving. (See story on weaving on page 10.)

the microscope I quickly encountered two complications: white balance and depth of field.

Since no appropriate lighting equipment had been prepared, I used two tungsten desk lamps. They immediately forced me to confront color temperature, a measure of the spectral properties of a light source in units Kelvin (K). Unlike the human eye which adapts to changes in the color of a light source, film does not. Color temperature can adversely affect the image: high color temperature (e.g. an overcast sky, 7,000 K) gives a bluish appearance and a low color temperature (e.g. bulbs, 2,800 K) a reddish appearance. The standard daylight type film is 5,500 K, a value which correctly reproduces the color of a subject in daylight.

But when you photograph dark subjects lit with something other than a photoflash, such as our tungsten desk lamps (2,800 K), the image will have a color cast, unless you make adjustments. To reproduce correct

color you need a flash that produces 5,500 K or color conversion filters, if using other light sources.

Digital cameras, however, unlike film cameras, have a built-in mechanism to adjust for the color of the light source. "White balance" processes information from the camera's image sensor (CCD) to correct the color. I took advantage of the "preset white balance" to solve the problem of my mixed lighting sources. To measure for this value, I put a white object under the lighting and shot it. Then, the camera automatically calculated the color temperature.

### Depth of Field

The next complication was the depth of field. Normally you adjust the camera for the depth of field with the aperture of the lens. A small aperture, for example, allows you to capture images in focus over a long distance. But with photomicroscopy the body of the digital camera is directly attached to the microscope. There is no intervening camera lens and, consequently, no way to adjust for depth of field.

When photographing planar surfaces and cross-sections of tools and ornaments there was no problem since my subjects had no depth. However, when I photographed the irregularities of cross-sections in a piece of pottery or faience, I had to focus on each of their points in collaboration with the respective specialists, Anna Wodzinska and Angela Jones, who chose the features that were most important to record. But the camera's small screen was insufficient for checking the microscopic subject. No more than one person at a time could see the image. I solved the problem with Nikon Capture software, which allowed me to control the camera operation remotely from a computer (see photo on facing page). The image seen by the camera was immediately visible on the computer screen where the specialists were able to confirm the areas they wanted to record.

During the spring of 2004 I took more than 250 photomicroscopic images, which will allow our specialists to study their microstructures anywhere and share the

## Season 2004: Thanks to Our Supporters

Ann Lurie, on behalf of the Ann and Robert H. Lurie Foundation, once again insured that our goals for a long, ambitious, and rewarding field season were fully met, and for this we offer special thanks.

We also give special thanks to David H. Koch, Peter Norton, and Nathan Myrhvold for major support. I am grateful to Bruce Ludwig who has helped to develop financial support for our work at Giza since 1986. Our 2004 season would not have been possible without the support of Jon Jerde,

Robert Lowdermilk, Glen Dash, Matthew McCauley, George Link, James Allen, Douglas Rawles, Ann Thompson, Fred and Suzanne Rheinstein, Sandford and Betty Sigoloff, Victor and Nancy Moss, David Goodman, Marjorie Fisher, Alice Hyman, Don Kunz, Bonnie Sampsell, Lora Lehner, and Craig Smith.

We also welcome the new contributions of Michael Fourticiq, George Sherman, Michael K. MacDonald, Donna L. Dinardo, Robin Young, and Barbara Russo.

~ Mark Lehner

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## Thanks to Our Colleagues

For a very successful season, and for collaboration based in deep friendship, I am grateful to Dr. Zahi Hawass, Undersecretary of State and Secretary General of the Supreme Council of Antiquities (SCA). We thank Sabry Abd al-Aziz, General Director of Pharaonic Monuments; Atef Abu Dahab, Director of Giza and Saqqara; and Adel Hussein, Director of Giza.

We enjoyed working in close collaboration with Mansour Bureik, Chief Inspector of Giza, and Inspector Mohammed Shiha, who represented the SCA during our 2004 season. We thank Mohammed Hameda who also represented the SCA, and the following inspectors: Shiamah Mohammed Abd el-Rahman, Fatma Hussein Mohammed Ali, Heba Hosni Attia, Amira Hassan Abdallah, and Henan Mahmend, who worked with us at the excavation site. We

would like to thank Ahmed Eiz who served as our inspector in the storeroom. We are especially grateful to Eng. Abd al-Hamid Kotb for assistance with mechanized equipment used to clear modern overburden from our site. Once again this season we are grateful for the services of loader operator Mohammed Musilhi, who carried out this task with skill and determination. Without this help we could not have done our work. Reis Ahmed Abd al-Basat did a remarkable job supervising our specialist workers and skilled excavators from Luxor.

