



AERA

Working Through Change

Annual Report 2010–2011

Ancient Egypt Research Associates



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Cover photo: Dark shadows and bright light move from downtown Cairo to Giza and the Great Pyramid, witness to major civilization change over 4,500 years until today. View to the northeast, toward Tahrir Square.



AERA

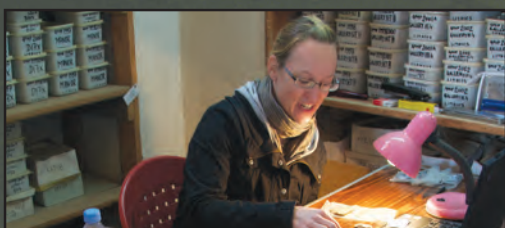
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Photo Acknowledgements

The photos in our annual report were taken by Mark Lehner, Yasser Mahmoud, Hilary McDonald, Jason Quinlan, Richard Redding, and Ana Tavares.

Working Through Change: AERA 2010–2011



A Message from Mark Lehner

While thinking about how we worked through great change all around us during Season 2011, I recalled an image buried under 40 years of stratified memories: *Ko*, the hexagram for “revolution” in the *I Ching*, *the Book of Changes*, an ancient Chinese book of oracular wisdom associated with great names like Lao-Tzu and Confucius. I drew the hexagram from a chance process of sorting and counting 49 yarrow stalks, each sort and count making either a strong, straight line, —, yang, or a yielding, broken line, - -, yin. I was at my desk in my mother’s house in Minot, North Dakota. My mind was much more permeable then, and I had yet to head for Egypt.

Ko in the *I Ching* represents “revolution” as in molting:

The Chinese character for this hexagram means in its original sense an animal’s pelt, which is changed in the course of the year by molting. From this the word is carried over to apply to the “moltings” in political life, the great revolutions connected with the changes of governments.

Or personal molting. Shortly after casting *Ko*, a friend dropped me off on Highway 83 South, the beginning of a hitchhiking trip to the U.S. East Coast that eventually, through many chance steps, rather than planning, led me to Egypt within a year.

Like all 64 hexagrams, *Ko*, is made of two of the eight trigrams; at the top, *Tui*, “The Joyous,” (Lake) and at the bottom, *Li*, “The Clinging” (Fire).



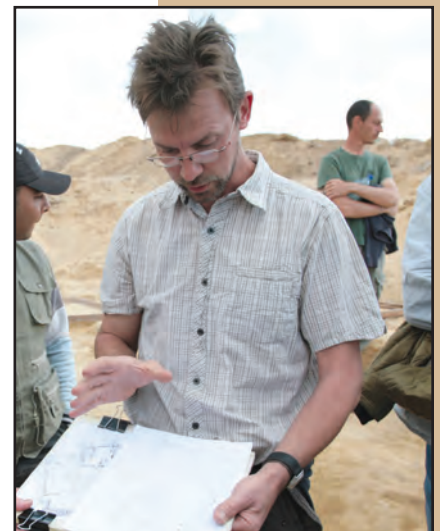
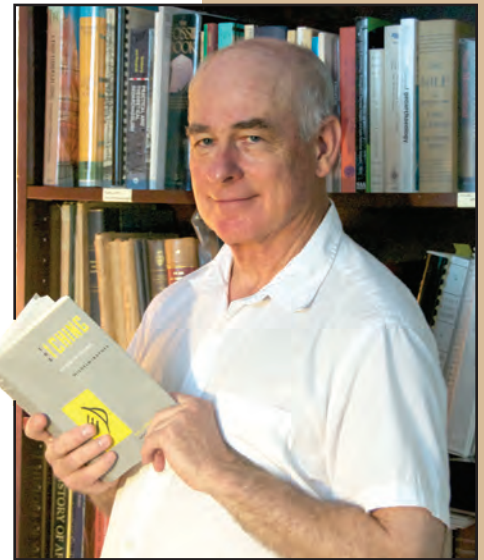
Lake and Fire, joy above and clinging below, stand in opposition. I imagine this clinging unbearably holds down the joyous, leading to overthrow. Maybe such opposition is what made me think, after Season 2011 in Egypt, of this image from a tradition so far removed from all things Egypt, yet, perhaps, reflecting an understanding of great and sudden change that can be very much the same anywhere. For me, forty years ago, clinging meant staying with everything old and familiar in my hometown, as opposed to joyously (?) seeking out new horizons.

To reflect our 2011 theme of *Working Through Change*, and honor the Egyptian January 25 Revolution, we arranged one of our usual montages of work images in the pattern of the hexagram, *Ko*. And so there you have it, on the facing page.

Thank you to everyone who made this season possible and continued to support and trust us through Egypt’s Revolution. Egypt saw the greatest change from January 25 until February 11, but the “molting” continues and so does our work. Working closely with Egyptian friends and colleagues, we discovered more about a momentous time in Egypt’s ancient past, while they faced the challenges of momentous, historical change in Egypt today.

The AERA team halted work on site in late January and early February, but only for a week. During that time, our 21 team members worked on excavation records at the AERA villa and in our three rental apartments near the pyramids. On February 6, we resumed full days of excavation with 40 workers, two front-end loaders, a backhoe, and trucks.

We were able to continue due to the security and support that derives in no small part from the trust, sharing, and collaboration we have established over





decades of working in Egypt. At the beginning of the field season, our team was more than two-thirds Egyptian, including some of the best of our former AERA-ARCE Field School students and teachers on leave from their positions as inspectors with the Supreme Council of Antiquities. In February four additional veteran AERA-ARCE Field School students and teachers joined our team.

Through these unsettled times in Egypt, AERA completed a very productive field season, once again carrying out projects at Luxor and at Giza, where we excavated in two sites, the “Lost City of the Pyramids” (Heit el-Ghurab, HeG) and the Khentkawes Town (κκτ). In addition we conducted a very productive laboratory season. Allow me to list and summarize our major achievements.

- **Khentkawes Basin and the Town Beyond**

We discovered that the Khentkawes Town, one of the oldest examples of town planning in Egypt, attached to the gigantic tomb of an enigmatic queen, extends ever farther east in the form of a deep basin (a harbor?), and then as a dockside storage facility of grain silos, courts, and magazines.

- **OK Corral and the Southern Boundary**

We discovered the southern limit of the Lost City of the Pyramids. Beyond a set of two enclosures called Standing Wall Island the site ends in an Old Kingdom cattle corral. Now we begin to see holding pens and, possibly, butcher shops that supplied the residents of the Pyramid City with the abundance of prime beef and mutton evidenced by animal bone from our excavations carefully saved and analyzed over many years.

- **Menkaure Valley Temple Revisited: A Century Later**

We entered the Menkaure Valley Temple (MVT) for the first time since George Reisner excavated the MVT 101 years ago and found statues of Menkaure that rank among the greatest sculptures in the history of art worldwide. We discovered that the history of building and rebuilding is much more complex than Reisner realized. To the MVT belonged features that we have mapped to the east: the Glacis, broad ramp, Annex, and two vestibules with polished alabaster column bases.

- **Luxor Study Field School**

Field Directors Ana Tavares and Mohsen Kamel launched the Luxor Study Field School (LSFS) with an all-Egyptian team under the charge of senior AERA Field School teachers. The LSFS team studied the rich corpus of 2,000 years of pottery and artifacts from the 2010 AERA Salvage Archaeology Field School whose members excavated modern to Roman layers of the old town mound directly in front of the famous Luxor Temple.

- **Resurrecting House E in the Khentkawes Town**

Ana Tavares, Ashraf Abd el-Aziz, and architect Günter Heindl, who for many years has specialized in ancient mudbrick structures, conserved and built a replica of House E, which we excavated in 2009, as a pilot project for AERA’s restoration of the κκτ. Ashraf and Günter prepared bricks, mortar, and plaster as close as possible to the 4,500 year-old originals.

- **Ancient Foods, Environment, and Climate: Archaeological Science Program**

In the Giza Field Lab, Mary Anne Murray led a team of specialists in the trace analysis of organic matter from drillcores and 4,500 year-old pottery and living floors—evidence of environmental conditions and climate change pertinent to questions of ancient harbors and how the pyramid builders delivered Nile water deep into the desert.

- **NGO Status in Egypt**

In April the Egyptian Ministries of Social Solidarity and Foreign Affairs completed and granted AERA's registration as a foreign NGO (nongovernmental organization). NGO status gives the AERA mission official recognition by the Egyptian government, allows us to secure our property purchase, register the land in AERA's name, and begin to build for the future.

- **Giza Occasional Papers 5 (GOP5) Published**

AERA issued our first hardback volume of the in-house publication, *Giza Occasional Papers*, with Volume 5, *Season 2009 Preliminary Report* on the results of our ambitious 2009 work in the HeG site and in the KKT. *GOP5* brings the series to a higher level, with abundant foldout maps, photographs, and color plates.

- **Rectifying Maps of the Giza Necropolis**

Working with Peter Der Manuelian of Harvard University, and his Giza Archives Project at the Boston Museum of Fine Arts, AERA Geographic Information System (GIS) team member Rebekah Miracle "geo-rectified" many of the maps produced by previous archaeological missions of the Giza Necropolis, its pyramids, tombs, and temples.

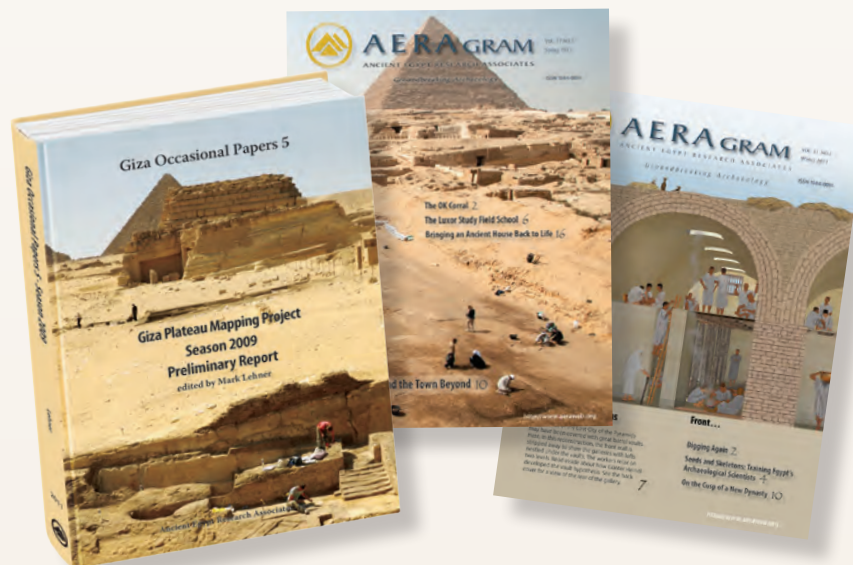
- **Reconstructing the Lost City Graphically**