We are grateful to Gil Stein, Director of the Oriental Institute, University of Chicago, and Larry Stager, Director of the Harvard Semitic Museum, for the support of their institutions. We also thank Joe Greene and James Armstrong of the Semitic Museum for their help. ~ Mark Lehner

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images with other researchers. In future field seasons photomicroscopy will become standard procedure for preparing a record of our microscopic data. I expect to be very busy. ~ Yukinori Kawae

Yukinori Kawae, archaeologist and photographer for the Giza Plateau Mapping Project

since 2004, grew up in the Hyogo Prefecture in western Japan. A resident of Egypt for the last 13 years, he graduated from the American University in Cairo with a B.A. in Egyptology and plans to do a graduate degree at Cambridge University. His photos of Egypt have been published in Japanese magazines and Egyptian tour brochures.

Until 2002 we knew our ancient city mainly as a ponderous mass of large scale architecture—thick walls and massive galleries—with a rigid, orthogonal layout oriented almost in line with the cardinal directions. During the 2002 season we found a very different face of the city when we rushed to do salvage work ahead of a crew building a new high security wall on the eastern edge of the site. In the builders' foundation trench we discovered a maze of little mudbrick walls running every which way. When we cleared back from the trench we found a hodge-podge of courtyards, houses, and walls. This settlement had grown "organically" right next to the Royal Administrative Building, apparently without any pre-laid plans (see map on page 3).

We hypothesized that this district, dubbed the Eastern Town, was home to craftsmen and other permanent resident workers. But we did not have time to do more than clear the surface and map walls visible in the mud mass.

## Behind Mudbrick Walls: Life in an Eastern Town House

This season we set out to learn about life here by intensively excavating a house. One of the "big" questions was how this little hamlet related to the specialized pyramid-building city. Was this workers' housing different from the gallery barracks or an integral part of the "backroom" operations, contributing in various ways to food and craft production? Also, did life continue here after the Gallery Complex was abandoned?

We selected for excavation a 10 x 10-meter area (four excavation squares) that, as we could see from our previous clearing, encompassed a discrete house compound. Here Dan Hounsell and Emma Hancox uncovered a walled compound with a small house in the center encircled by courtyards. The structure is built of mudbrick with plastered walls and floors.

Here we offer some preliminary observations about life in this compound based primarily on Dan and Emma's field report, along with information from other sources and guesswork.

### The Core Domestic Unit

#### House:

(outlined in red in 3-D model on the right)

Three rooms: vestibule, main room, and platform niche

#### Entrance way:

A dogleg through a vestibule - isolated the interior spaces from the outside (black line in diagram at the bottom of the facing page). This indicates a need for privacy, and was probably a way to deflect desert winds. A door socket remains from a pivoting door (figure 3)