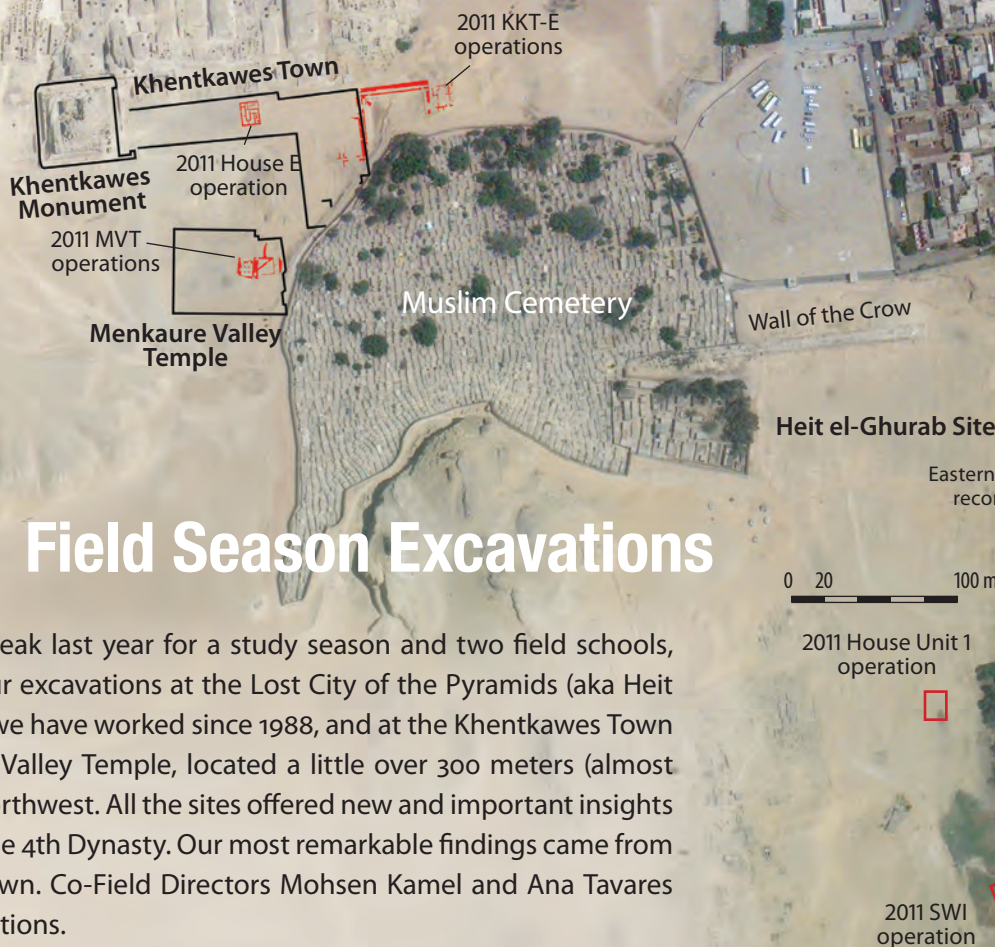
Working with Günter Heindl's suggested reconstruction of the HeG galleries as barrel-vaulted "double decker" dorms, Wilma Wetterstrom digitally modeled the Gallery Complex in 3-D. With our GIS, Rebekah Miracle sets Wilma's reconstructions into a detailed rendering of the landscape. Our laser scanning helps to build a digital 3-D model of these settlements, trying out different hypotheses about the original forms of the ancient buildings.

We are pleased to present the results of these projects and our significant discoveries at Giza here in our 2010–2011 Annual Report. As I write, we plan to start work within weeks for an AERA-ARCE Beginners Field School at Mit Rahina, site of Egypt's ancient northern capital, Memphis. We will then have launched training programs for Egyptian archaeologists at the sites of ancient Egypt's two primary capitals, south and north, Thebes and Memphis.

Thank you again for all your help and support, and for making possible our accomplishments. We will keep you posted on changes, deep past and evolving present.

Mark





The 2011 Field Season Excavations

After taking a break last year for a study season and two field schools, we resumed our excavations at the Lost City of the Pyramids (aka Heit el-Ghurab), where we have worked since 1988, and at the Khentkawes Town and the Menkaure Valley Temple, located a little over 300 meters (almost 1,000 feet) to the northwest. All the sites offered new and important insights into life at Giza in the 4th Dynasty. Our most remarkable findings came from the Khentkawes Town. Co-Field Directors Mohsen Kamel and Ana Tavares oversaw the excavations.

The Khentkawes Basin and the Town Beyond

Since we began working at the Khentkawes Town in 2005, we have been shedding new light on this important settlement, which was first excavated in 1932 by Selim Hassan. The town, presumably built for priests, extends east of the large mastaba-like tomb of Khentkawes, a late 4th Dynasty queen who may have ruled in her own right. Although Hassan excavated the town and mapped it, he left much that could be discovered through modern excavation techniques and, remarkably, an eastern extension of the complex that he apparently missed. Starting in 2007, we began to uncover a set of approach ramps, stairs, and corridors at the eastern end of the town built unto the bedrock face of a deep

quarry. Here the town makes a turn to run along the bedrock edge to the south. On Hassan's map this marks the eastern limit of the town. But we found ramps and stairs that led down from the town to a deep basin. This season we discovered the other end of the basin, the eastern side, and beyond it, farther east, yet more settlement. With this season's work we added 50 to 55 meters (164 to 180 feet) to the total length of the Khentkawes complex, in addition to the 20 meters (66 feet) of ramps, stairs, and corridors we uncovered in 2009.

Following a Wall

After uncovering the basin in 2009, we asked: how large is this basin? Did

it receive Nile water and serve as a harbor? And that long corridor running east along the north side of the basin, where did it lead?

At the beginning of the 2011 season, we set out to follow the northern enclosure wall, which bounds the mysterious corridor and the northern edge of the basin. But first we had to clear an immense blanket of sand up to eight meters (26 feet) thick. Mohsen brought in a huge *hafaar* (mechanical excavator), two front-end loaders, and two large trucks to remove the sand overburden. The team began at the western side of the basin, first clearing the backfill from our 2009 season. Mohsen and Overseer Sayed Salah carefully guided the machine blade

so as to avoid contact with archaeological remains. Workmen with hand tools followed, clearing away the last of the sand. As the team pushed east, they were constrained on the north by Old Kingdom rock-cut tombs, and on the south by a gravel road, much used by horse and camel riders, running high upon the sand along the modern Muslim cemetery. Eventually they punched through the sand a canyon, 60 meters (197 feet) long and 27 meters (89 feet) wide.

As we pushed eastward, faint traces of the thick northern enclosure wall and the corridor wall gradually emerged on the north side. Unlike the walls that stood high in the northwest corner of this lower complex, these walls to the east were worn down by erosion to ankle-height and less. In the northwest corner the quarry face and debris that had collapsed from the upper town shielded the walls of the lower complex.

Dan Jones and Kasia Olchowska, who excavated the approach structures in 2009, tracked the northern enclosure wall, the corridor wall, and the edge of the deep basin, all running parallel, to the east, to a point where the mudbrick walls almost disappeared. Water cut gullies through the corridor, corridor wall, terrace, and the side of the basin. We could still see where the corner ended at a small square patch of exposed foundation, slightly narrower than the corridor. Possibly a small chamber, all that remained were a few centimeters of mudbrick. Perhaps it had served as a porter's room adjacent to an access into the corridor from the terrace at the

northern edge of the basin, but a gully wiped out any trace. While carefully scraping around the faint outline of the box we discovered the northeastern corner of the enclosure wall where it turned to run east above the terrace along the eastern edge of the basin, which came to light a few days later.

Bounding a Basin

As workmen cleared away the last of the sand and revealed the eroded eastern edge of the basin running south, they uncovered traces of a thin mudbrick retaining wall, a continuation of the thin mudbrick walls we found in 2009 retaining limestone debris to form the lower terrace on the western side of the basin. No corridor ran along this side of the basin as on the north and west. Only the terrace runs between the enclosure wall and basin edge.

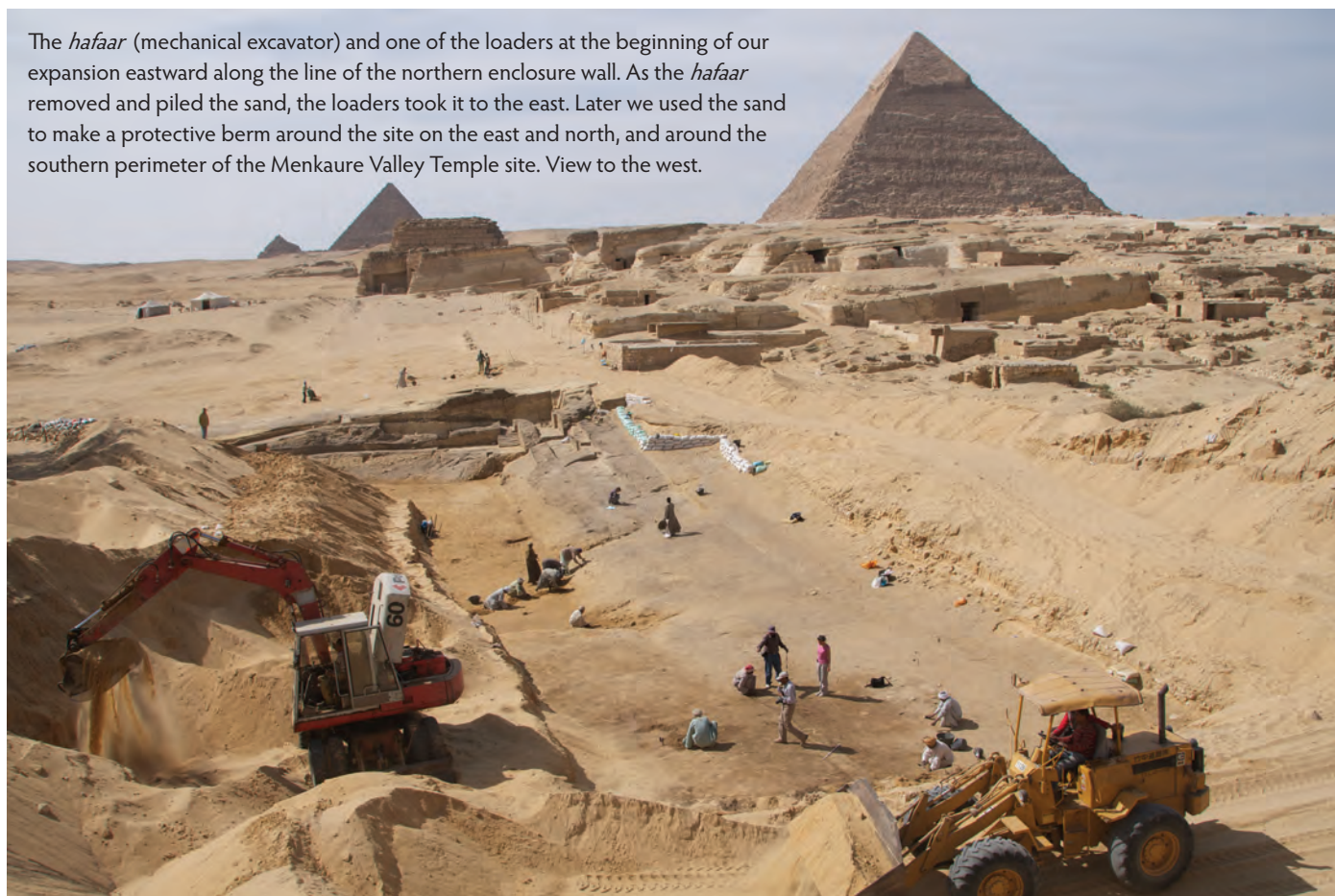
With three sides of the basin now defined we could measure its east-to-west width: 37.20 meters (71 cubits, 122 feet). If the basin was the same dimension north to south, the southern edge would lie under the gravel road around the modern cemetery.