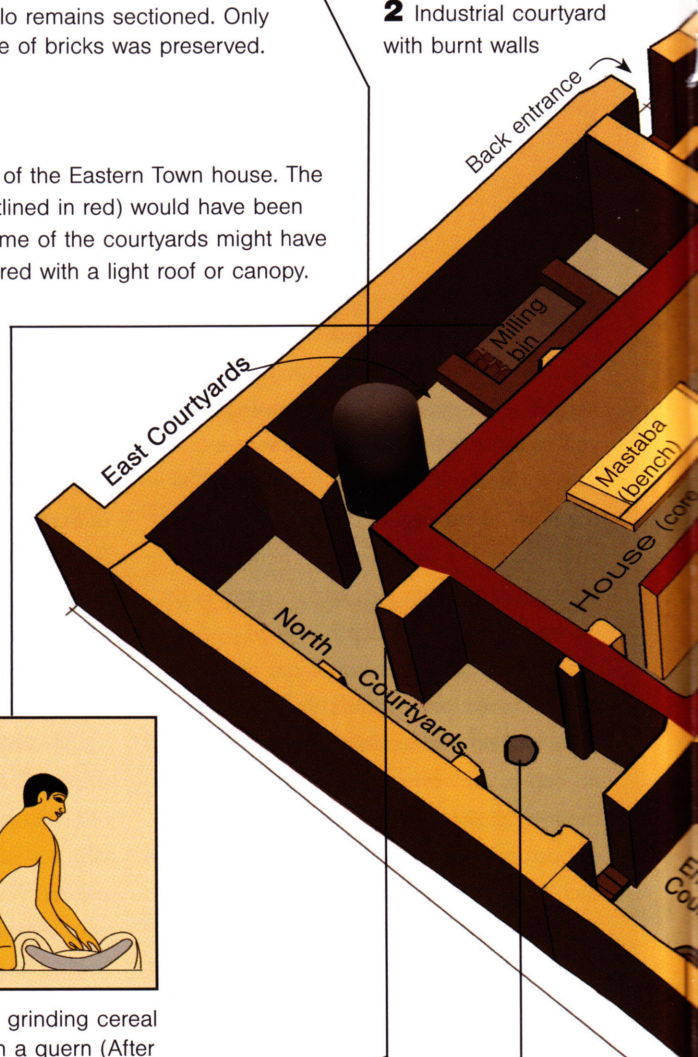
**1** Grain silo remains sectioned. Only one course of bricks was preserved.



Dan Hounsell

**2** Industrial courtyard with burnt walls

3-D model of the Eastern Town house. The house (outlined in red) would have been roofed. Some of the courtyards might have been covered with a light roof or canopy.

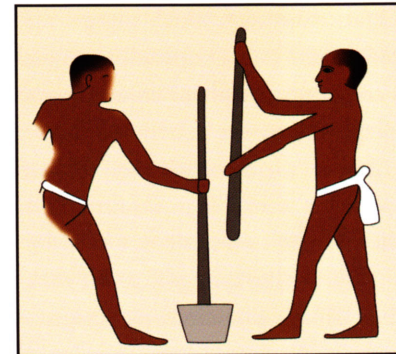


**7** Woman grinding cereal grains with a quern (After Ty's 5th dynasty tomb, Saqqara.)



Dan Hounsell

**6** Pot embedded in the floor used for cooking (?)

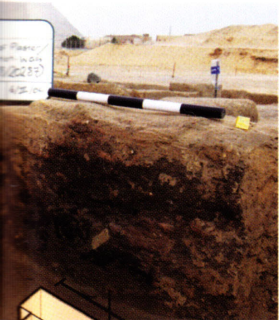


**5** Men pounding cereal in a mortar, (After Ty's 5th dynasty tomb, Saqqara.)

Mortar emplacement?



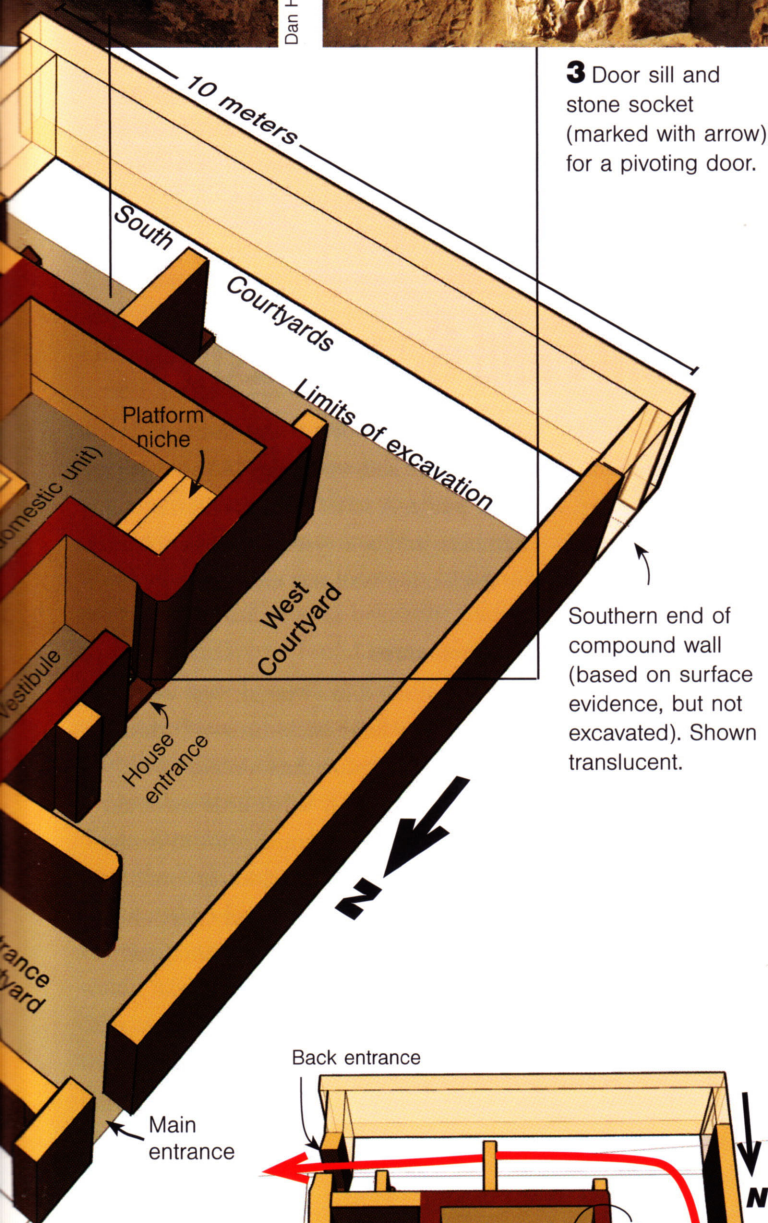
**4** Dep... possib...



Dan Hounsell



Emma Hancock



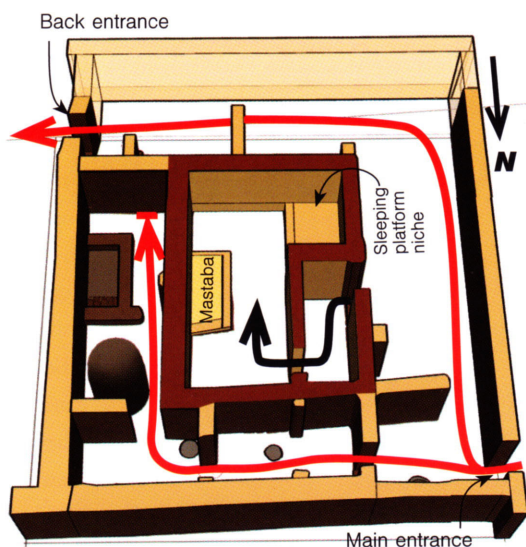
**3** Door sill and stone socket (marked with arrow) for a pivoting door.

Southern end of compound wall (based on surface evidence, but not excavated). Shown translucent.



Emma Hancock

Depression in courtyard used by potters



Access into house (black line) and through the courtyards (red line red)

## Living rooms:

One main room with a bench (for sitting/sleeping) and a sleeping niche. A retreat from cold, rains, windstorms, and summer sun. Here residents probably ate, slept, played, cared for children, and entertained guests. It probably had no windows but may have been lit with oil lamps.

## Roof:

Probably made of thin wood beams, reed matting, and mud daub. It may have been used for work, sitting, playing, and sleeping in the summer, and fuel storage.

## The Courtyards

### Access:

Convoluting. From the compound entrance residents walked successively through the small courtyards wrapping around the north and east side of house (lower red arrow in diagram below.) To reach the ones on the west and south side, they had to backtrack to the entrance. From there they could walk successively through the courtyards to a back door that may have opened onto an alleyway.

### North and east courtyards - domestic:

Features suggest that it was probably used mainly for food storage and preparation:

- A silo likely used to store grain (figure 1)
- An emplacement - possibly for a mortar used with a pestle to break up emmer wheat spikelets (figure 5), an essential step in processing emmer; it must be done before the grains can be ground.
- A bin where grains could possibly have been ground with a saddle quern. Walls on one end braced the quern and at the other end, the grinder's feet, while she worked (figure 7).
- A pot embedded in the courtyard floor (figure 6) - may have been used for cooking. The pot was filled with heavy clay and mudbrick fragments which showed evidence of heating: red/orange on top. The adjacent walls were also reddened by heat. The pot was not a hearth but was used to hold hot objects (e.g. heated stones) which suggests cooking.