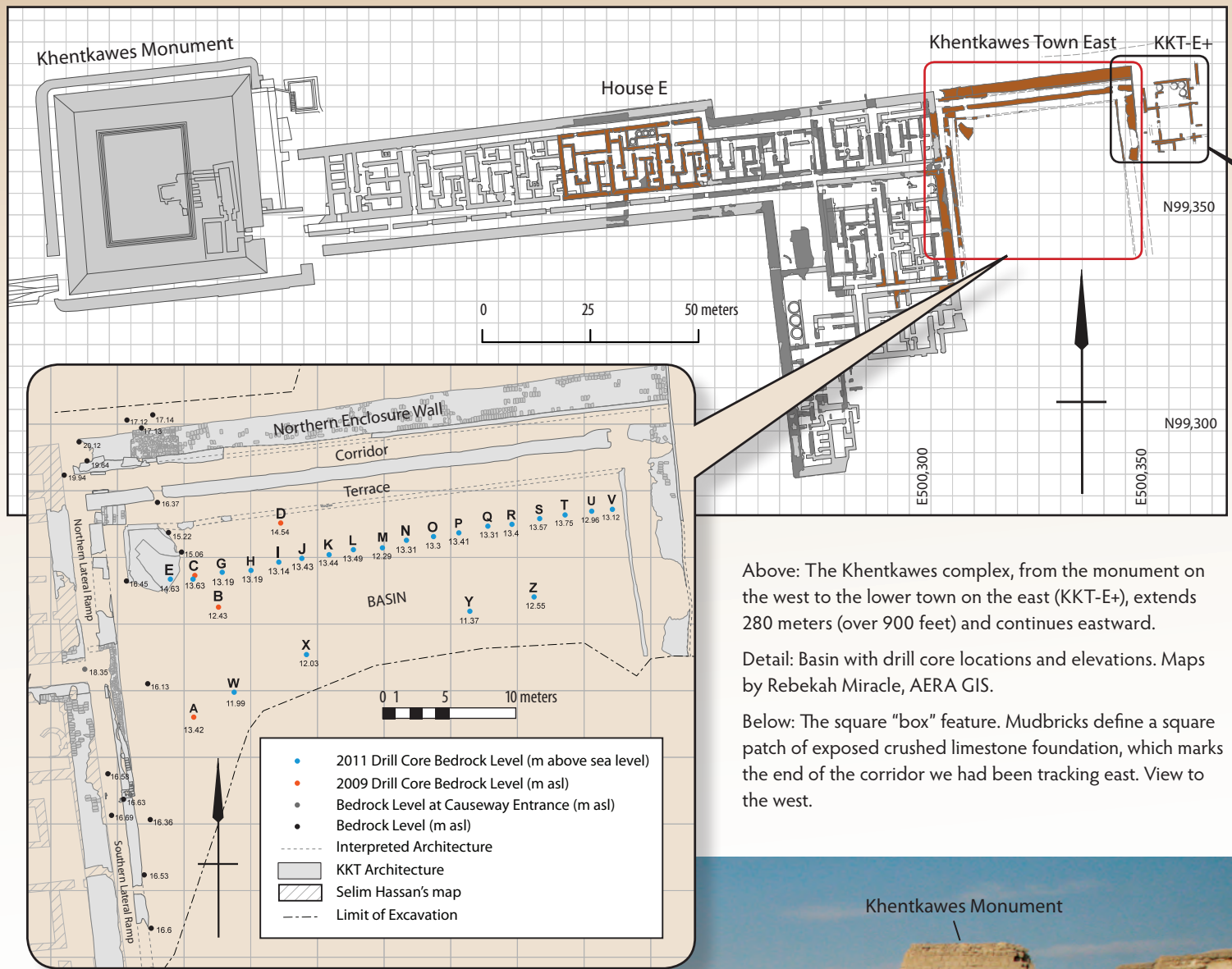
Plumbing the Basin Depths

We still faced the question: did Nile waters flood into the basin from a canal off the floodplain?

As in 2009, ground water still prevented us from clearing the sand down to bedrock bottom. So Ana, Mohsen, Dan

The *hafaar* (mechanical excavator) and one of the loaders at the beginning of our expansion eastward along the line of the northern enclosure wall. As the *hafaar* removed and piled the sand, the loaders took it to the east. Later we used the sand to make a protective berm around the site on the east and north, and around the southern perimeter of the Menkaure Valley Temple site. View to the west.





Above: The Khentkawes complex, from the monument on the west to the lower town on the east (KKT-E+), extends 280 meters (over 900 feet) and continues eastward.

Detail: Basin with drill core locations and elevations. Maps by Rebekah Miracle, AERA GIS.

Below: The square "box" feature. Mudbricks define a square patch of exposed crushed limestone foundation, which marks the end of the corridor we had been tracking east. View to the west.

Jones, and workers hand-augured 22 corings to find the bottom, which may step down from east to west and from north to south. The deepest point we hit bedrock was close to the southern edge of our clearing, 11.37 meters above sea level (asl), a meter deeper than our estimate (12.50 m asl) for the elevation of the Old Kingdom floodplain east of the Giza Plateau.

The low elevations from the corings on the south made us wonder if the basin bottom stepped down even lower into a trough farther south. As we cleared the eastern edge as far south as we could go we looked for an opening to a canal leading to the east that could have carried Nile waters into the basin. But the edge continues; no evidence of a canal turned up.

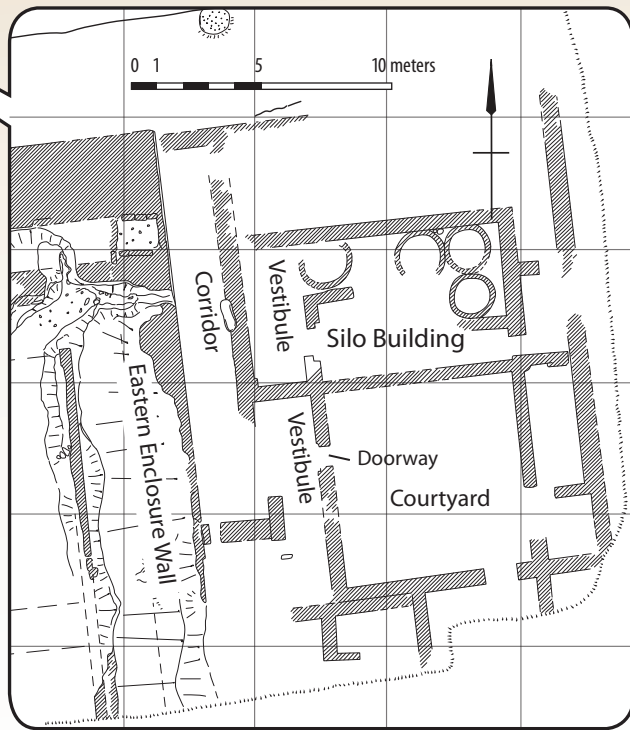
More Mudbrick Structures: The Town Continues!

Beyond the eastern edge of the basin, we discovered settlement structures. In an area roughly 15×20 meters (49 \times 66 feet), we revealed a complex situated on a terrace 3 to 4



Right: Rabea Eissa and Hanan Mahmoud study and map traces of mudbrick walls and other deposits at the eastern end of the Silo Building in KKT-E+. View to the south.

Below: Detail showing the KKT-E+ complex. Drawing by Mark Lehner.



meters (10 to 13 feet) lower than the northeast corner of the upper, main Khentkawes Town.

We called this extension KKT-E+ (Khentkawes Town East+). We exposed a building with four silos, a courtyard, corridors, and small chambers. In this complex, town administrators may have stored, counted, and distributed grain and other goods. Deliveries may have come via the basin/harbor.

The Silo Building housed at least four silos (a fifth might turn up in the open space between two of the silos when we excavate). These were about the same size as the silos in House E in the Khentkawes Town (see photo on page 26). As in House E, ash was packed around the silos, probably to deter pests. Workers most likely filled the silos from the top and extracted grain from an opening near the bottom. Access to the Silo Building was through a doorway off a corridor or antechamber on the east side of the structure. Another doorway may have stood in the northwest corner of the building. Immediately south of the Silo Building is an open courtyard, flanked on two sides by small chambers that might have been storage magazines. A door on the west wall of the courtyard opened into a vestibule that connected to a corridor running along the eastern enclosure wall from the north and probably to the south. Since the complex continues to the east and south beyond our limit of clearing, we do not know its full extent.



King-Sized Complex for a Queen

Before our discoveries, Egyptologists knew the Khentkawes complex as an unusual stone tomb and a town of priests' houses flanking a 150 meter-long causeway. Altogether this array spanned 210 meters (about 690 feet) east-west—a complex greater than that of any other queen of this period. Our excavations in 2009 and 2011 revealed the complex was even grander, extending more than another 70 meters (230 feet) to the east, with a harbor/basin and lower settlement.

Queen Khentkawes' title, inscribed in her tomb, can be read as "Mother of Two Kings" or as "Mother of the King and King of Upper and Lower Egypt." If the title refers to kingly sons, these sons must have been two very important kings with means to build such a monumental layout for their mother (plus their own), perhaps even to begin planning it early in the gigantic quarrying of stone at Giza for the pyramids. Or, along with many of the accouterments of kings' pyramids, perhaps the expansive harbor/basin and valley complex reinforce the idea that Khentkawes may, indeed, have ruled as a king in her own right.

A Hundred and One Years Later: Peering into the Menkaure Valley Temple

With regret, I have determined to cover up all the back or western part of the temple ... Perhaps in another century some archaeologist may wish to test the accuracy of our work or to settle questions, which may come up later (George Reisner Diary, February 8, 1910, p. 20).

For decades the relationship between the Khentkawes Town (κκτ) and the Valley Temple of the Menkaure Pyramid (MVT) has remained a curiosity—two ancient architectural footprints jamming into one another like colliding galaxies. On the map, the town attached to the gigantic stone tomb of the mysterious queen Khentkawes seems to jump across a sloping broad ramp to annex itself symbiotically onto the eastern front of the MVT.

In the Annex, the columned Vestibule 1 (377) immediately inside the MVT central doorway seems to repeat itself as Vestibule 2 (202), but turned to open north to the top of the broad ramp between the MVT and κκτ. A limestone-paved pathway crosses an open court (206) and connects the two vestibules running under a mysterious mudbrick blocking of the MVT doorway.

In Season 2011 we became certain that the κκτ did not jump the ramp. The Annex was actually an extension of the MVT. Just as we have found that the κκτ itself extends much farther east than scholars knew (see pages 6–9), so the MVT carries on farther east in the form of the Annex and the broad ramp on the north, as well as the approach corridor on the south. Builders created the two columned vestibules and

connecting stone path together in the 5th Dynasty, 60 to 80 years after the first mudbrick MVT had been built and partially destroyed. Later still, toward the end of the 6th Dynasty, MVT walls once again lay in ruin, and once again builders resurrected the temple.

Eye on the Interface

Over the two decades that we have excavated the Lost City of the Pyramids, we have had an eye on returning to the question of the relationship between the κκτ and the MVT. In 2005 we began at the interface between the two complexes, but it was not until 2008 that we ventured to the eastern front of the MVT, 99 years and 10 months after Reisner began his excavations. We moved inside the central MVT doorway 101 years to the month after he ended his excavations at just this doorway.