### West courtyards - public, varied uses:

Front yard for the house. This could have been the focus of everyday life—sitting, visiting, playing, craftwork. Possibly pottery was shaped here. A clay-coated depression in the entrance courtyard is similar to what 20th century village potters used to hold large pots while hand-shaping them (figure 4).

### South courtyards - industrial:

Central one was possibly used for faience working. The walls were heavily burned. Pottery was embedded in the walls, probably as a thermal cushion, indicating it was intended to withstand much burning (figure 2). Abundant faience fragments and small faience objects were found here. However, there was no evidence of burning on the floor; craftsmen may have used a pot hearth set on a base. The small court next to the back entrance had a bin possibly used to store fuel. The other courtyard also showed burning on the walls.

## AERAGRAM

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### Editor

**Wilma Wetterstrom**

Harvard University

AERAGRAM is published by AERA, Ancient Egypt Research Associates. It reports on ongoing research and other developments on the Giza Plateau for friends and supporters of AERA and others interested in ancient Egypt.

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## Giza in Print

Last spring Mark Lehner's article "The Pyramid Age Settlement of the Southern Mount at Giza" came out in the *Journal of the American Research Center in Egypt*, Vol. 39, 2002, pp. 27-74. It discusses the results of our work at the "Lost city of the Pyramids," from 1988 through 2002. In the 2001 issue of the same journal Mark and Nicholas Conard published an article on work from our first season, "The 1988/1989 Excavations of Petrie's 'Workmen's Barracks' at Giza" (*JARCE* 38:21-60).



Standing Wall Island and adjacent areas. The southern tip of the Western Town shows at the top of the plan. The location of the "island" in relation to the whole site is shown in the inset map on page 3. The fine blue marks just north of the "island" are salt lines which may reflect the location of ancient walls.

## More Stories from Field Season 2004

The Western Town (page 1) was the biggest story this field season, but other operations across the site also yielded much important new information about our pyramid city.

### Standing Wall Island

While clearing at the southern end of the soccer field, we found a thick fieldstone wall, standing 1.5 meters above the mud mass (see map above). "Standing Wall" is the north side of a complex with two large enclosures, within which thin mudbrick walls can be seen on the surface. Along the east side two doorways open to areas currently under the soccer field.

### Around the Soccer Field

One of our goals this season was to clear around the soccer field, and in so doing we not only found the Western Town, but we also discovered that the Eastern Town continued south along the east side of the field (see map on page 3). Here we encountered the same pattern of small houses and courtyards but the orientation was shifted farther west of north than anywhere else on the site.

Upon clearing along the north side of the soccer field we found that the Royal Administrative Building (RAB) continued south to the field and under it, as we had expected. In addition to opening new squares here, we resumed excavations in the

northwest corner of the RAB and found that the structure had a complex history with an earlier phase. A series of magazines, small chambers, and courtyards stood here before the thick outer wall was erected.

### The Enclosures

Just west of the RAB's western wall we found a series of five large enclosures with thick fieldstone walls more than a meter thick (see map on page 3). What little we could see of internal architecture, prior to excavation, suggests that the enclosures contained a series of large magazines and courts, hinting at storage and accounting functions.

### North of the Wall of the Crow

The Wall of the Crow rises more than 8 meters high along the northwest side of the site (see inset map on page 3). Until this season, we knew little about the area north of the wall, except for what we had gleaned from a 2001 test excavation. In front of the wall's massive gate, in a 5 x 5-meter square, we found traces of a cambered pathway. But we could not tell if more ancient city or perhaps a harbor lay beyond.

This season we carried out two operations north of the Wall of the Crow, prompted in part by an imminent plan to build a cement and steel corridor from the modern town to the Muslim Cemetery at the west end of the wall. The proposed

route ran between the tourist bus parking lot and the wall. We worked with the Supreme Council of Antiquities and Giza Inspectorate to retrieve archaeological information before construction began.

Near the east end of the wall we excavated an 11 x 24-meter trench, after removing a deep layer of modern debris and clean sand. We found a compact limestone debris surface rising to a mound at the eastern end of the north side of the wall. This "Mason's Mound" may be the remains of a ramp or embankment that the builders used in hauling blocks to the upper courses of the wall.

Our second operation was a thumb-shaped clearing (photo below) north of the gate in the Wall of the Crow. Starting 5 meters north of our 2001 excavation, our exposure revealed that the compact surface seen at the east end of the wall continued as a broad terrace. But there was little else: only two mudbrick lines from a structure that apparently washed away. In four test trenches that we sank below the Old Kingdom surface we found layers of water- and wind-sorted gravel, clay, and sand.

The paucity of settlement remains here probably reflects the fact that this area is the south side of the mouth of the Central Wadi. Running from the high desert through the Giza Plateau, the wadi would have periodically carried flood water from sporadic rains. Any structures built here would likely have been washed away.

### In Sum

With the 2004 season work we extended the site another hectare on the southwest, determined its northern limits, and refined our knowledge of areas previously studied.

# GPMP 2004 Field Season Crew

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Operation Wall of the Crow Gate North (WCGN). Looking from the top of the wall to the northwest. The Muslim Cemetery is visible behind the thumb-shape clearing of the operation.



Mark Lehner

# The Hidden Industry: Weaving at the Workers' Settlement

*In 2003 we began studying the objects that we retrieved during our marathon Millennium Project. Assistant Field Director Ana Tavares describes here the tenuous but tantalizing traces of spinning, weaving, and sewing that she is discovering among these finds.*

**W**e would expect to find some evidence of a textile industry given the important role that fabrics, rope, twine, nets, and cordage must have played in the workers' daily lives. They would have needed garments such as loincloths, kilts, and cloaks, especially in the winter. The weather during the Old Kingdom was slightly wetter and perhaps a little cooler than today—and we wear three or more layers of clothing on cold January days.

The inhabitants of the town also would have used fabrics for wraps, bedding, cushions, sieves, and bags, as well as for lamp wicks. They sealed jars and other containers with cloth too. We see the negative impression of these fabrics of various weaves on mud sealing fragments from our site.

Textiles served as wages and rations in ancient Egypt, as attested in tomb scenes and texts. An Old Kingdom letter reports that when quarry workers, possibly at Tura, did not receive their payment, or rations, in cloth, they took their demand to officials of the Step Pyramid at Saqqara. Cloth wages were paid to craftsmen, while textile rations went to *corvée* laborers, those fulfilling obligatory labor.

Repairing was another aspect of the textile industry. Ancient fabrics show different techniques of mending, darning, and patching. Given the nature of construction work, clothes worn by the pyramid builders must have torn often. The large number of needles from our site may reflect frequent repair jobs.

Mats and baskets would have required periodic mending, as well. The builders probably carried most of the material for making mudbricks, fieldstone walls, and pyramid ramps, as well as masonry

debris, in baskets. A large force of workers might have been needed for weaving and mending mats and baskets.

## Thin Traces of a Textile Industry

Although we are certain that textiles played an important role in the life of the workers' settlement, we have no remains of linen cloth, nor basketry, mats, or cordage. These materials would not have survived in the damp sediments of the site. We have to infer the weaving industry from subtle traces. Unlike bread baking and copper work which leave robust, easily identifiable remains, weaving, spinning, and sewing are hidden, attested at Giza mainly by a small but suggestive number of objects.

These include bone points, bone rods, needles, and spindle whorls. The seven bone points we recovered (see photo below) indicate that people were weaving on the site. Bone points are traditionally used to push weft threads down and to free or reposition warp threads. Their pen-nib point, and the fine striations, captured so well in the microscope (see photo on page 4), have unmistakable parallels with later examples from other sites. Barry Kemp and Gillian Vogelsang-Eastwood<sup>1</sup> attribute the lines to the grinding stones used to shape the bone to a point.

We have evidence of spinning at Giza in the form of spindle whorls. A spindle whorl is the weight on the shaft used to spin yarn. We have also recovered numerous ovoid ceramic objects that might have been used in weaving. In addition, there are small mud balls and ceramic sherds which might have served as cores to wind thread. Sewing (and/or repairing), on the other hand, is well attested with 18 copper needles. Unmodified fish spines might also have been used as needles.<sup>2</sup>

## Missing Elements

Our corpus of weaving implements is small. So far we lack spindle shafts, warp spacers, heddle rods, sword beaters used to pack down the weft threads, and spools, also called bobbins or shuttles, which carried the weft thread. Unfortunately, these were usually made of wood which, like cloth, does not survive in the site's damp sediments. Spindle whorls were often made of wood as well, which limits our finds of these objects to the ceramic and stone versions.