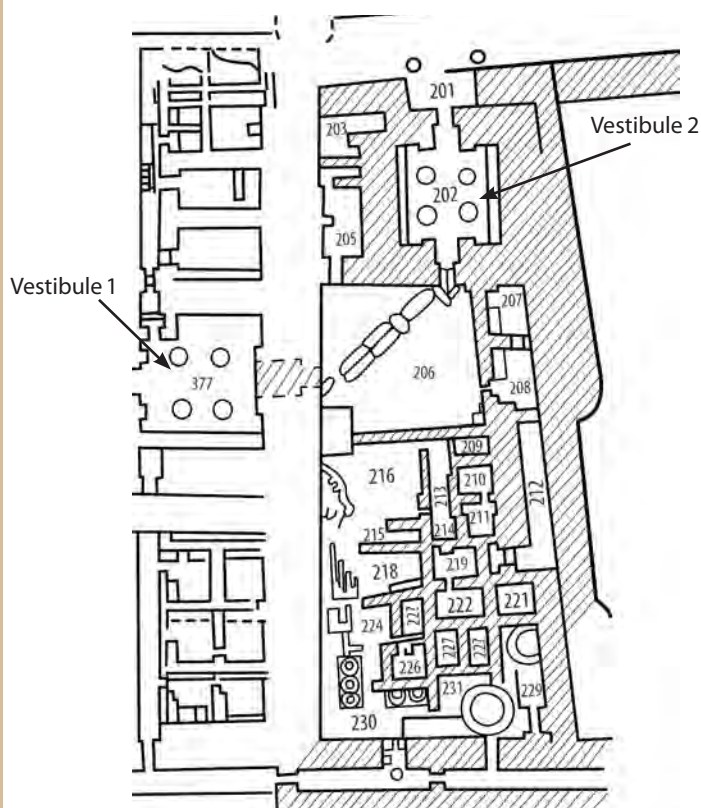
When Reisner excavated the MVT, Egyptologists were just beginning to realize that attached to every pharaoh's pyramid was a memorial temple from which a long causeway ran to a valley temple, a monumental portal to the whole complex. Because the MVT lay so low at the bottom of the southeasterly slope of the Giza Plateau, centuries of drift sand up to four meters deep had covered it, forming a protective cover over the compact, layered mudbrick ruins in which lay embedded statues and pottery from 350 years of temple activity.

Reisner's excavators ended their vertical clearance work at the northeastern corner and the central doorway through the thick, eastern wall that opened into Vestibule 1. Four wooden columns supported the roof, rising upon round, beautifully polished alabaster bases, each a meter in diameter. Reisner never cleared more than an arm's length farther east of the MVT entrance where he left the sand several meters thick.

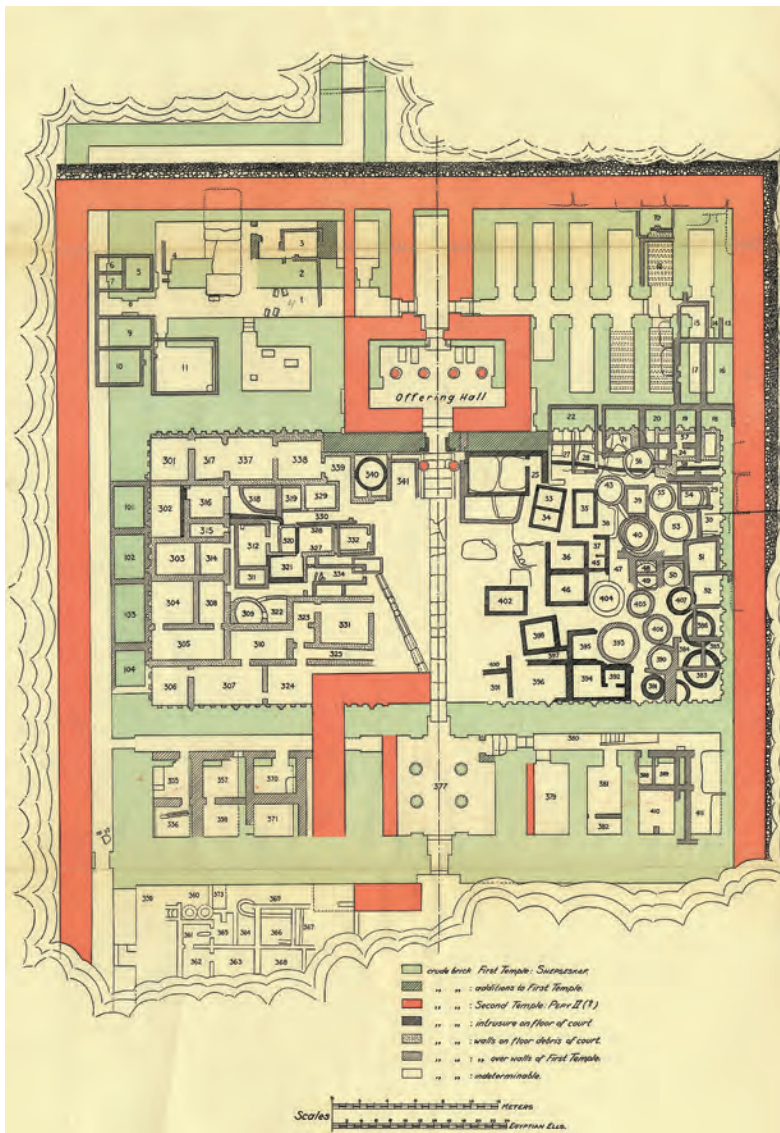
Reisner's Two Temples

Reisner saw clear evidence that the massive stonework on Menkaure's pyramid complex stopped suddenly. His son and successor, Shepseskaf, the last 4th Dynasty king, finished the "first temple" with mudbrick walls upon a foundation platform of huge limestone blocks laid down by his father's builders.

Reisner documented walls of a "second temple" built largely upon the ruined walls of the first. Some 200 years after Menkaure, Pepi II renewed tax exemption for the (new) residents of Menkaure's pyramid town, a community of small houses, storages bins, and silos that invaded the court; the temple became a small village. The "second temple" consisted of walls enclosing this community on the west, north, and south, and around and above the original offering hall and sanctuary.



Map based on Hassan's plan, modified to show the blocked entrance between Vestibule 1 (377) and the open court (206).



Reisner's (1931: plan VIII) multi-phase map of the MVT. Light green codes the first (4th Dynasty) temple. Orange codes the second (6th Dynasty) temple. Reisner said he found no eastern wall for the second temple.

Reisner published a map showing all phases at once. He coded the thick second temple walls in bright orange. He wrote that he could find no eastern wall for the second temple. He took the standing eastern wall as belonging to the first temple. Thick "second temple" walls did frame Vestibule 1 on the south. Reisner took these down at the end of his work, and so we did not see them when we returned to this spot 101 years later.

Selim Hassan and the MVT Annex

Twenty years later, in 1932, Selim Hassan arrived at the eastern front of the MVT. He had cleared the entire northern "leg" of the Khentkawes Town, then turned south, burrowing through an overburden of sand up to six meters thick to expose the "foot" of the L-shaped town extending south to just shy of the northeastern corner of the MVT. Hassan now looked upon what lay directly east of the MVT entrance.

Between the KKT and MVT, Hassan found, but scarcely mapped, a broad ramp ascending to a gigantic stone-lined basin on the north. On the south, Hassan found the doorway into Vestibule 2, with four round alabaster column bases, practically identical to the four Reisner had found in Vestibule 1.

Reisner's book *Mycerinus, the Temples of the Third Pyramid* appeared in 1931, the year before Hassan started at KKT. Because Reisner only cleared the far southwestern corner of the Annex, and did not see Vestibule 2, and because Hassan cleared the Annex 22 years later, when the MVT remained mostly backfilled, Hassan could interpret the Annex as a connected, but separate temple, namely, the valley temple of Queen Khentkawes. He thought the Khentkawes causeway turned south to lead to the broad ramp between the KKT and the MVT. In fact the Khentkawes causeway runs straight east to the eastern edge of the town, and, as we have found in our work since 2007, the causeway ends at two lateral ramps, leading down north and south to a lower corridor, stairs, terrace, and deep, large basin. This arrangement must be for the Khentkawes complex the equivalent of the valley temples of kings' pyramid complexes.

AERA in the MVT:

We Began Where Reisner and Hassan Ended

In our Season 2011 we took our investigations directly into the MVT. We cleared Vestibule 1, inside the central, eastern entrance of the MVT proper, and we re-cleared the eastern half of Vestibule 2, at the north of the Annex, which we had re-excavated in 2008 (GOP4: 24-27). We also cleared the open court (206) east of the MVT entrance and the limestone path that crosses this court and connects the southern threshold of Vestibule 2 with the eastern threshold of Vestibule 1.

Amelia Fairman supervised this work, and the excavation of three small trenches (A, B, C) along the eastern base of the MVT eastern wall, and a fourth trench (D) that spanned the floor of Vestibule 1 between the northeastern of the four column bases and the MVT eastern wall.

Missing Phase Alert: Two Temple Resurrections

The MVT was larger than Reisner could know, taking in the whole Annex terrace, its eastern glacis-like drop into a deep basin, the broad ramp, and both Vestibules 1 and 2. The building history must have included a major refurbishing between the times of Reisner's first and second temples. We begin to suspect that as part of this refurbishing, builders connected Vestibules 1 and 2 with the limestone path, and possibly installed the alabaster column bases.

In her three trenches along the eastern base of the MVT eastern wall, Amelia found that only the bottom one to four courses of brick of the original wall remained standing. Amelia found the thick white marl and gypsum plaster face,

“lipping up” from the floor east of the MVT onto the original wall. Only a palm’s height remained of brick courses and plaster combined.

When people took care to rebuild it, they probably sliced the ruins of the original wall close to its base in order to make a good level on which to rebuild. Reisner took this rebuilt wall as the original eastern MVT wall. But in the section of Trench A, we can see the original outer, plastered face up to the truncation of the wall. Above the lowest few courses, we see the same plaster on bricks, albeit upside-down, as though those who rebuilt the temple wall took chunks of the old wall, with bricks still articulated, and re-incorporated them into the rebuilt, second temple wall.

Although the wall that stands is definitely a rebuild, it cannot date to the time of Reisner’s orange-coded 6th Dynasty “second temple” walls. Reisner removed the 6th Dynasty wall framing Vestibule 1 on the south, including one segment up against the MVT eastern wall in the spot where we worked, so we did not see it. But numerous photographs from his excavations show that these allegedly 6th Dynasty walls were built against, up, and over the (rebuilt) eastern MVT wall, which must therefore be earlier.

Accouterments for Temple Remodeling

Builders must have created the limestone threshold in the MVT eastern doorway and the limestone pathway connecting Vestibules 1 and 2 about the same time that they reconstructed the eastern MVT wall—during the phase that is missing in Reisner’s temple sequence. We are less certain about when builders laid in those alabaster column bases, but we suspect they might have been part of the same middle phase. Excavations in Trench B indicated that the limestone path dates to after the deconstruction of the first eastern temple wall, and probably to the time when this wall was rebuilt. Amelia dates both the limestone pathway and threshold of the MVT entrance to the rebuild of the eastern wall, her Phase 2, “Rebuilt Temple.”

The pathway meets the threshold underneath the entrance blocking. The two are surely parts of the same construction event. Unfortunately, we ran out of time before we could remove the blocking so we left it intact, as did Reisner and Hassan.

Vestibule 1 alabaster column bases.
View to the northeast across the MVT eastern entrance with its limestone threshold and pathway to Vestibule 2 (upper right background).

Tale of Twin Vestibules

During our Season 2008 we exposed the four alabaster column bases in Vestibule 2 for the first time in 76 years, and during our Season 2011 we exposed the four alabaster column bases in Vestibule 1 for the first time in 101 years. We were impressed by what a match the Vestibule 1 bases make—albeit more worn—with exactly the same diameters as those in Vestibule 2. The similarity of the column bases, and the diagonal limestone pathway, suggest an explicit, direct, formal, and functional connection between the two vestibules.

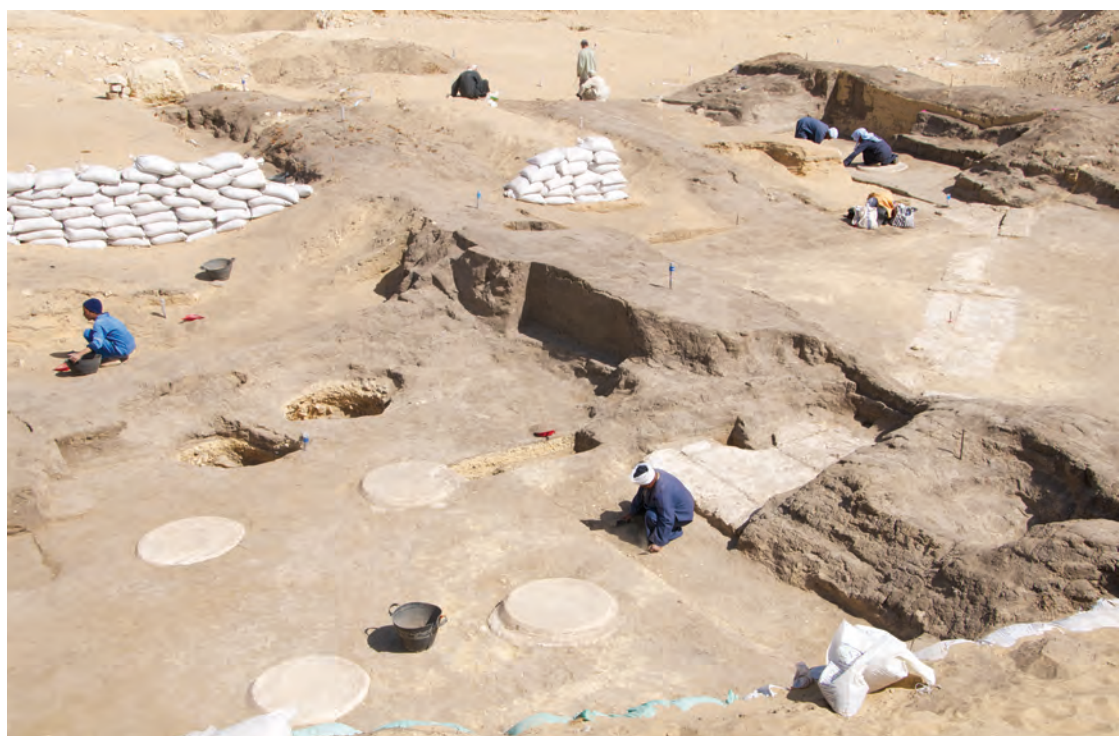
When were these Vestibules created? In Trench D Amelia found the cut of the pit the builders dug for setting the northeastern alabaster column base into the limestone crush foundation so that only the relief-carved circle would rise above the floor. The builders dug this pit down through a lower layer of dark, gray Nile clay, 5 cm thick. If this Nile clay layer comprised an original floor, we could imagine that the alabaster column was set in later, and this is important for our assessment of whether the two vestibules are contemporary.

Return of the King

What king during which dynasty ordered the reconstruction and expansion of the middle phase?

Round stone columns and column bases in royal pyramid temples are more a feature of the 5th Dynasty than either the 4th or late 6th when temples featured square columns. We know of no other round column bases in the temples at Giza, except those of limestone in the offering hall of the MVT and in the temples of Menkaure’s queens.

Eight clay sealings from Menkaure’s Upper Temple bear the names of kings Menkaure, Niuserre, Isesi, Teti, and Pepi I. To these we might add the royal names Merenre and Pepi II found on stela fragments in the Upper and Valley



Temples respectively. We find none of the early 5th Dynasty kings—Userkaf, Sahure, Neferirkare, Shepseskare, and Raneferef—who followed Shepseskaf. We are also missing Menkauhor and Unis at the end of the 5th Dynasty.

We get the impression that at the end of the 4th Dynasty, after Shepseskaf takes great effort to finish Menkaure's Upper Temple and Valley Temple, as well as the chapels of the pyramids (GIII-a, b, c) of three of Menkaure's queens in mudbrick, the royal house neglected Menkaure's temples, just as pharaohs began building their memorial monuments at Saqqara and Abusir. Then, around the middle of the 5th Dynasty, perhaps in the reign of Niuserre (the first of the 5th Dynasty kings' names on sealings), royal attention returned to Giza. The sequence of settlement within the MVT court reinforces this impression.

Reisner found three major horizons of small apartments, bins, and granaries in the MVT court interspersed with two layers of debris from plunder, neglect, and decay of walls before the whole site was finally abandoned, and covered by a third debris layer and then sand. Although Reisner did not realize it at the time, these three periods of settlement within the temple correspond nicely with three major construction and rebuilding periods. The most substantial and organized of Reisner's settlement horizons appears to have been that of the middle period, consisting of five orderly apartments in the southern court, with the bins and silos to the north.

We ask: did people inhabit these structures shortly after the time when builders reconstructed the MVT eastern wall and also installed the limestone thresholds of Vestibules 1 and 2, the connecting pathway, and maybe also the alabaster column bases? If not, then when?

It was Reisner's impression that Menkaure's statues suffered most from the temple occupants themselves during the 5th Dynasty. We might hone this suffering to the early part of the 5th Dynasty, whose kings Userkaf, Sahure, Neferirkare, Shepseskare, and Raneferef are missing in the royal names from the Upper and Valley Temples.

Without recognizing or giving emphasis to that middle building phase, in between his "first temple" and "second temple," Reisner did not quite pull together the indications of pious attention between the early 5th and 6th Dynasties. We are now compelled to do so by finding the rather complete rebuild of the MVT eastern wall.

Reisner did note that the seal impressions signal resumed service in the upper temple by the reign of Niuserre. Reisner noted that it was probably in the 5th Dynasty when someone built a mudbrick screen wall across the portico of the MVT, a refurbishing of an original parapet wall retaining the higher floor level of the portico. This screen wall matched a screen wall across the portico and offering hall in the Upper Temple.

In both temples the wall effected a stricter separation of the inner from the outer temple, which we find in 5th and 6th Dynasty pyramid temples. Significant for our dating of the limestone pathway between Vestibules 1 and 2 and the MVT eastern threshold, Reisner decided that the limestone threshold of the double-leaf doorway through the MVT screen wall, and the stone ramp leading up to it, must also have been built in the 5th Dynasty as a replacement for an original ramp and threshold.

The later portico ramp rises to a threshold at the end of a limestone pathway leading straight across the court from a limestone threshold in the doorway between Vestibule 1 and the court. Builders might well have installed the court pathway and the portico ramp and threshold through the screen wall at the same time as the threshold in the eastern MVT entrance (which Reisner does not include in his map) and the limestone pathway between Vestibule 2 in the Annex, and Vestibule 1 in the MVT. The whole looks like one intentional route.

These temple accouterments, and the formal complex of bonded rooms on the layer of plunder and debris in the court (Reisner's phase II.3), signal the return of royal attention, perhaps in the reign of Niuserre, a guess based upon the sealings in the upper temple.

Return of the (Problematic) Queen: The Khentkawes Quandary

If we assign to Niuserre a major middle phase in the MVT building history, a phase that Reisner missed, it brings us round again to the "Khentkawes problem." We find inscribed on the tomb of Khentkawes at Giza, whose town shows an intimate proximity to Menkaure's Valley Temple, a title that we can translate either, "Mother of the King of Upper and Lower Egypt and King of Upper and Lower Egypt," or "Mother of the Two Kings of Upper and Lower Egypt." In addition, we find another Khentkawes at Abusir, with her own pyramid complex inscribed with the same title.

We know the Abusir Khentkawes was Niuserre's mother. The Czech archaeologists discovered her pyramid in 1970, south of the pyramid of Neferirkare, her consort and Niuserre's father. The Abusir Khentkawes is now thought to be Khentkawes II. Niuserre's elder brother might have been King Raneferef, and so, perhaps, the second king indicated by reading "Mother of Two Kings."

On that reading, who were the two kingly sons of Giza Khentkawes I? Was it the connection of a direct lineage that impelled Niuserre to return to Giza and upgrade the mudbrick temples that Shepseskaf had completed so quickly for Menkaure?

The OK Corral



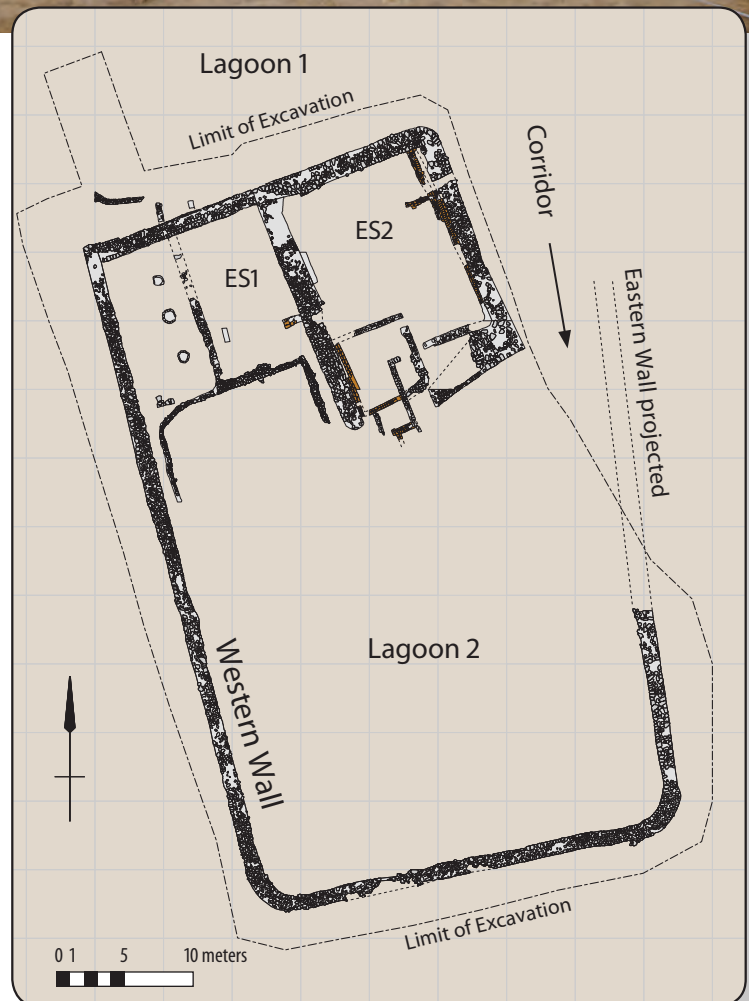
The 2011 field team mills about in the vast enclosure we dubbed the OK Corral. It is attached to Standing Wall Island (visible in the background). The thick stone wall encircles the space on the west, south, and east. View to the northwest.