The horizontal loom used during the Old Kingdom would have left few archaeological traces (see sidebar). We also lack distinct loom elements such as heddle supports, loom beams, and pegs because these were also made of wood and have not been preserved.

## A Welcomed Confirmation

During the 2004 season we had a welcomed confirmation of the importance of textiles and cordage in the workers' daily life. We

A collection of tools for spinning, weaving, and sewing from Giza. Clockwise from the upper left: a ceramic spindle whorl seen from the top, two copper needles, the broken tip of a bone point, another bone point, and a bone rod. Scale: approximately 1:1. Photos by Francis Dzikowski except bottom one.



Yukinori Kawae

recorded, with the Giza Inspectorate, a 10-meter-tall section cut through the mounds of ancient debris from the building of the Great Pyramid. Here, high on the plateau north-northwest of the pyramid, organic material was well preserved. We recovered and analyzed many pieces of textiles and rope. This confirmed that cloth, rope, and baskets were ubiquitous on this monumental building site, 4500 years ago.

### Producers and Consumers

Nice objects are rare at our site. Mostly we find fragments of pounders and abraders, which must reflect the endless hours of stone working on the funerary complexes. The overall impression is that people carried away most of the useful, portable objects when they abandoned the site at the end of the 4th dynasty.

This, in addition to poor preservation, might account for the paucity of finds related to textile manufacture. But it may not be the only factor. An interesting pattern of production and consumption is emerging from the material culture and artifacts. The site might have been provisioned with final or near-final products including cloth, mats, rope, and other woven goods. We have reason to believe that the Gallery Complex—probably used to house the rotating labor force—and the structures within the Enclosure Wall (see map on page 1) were provisioned with cereals already ground into flour. Here we find innumerable bakeries, but few grinding stones and no querns. Nor is there botanical evidence that grains were processed in this area. In contrast we do have querns from the Royal Administrative Building (RAB), the Eastern Town,

(see story on page 6), and the Western Town (see story on page 1). Cereals were apparently stored in large silos in the RAB, and ground into flour there and in the Eastern and Western Towns for delivery to the bakeries. We also have evidence of provisioned meat but few faunal remains of small game that could have been hunted on the nearby desert edge.

Other production seems to have taken place in the RAB and Western Towns. The majority of the weaving implements come from these areas, suggesting that the residents produced goods here to be used elsewhere in the town, including cloth, rope and baskets.

As we continue our work we may uncover more elements of the weaver's trade and unveil this hidden industry. ~ Ana Tavares

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1, 2. Kemp, Barry J., and Gillian Vogelsang-Eastwood, *The Ancient Textile Industry at Amarna*. 68th Excavation Memoir, edited by Anthony Leahy. Egypt Exploration Society, 2001

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Ana Tavares joined the Giza Plateau Mapping Project in 2002. A native of Portugal, she studied Egyptology at University College London and works as a free-lance archaeologist in Europe and the Middle East.

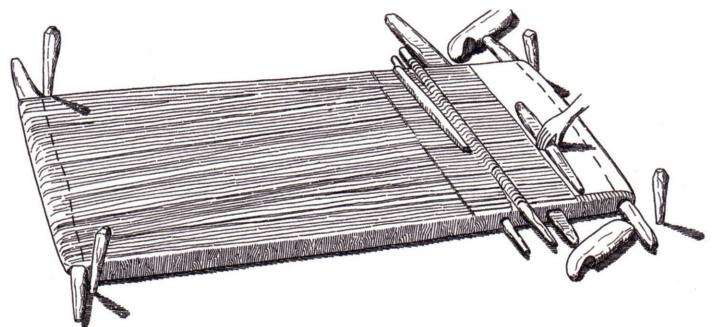
## The Horizontal Loom in Ancient Egypt

From Predynastic times up to the present Egyptians have used horizontal looms to produce lengths of woven fabric. These looms are simple contraptions easy to dismantle and reassemble; they would leave tenuous traces in an archaeological context, probably no more than post holes.

A series of threads (the warp) stretch horizontally between two short beams, fixed in place by pairs of wooden pegs driven into the ground (see model on the right). The warp threads are divided into two alternating sets. Using a stick with thread loops attached to it, called a heddle rod, the weaver lifts one set of threads, allowing him to pass a weft thread across through the opening, the shed. When he lifts the second set of warp threads, he creates the counter shed and can pass the weft thread across in the opposite direction. The weaver starts at

one end of the warp and moves along its length until he reaches the opposite end.