Since he began working at the Lost City of the Pyramids site, faunal analyst Richard Redding has remarked on the vast quantities of animal bone turning up. He suspected that the central authority must have provisioned the community with meat, drawing livestock from a large area, since local herds could not have sustained such consumption. When we resumed work on the area dubbed “Standing Wall Island,” this Season 2011, we revealed a large enclosure that we hypothesize served as a cattle corral attached to structures that might have been slaughter facilities. We could not help but call this the “OK (Old Kingdom) Corral.”

Standing Wall Island

We first exposed parts of this curious compound in our 2003 test trenches at the southern extreme of the site. In 2004, we cleared thick fieldstone walls standing much higher than most of the walls at the Lost City site, built on ground that fell into deep water-logged depressions on the north and south. So we called this “Standing Wall Island.” Thick fieldstone walls defined a large enclosure, wrapping around the north, east, and west sides. Another fieldstone wall divided the area into two smaller enclosures, ES1 and ES2.

Since first revealing Standing Wall Island, we have puzzled over its function. Enclosures ES1 and ES2 resembled Enclosures 1 through 5, just west of the Royal Administrative Building, where we imagined scribes recorded goods going in and out of backroom storage chambers.



Map after 2011 excavations showing Standing Wall Island and the extent of the corral. Prepared by Rebekah Miracle, AERA GIS.

In 2004 the Standing Wall Island enclosure appeared to open to the south, where its western boundary wall disappeared under the thick sand.

Season 2011

Pursuing the western wall some 35 meters (115 feet) to the south, we found the solution to the puzzle of Standing Wall Island. The wall turned eastward in a broad, rounded curve, and then ran for another 31 meters (102 feet) where it turned at another rounded corner to run back north. We traced it for approximately 25 meters (82 feet), until it disappeared under the modern soccer field (which we cannot excavate).

Rounded Corners

Richard was fairly certain that the rounded corners were the key to the function of Standing Wall Island. Rounded corners are found in ancient Egyptian architecture, but they are not common. At the Lost City site we found such corners only at the northwest corner of the Royal Administrative Building and the Enclosure Wall around it. On the Giza Plateau, the enclosure wall around the Khentkawes Monument also has

rounded corners. But most of the architecture at the Lost City site and Khentkawes Town is rectilinear.

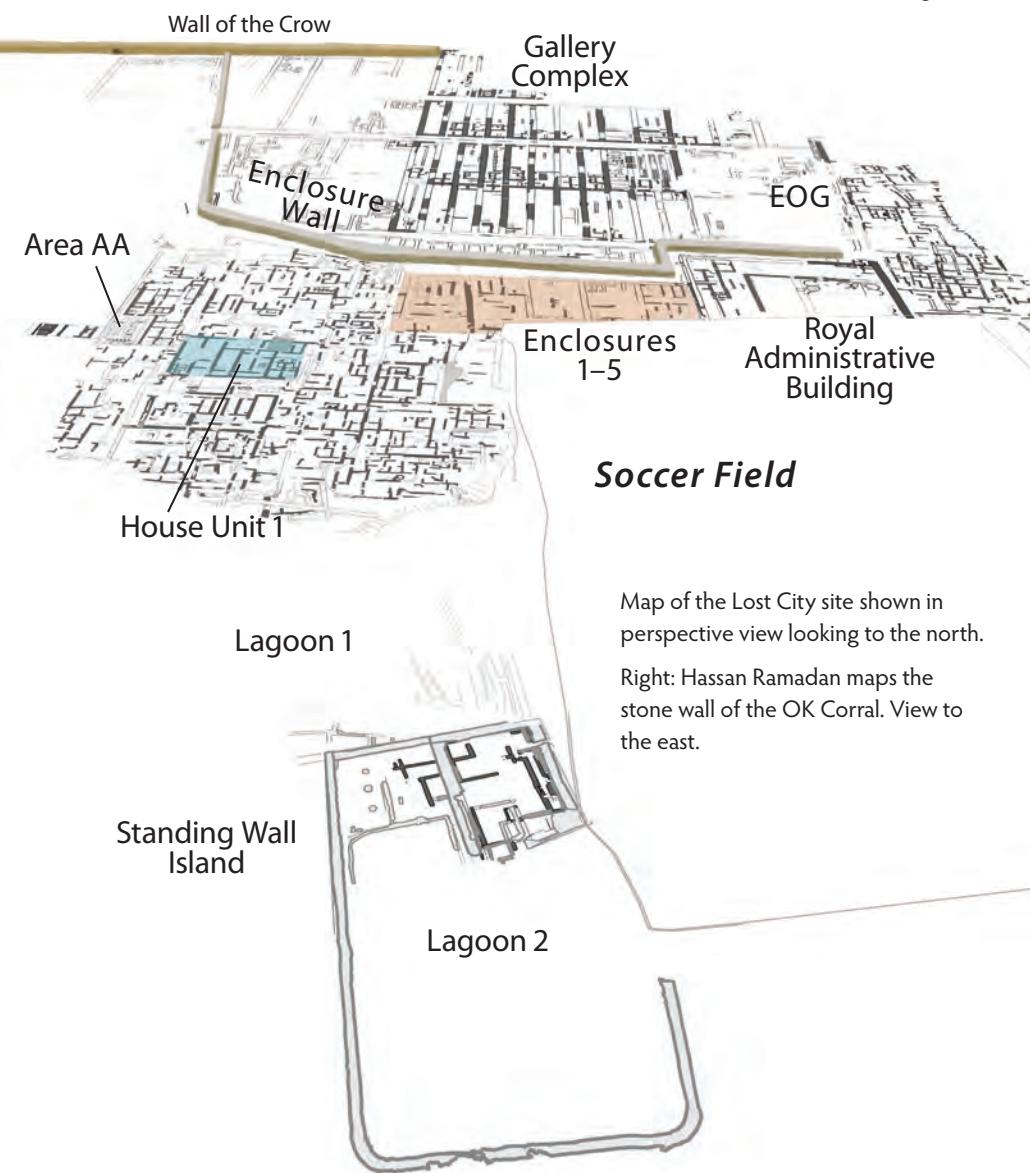
Richard knew from his studies of animal husbandry in the Middle East, beginning with his PhD dissertation research in the 1970s, that rounded corners are used in livestock enclosures. So he suspected that the enclosure south of Standing Wall Island served as a cattle pen—the “OK Corral.”

People who work with cattle know the importance of rounded corners in managing them. Cattle are very comfortable with rounded corners and will happily follow a rounded wall as long as they can see ahead two or three times their body length. Hence modern corrals feature rounded corners.

In addition, the eastern wall runs to the east of ES2, leaving a gap. This open, narrow passage forms a natural chute or driveway for herding cattle into the open area of the corral. The passage could have easily been gated, facilitating the control and management of cattle, sheep, and goats.

Rounded Pens Past and Present

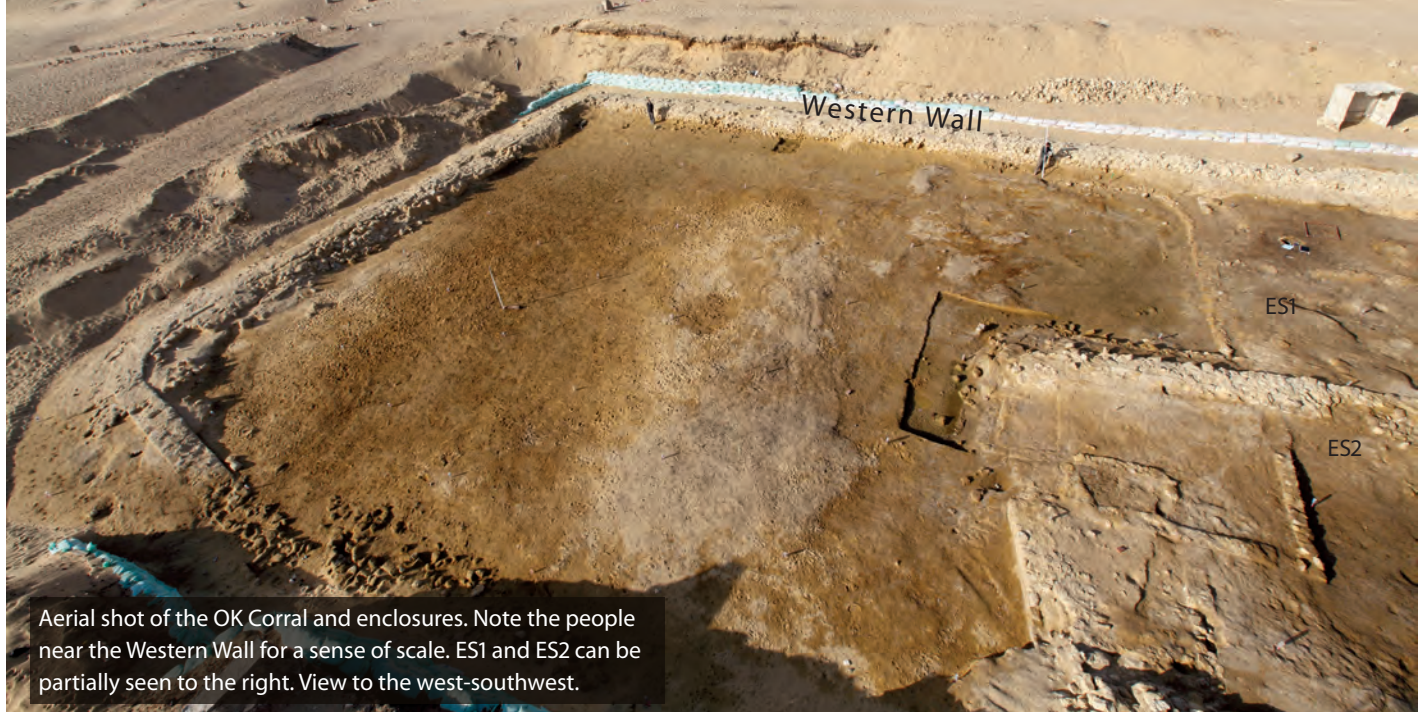
Round corners are equally important to non-Western herders. Cattle herders from South Africa to Sudan, from Somalia to Senegal use round corrals for their cattle, sheep, and goats.



Map of the Lost City site shown in perspective view looking to the north.

Right: Hassan Ramadan maps the stone wall of the OK Corral. View to the east.





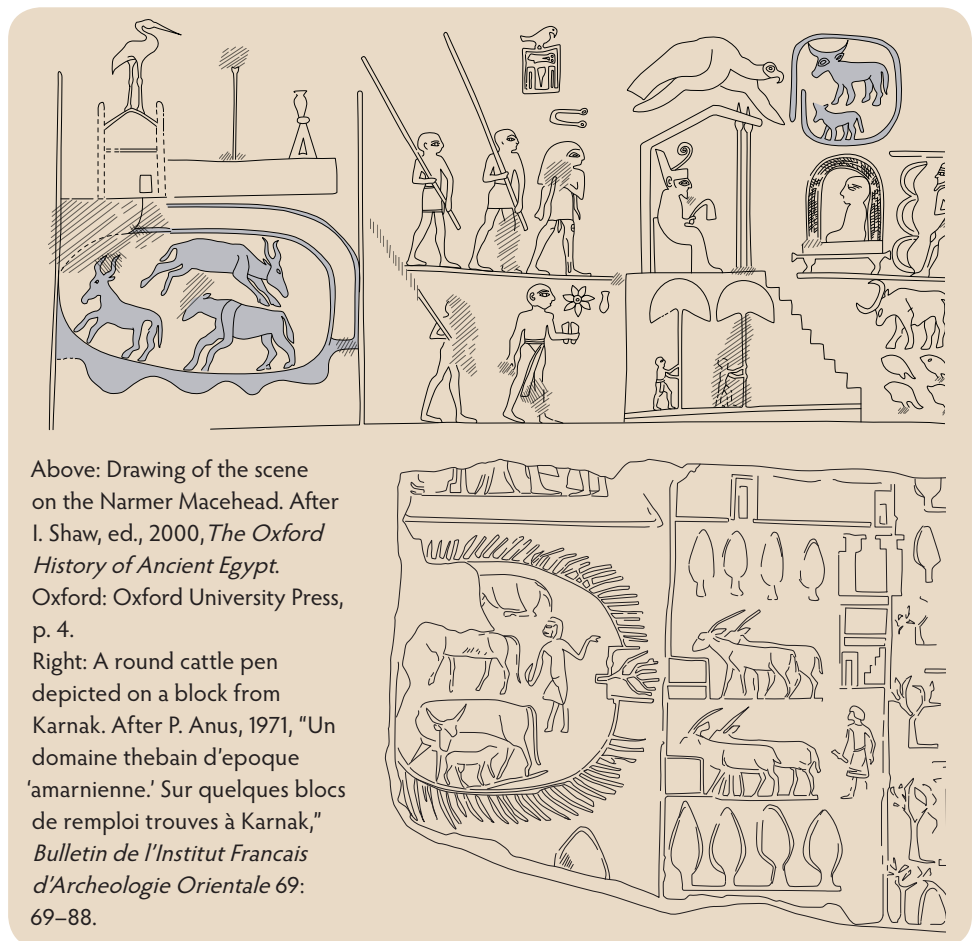
Aerial shot of the OK Corral and enclosures. Note the people near the Western Wall for a sense of scale. ES1 and ES2 can be partially seen to the right. View to the west-southwest.

People also used round pens for livestock in the ancient world. The earliest known round corrals were used by horse herders in Kazakhstan between 5600–2300 BC. Circular animal pens that date after 3300 BC have been found in Iran, Turkey, Israel, Syria, and Nubia. The earliest known structures in Egypt thought to be livestock pens were found at the Old Kingdom site of Kom el-Hisn in the western Nile Delta. The excavated occupational levels dating to the 6th Dynasty produced two rounded structures defined by mudbrick walls. The most complete appears to have a narrow access on the northwest corner.

We also see rounded corrals in Pharaonic art. A block from Karnak shows a round pen for cattle. The Narmer Macehead, recovered from Hierakonpolis, shows two round corrals in an inscribed scene. One corral contains a bull and possibly a goat; the other, three wild bovids, most likely hartebeest. Both pens have a narrow entrance, or chute, associated with the corral.

A Slaughterhouse?

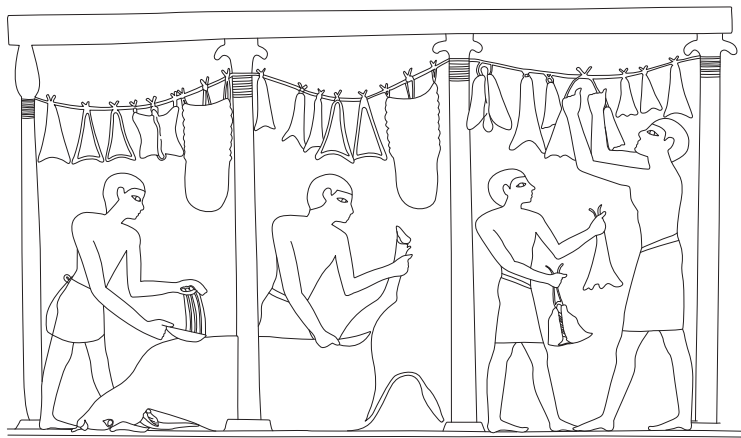
If the enclosure to the south of Standing Wall Island was an animal corral, the two small enclosures, ES1 and ES2, may have been a facility where cattle, sheep, and goats were slaughtered and dismembered. We cannot yet test this hypothesis since



Above: Drawing of the scene on the Narmer Macehead. After I. Shaw, ed., 2000, *The Oxford History of Ancient Egypt*. Oxford: Oxford University Press, p. 4.

Right: A round cattle pen depicted on a block from Karnak. After P. Anus, 1971, "Un domaine thebain d'époque 'amarnienne.' Sur quelques blocs de remploi trouvés à Karnak," *Bulletin de l'Institut Français d'Archéologie Orientale* 69: 69–88.

we have neither fully excavated these areas nor analyzed the material culture recovered here this season. But in future seasons we will be looking for evidence of slaughtering, such as tethering stones to restrain animals, chert flakes from sharpening knives, and pillars used to support lines for hanging meat. Three stone-lined circles in ES1 might have served as sockets for posts to tie lines for hanging meat.



Scene from the tomb of Antefoker showing hanging meat to dry from lines attached to columns. After S. Ikram, In *Ancient Egyptian Materials and Technology*, ed. by P. T. Nicholson and I. Shaw, p. 656. Cambridge, Cambridge University Press, 2000.

of an Old Kingdom week. Although these figures are rough estimates based on modern standards for cattle herding, they offer a baseline for future hypothesis testing.

Elite Neighbors Upwind

Curiously, the OK Corral lies near the Western Town, a district of large homes that probably housed high administrators. House Unit 1, in the center of the district, was most likely the residence of an important scribe and possibly a scribal workshop.

How could a slaughterhouse operate so close to these allegedly “elite” homes? We would expect such an unpleasant industrial facility to be located far away. However, the location of the OK Corral to the southeast of the Western Town allowed the prevailing northwesterly winds to carry odors and noise away from the settlement. This was probably not happenstance. The only well-documented Old Kingdom slaughterhouse, at Raneferef’s pyramid complex at Abusir, is also located in the southeastern corner of the site.

It is possible that proximity to the meat source, without the odor, might have been convenient, even desirable, for the upper class district. The residents ate more beef than people in any of the other districts of the community, according to Richard’s analysis of animal bone from across the settlement.

Provisioning a Town

With the discovery of the OK Corral, we have found a critical piece in the puzzle of the settlement’s economy, a puzzle that has been coming together for some time. Early on we began to find bakeries used to make bread on an industrial scale. At the same time we started recovering large quantities of cattle, sheep, and goat bones and soon realized that the town was provisioned with grains and livestock by a central authority. In 2002 we unearthed a large facility (RAB) for storing grains, a set of large silos. Four years later we uncovered a complex where beer might have been brewed. Now, at Standing Wall Island, we have the site where livestock were apparently held, and probably slaughtered and butchered. The facility, like other evidence of food production at the Lost City site, reflects provisioning on an industrial scale. The large area and stout walls of the corral suggest that it was created for sizable herds and for animals that might bolt when agitated, as cattle might do when confined with animals from different herds. Next season when we intensively excavate ES1 and ES2 we will determine if cattle were indeed slaughtered and butchered here.



Stone-lined circles in Enclosure ES1.

Supplying Meat to the Lost City

The photo on the facing page, taken from a high tower, gives a sense of the scale of the OK Corral, 1,110 square meters (almost 12,000 feet) which could have held about 555 cattle. In deriving this figure, Richard used the modern standard for cattle density of about two square meters per animal. But he notes that the numbers would have been lower if animals were kept and fed in this area, which is very likely. For feeding pens, each animal needs about 20 square meters. At this density, the corral could have accommodated 55 cattle. According to Richard’s estimate for the amount of animals consumed at the Lost City site (based on the size of the population and human nutritional requirements), 55 cattle would have provided enough meat for its inhabitants for 5 days, which is one-half



The Luxor Study Field School 2011

On April 9 we launched the Luxor Study Field School (LSFS 2011) for inspectors of the Supreme Council of Antiquities (SCA), our third field school in Luxor and our eighth program since starting the AERA-ARCE Field Schools in 2005. Our goal was to analyze material that the Salvage Archaeology Field School (SAFS 2) excavated last year from the remnant of the old Luxor Town Mound. The LSFS 2011 is a first step to a full publication of the site by the field school team, using the format tried in the Analysis and Publication Field School last year at Giza.

The old Luxor Town Mound, nearly as high as a two-story building, was slated to come down in 2010 in order to finish the process of clearing the Luxor Temple archaeological preserve to develop it for tourism. The mandate of the SAFS 2 was to take the mound down to ground level, excavating stratigraphically, in only seven weeks, and salvage the wealth of information it held. Spanning a period of 2,000 years, the mound preserved settlement remains from the Roman Period up to modern times. The mound was the last window onto this great span of history at Luxor, most of which had already been lost over the last 50 years as the area around the Luxor Temple was progressively cleared.

The formidable 2010 SAFS team efficiently peeled down the mound, thoroughly documenting each occupation layer and recovering a vast array of items of everyday life in Luxor. In order to analyze and publish this material culture, we planned to undertake a field school study season—but not this year, as we already had a full

2011 field season at Giza. However, Mansour Boreik, Director of Antiquities in Luxor, and John Shearman, Associate Director of the American Research Center in Egypt (ARCE), encouraged us to take advantage of the stability and funding available and hold a study season.

The Team

On short notice, Field School Co-directors Ana Tavares and Mohsen Kamel pulled together the AERA-ARCE Luxor Study Field School. They entrusted work on the ground to

Yasser Mahmoud and Mohamed Naguib, SCA inspectors who trained in our field school and went on to teach. This was the first time that an entirely Egyptian team ran a field school on the ground. They ran the program efficiently, adhering strictly to our protocol of weekly presentations, exams, and reports.

For the first time, we also carried out the program with extensive help from team members off-site, relying on the internet to



Left: Habat Allah Addallah holds a grain measure from the Andreus Pasha Palace, one of many objects she drew during the LSFS.

Above: In front of the Luxor Temple, workers load the 400+ bags of pottery sherds excavated by the SAFS 2 for transport to the Karnak Temple Lab for study.