A cloth woven on a horizontal loom has a distinct fringe along the left side (as faced by the weaver), called a selvedge or weft-fringe. Two stone or wood blocks with large notches support the heddle rod. A lazy rod (to keep the order of the warp threads) and a wood beater, shaped like a knife or short sword, would also have been used. Examples of these objects have been found at Middle Kingdom sites but they have not been preserved at Giza.



A drawing of the horizontal loom based on a miniature loom in a model of a weaving shop found in a Middle Kingdom tomb. From *Models of Daily Life in Ancient Egypt from the Tomb of Meket-Re at Thebes*, by H. E. Winlock. The Metropolitan Museum of Art. Cambridge: Harvard University Press, 1955, Plate 67.

By the New Kingdom, Egyptians were producing textiles on a large scale using the vertical loom. A more complex "machine" than the horizontal loom, it first appears in early New Kingdom representations but Kemp and Vogelsang-Eastwood (see references above) suggest that it may have been developed during the Middle Kingdom.

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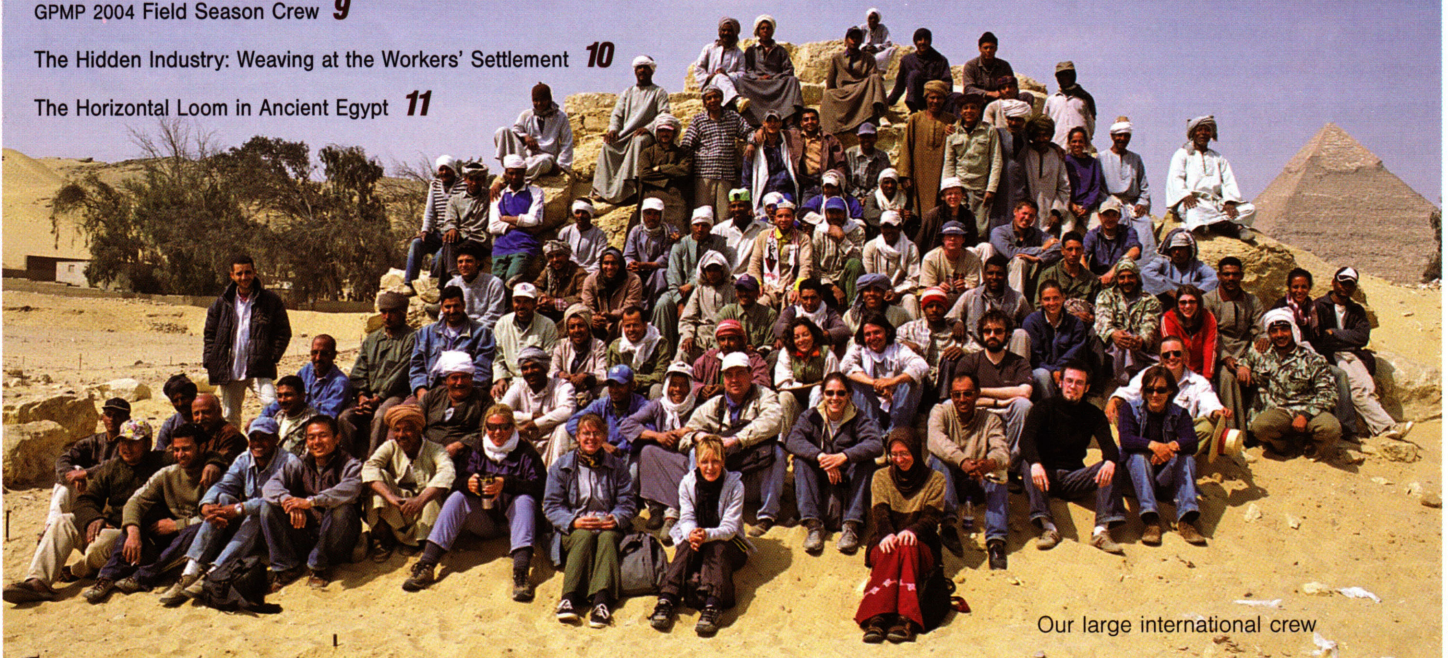
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