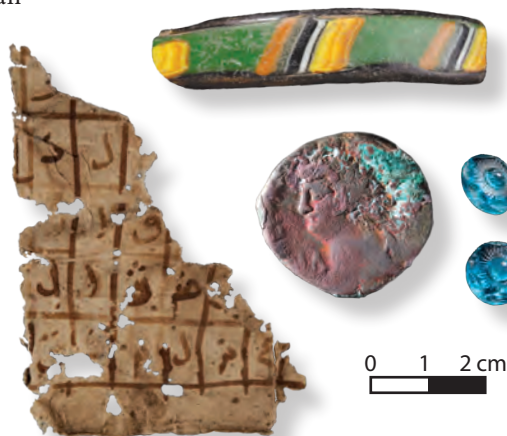
keep us connected. Since the analysis of the material culture requires quite specialized knowledge, we enlisted specialists to assist the team remotely. Consultants spread across three continents stayed in touch via weekly web conferencing meetings and a shared server that allowed everyone to work with photos, drawings, and documents. Ceramics specialist Aurélia Masson, who worked with the 2010 SAFS, logged and analyzed pottery drawings and recording forms in Cambridge, England. Also in Cambridge, William Schenck, Archaeological Illustration instructor in our previous field schools, provided advice online on how to record particularly difficult pieces. Delphine Driaux carried out objects research from Giza, while registrars Shaima Montaser and Salah el-Masekh took charge of the objects in Luxor. From Beni Suef, Rabea Eissa, an excavation team leader in the 2010 SAFS, prepared groups of archaeological deposits by chronological phase to insure that the team analyzed and recorded a representative set of pottery data for all the phases and major structures.

On the ground in Luxor, conservator Lamia el-Hadidi, another veteran field school instructor, treated and packed all the objects. AERA Archivist Emma Johnson did double duty, maintaining the 2011 LSFS and Giza excavation archives, with some shuttling between Luxor and Giza. ARCE photographer Owen Murray uploaded daily photos of artifacts for study onto our shared server.

The LSFS team in Luxor, 30 people altogether, worked at the ARCE facilities in front of the Khonsu Temple in the Karnak Temple precinct. ARCE provided open-air classrooms for ceramics sorting and analysis and opened their state-of-the-art Karnak Laboratory for illustration and conservation work. One LSFS team worked at the Luxor Temple on inscribed stone blocks, which were too heavy and bulky to move en masse.

The Materials

The 2010 SAFS excavations produced an enormous collection of material culture—the ceramics alone filled more than 400 large sacks. The relatively high and dry Luxor Town Mound preserved a vast range of materials: paper, textile, basketry, cordage, leather, wood, shell and bone, as well as metal, stone, minerals, glass, faience, and the abundant, ubiquitous ceramics. Among the everyday objects were lamps, knives, shoes, sandals, combs, bags, coins, pieces of furniture, jewelry, figurines, ostraca, various containers, and slips of paper with magical charms.



Selection of excavated objects for study: from top, clockwise, fragment of glass bracelet, glass beads, coin, and Islamic magical spell fragment.



Top: Ceramic student Ashraf Mohamed Ahmed studies pottery sherds excavated from the Luxor Town Mound in the ARCE open-air classroom located in the Karnak Temple precinct.

Above: Team members sort the inscribed block fragments from the 2010 excavations. Inset shows a detail of a beautifully carved depiction of lotus plants.

The 2010 SAFS team also recovered many carved stone fragments from ancient Egyptian shrines and temples that people of old Luxor had reused in the foundations of their mudbrick buildings. The stones bore relief-carved scenes and hieroglyphic texts that needed to be documented.

The major prize of the 2010 excavations was the corpus of pottery spanning the Roman, Coptic, Byzantine, Islamic, and modern periods. Because the ceramics of these periods are not well known from settlement sites and few have been published, the Old Luxor Town Mound corpus makes a major contribution to Egyptian archaeology.

The course taught by Mohamed Naguib and Mahmoud el-Shafey gave the six ceramics students the



Right: A ceramics student uses tile snips to get the fresh break necessary for proper analysis of the fabric of a sherd.



opportunity to document this important collection as they learned the basics of ceramic processing, recording, and analysis. The Archaeological Illustration group, headed by Yasser Mahmoud and Hassan Ramadan, assisted by Said Ebrahim el-Assal, played a critical role in producing publication-quality drawings of material from the SAFS 2 excavations. As they developed their drawing skills, the six advanced students illustrated objects, ceramics, and decorated blocks, including the inscriptions.

Success

By June 1, the Field School team had achieved its goals. The ceramics group documented a comprehensive sample of the pottery from each major period and wrote a short summary of their work for publication in the *Bulletin de la Céramique Égyptienne*, the major forum for ceramics in Egyptian archaeology. Together, the registrars, conservator, illustrators, and photographer documented all the decorated blocks, stabilized



From upper left, down: Illustration student El-Sayed Mamdouh copies an ostraca inscription; ceramics student Alaa Abd el-Haleem Ali el-Kady studies the fabric of a pottery sherd through a magnifying loupe; ceramics supervisor Mahmoud el-Shafey oversees Alaa's documentation.

Lower left: Illustration supervisor Hassan Ramadan explains illustration terms to students.

Lower right: Students from the ceramics group take advantage of the holdings of the Luxor Chicago House library.





Above: The field school team visited the potters of Garagus village, famous for producing glazed pottery from Aswan clay, and watched all the steps in pottery production. Here one of the potters explains how they prepare the clay using the holding tank in the foreground to levigate the clay.

Right: Entsar Mohamed Eid, a student in the illustration group, draws a sherd. She uses a caliper to get precise dimensions for her drawing.



their conditions, and reorganized the material for future study. The team documented artifacts with notes, information forms, photos, and illustrations. They packed the objects and stored them at Karnak for future study.

Another Analysis and Study Field School in Luxor will prepare all of the data from the 2008 and 2010 SAFS excavations for final publication. We are proud that the SCA team we have worked with over the last few years is producing work and running a field school to a high standard of professionalism.

Acknowledgements

We could not have carried out the Luxor Study Field School 2011 without the logistical support and encouragement from Mansour Boreik, Director of Antiquities in Luxor, and John Shearman, Associate Director of the ARCE. The work in Karnak was under the auspices of the Mr. Ibrahim Soleiman, Director of Karnak, and Amin Amar, Chief Inspector of Karnak. Mohamed Bakhit served as the SCA Inspector for the ARCE Laboratory work. The epigraphic work in the Luxor temple precinct was carried out with the support of Sultan Eid, Director of Luxor Temple. Wafaa Kamal Fouad served as the SCA Inspector for work in the Luxor Temple precinct. We are grateful for all their help.



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The AERA-ARCE Luxor Study Field School 2011 was made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents of this



article are the responsibility of AERA and do not necessarily reflect the views of USAID or the United States Government. Funding was provided through the American Research Center in Egypt (ARCE) USAID grant (No. 263-A-00-04-00018-00).

Ancient Foods, Environment, and Climate: Archaeological Science Program



Małgorzata Korzeniowska (left) and Brittany Hughes document a pieced-together pot in the Giza Field Lab.

In our excavations we meticulously uncover and document architecture, occupation layers, and natural deposits. From this painstaking work we learn a great deal about the ancient settlements. But we would miss essential pieces of the puzzle if we did not also collect and analyze the pottery, bone, seeds, stone tools, objects, clay sealings, and pigments in our Giza Field Laboratory.

Dr. Mary Anne Murray, Director of Archaeological Science, supervised a busy 2011 lab season that saw 20 specialists working on a wide array of material culture. Much of the work, in one way or another, contributed to our ongoing quest to understand everyday life at the Lost City.

Amalgamating AA...

Clay Sealings: Storage Bins and Purification Priests

Dr. John Nolan and Ali Witsell, our sealings team, have coaxed remarkable information and insights from tiny bits of clay that Lost City people used to seal boxes, jars, papyrus rolls, and doors. When the clay was wet, they pressed the bits over the item to be sealed and then impressed it with a cylinder seal incised with designs or titles of officials. The only texts we have from the site, sealings open windows unto the administration of the settlement and the larger economy. This season John and Ali completed work on an extraordinary collection of sealings recovered from Area AA (see map page 15). This production and storage center on the western edge of the site includes a bakery, possibly a brewery, and the enigmatic Pedestal Building, a structure with rows of mud and stone pedestals.

Working with 747 impressed sealing fragments, John and Ali have been able to reconstruct, so far, at least 16 cylinder seals. They belonged to officials, including five associated with the Royal Funerary Workshop



0 1 2 cm

Sealing associated with an assistant royal purification priest of Menkaure.

of Menkaure and eight royal purification priests serving the royal mortuary cults of the kings Khafre and Menkaure. Although these titles suggest ritual functions, the priests probably got their hands dirty working in the royal production activities here.

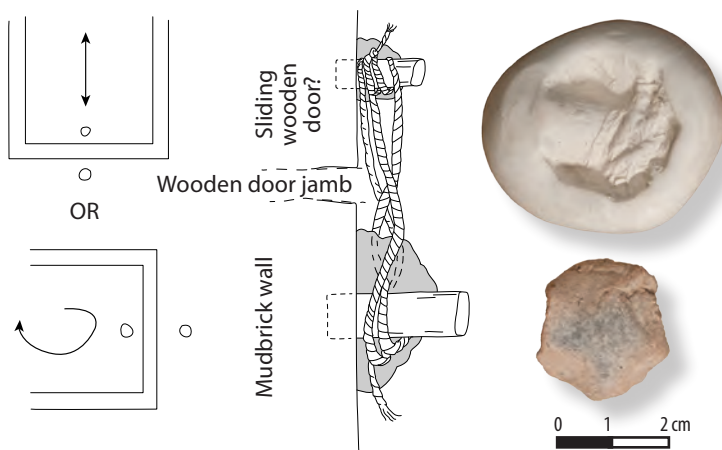
John and Ali also identified numerous impressions from “Informal Seals” that may have belonged to lower-ranking officials, including “Sealer of the Storehouse.”

Certain sealing fragments suggest that storage bins were housed in the Pedestal Building, possibly atop the pedestals. Ali and John found a high proportion of “peg-and-string” sealings: nearly 30% of the sealings compared with only about 5% for the Lost City site as a whole. Peg-and-string sealings are pieces of sealing clay that have been pressed against string or rope coiled around a peg or piece of wood. This closing mechanism could be used to secure openings ranging in size from small boxes to large doors. However, in Egypt and the Near East, peg-and-string sealings are also commonly associated with architectural storage devices such as small granaries or bins.

Plant Remains: Brewing Beer in Area AA

Every season we intensively collect remains of plants using a water separation technique called flotation, which allows us to recover seeds, bits of chaff and straw, fragments of wood charcoal, fruit stones, and other materials. We would not be able to pick out many of these by hand while excavating, let alone notice them, particularly since all of the plant material preserved at the Lost City site is charred from burning in a fire, mostly as fuel. All other plant remains deteriorated in the moist sediments of the site.

In the lab, the flotation samples go under the microscope, and the archaeobotany team of Mary Anne Murray and Claire Malleson patiently sort through the morass of tiny bits. They pick out and identify seeds and plant parts, and tabulate and document them—a long, slow process.



Right: Peg-and-string sealing (below) and an impression of the sealing back showing a positive impression of the peg and string.

Left: Schematic drawing showing how the peg-and-string fastener may have worked on a sliding wooden bin door.

This season the archaeobotany team completed work on their Area AA material, allowing for comparisons of patterns across the settlement. Among the differences that stood out: the relatively high proportion of barley to emmer wheat compared with other areas of the town. As barley was the main cereal used to brew beer in ancient Egypt, this finding lends support to our hypothesis that beer was brewed in Area AA. In addition, most of the barley chaff in Area AA was recovered in a small bakery adjoining the Pedestal Building on the east. Barley chaff, a by-product of beer brewing, may have sometimes been used as fuel after it was discarded. However, the bakery also produced a much higher density of acacia wood than the eastern area of the site, with relatively little evidence of by-products from cereal processing, the most common fuel across the site. Acacia charcoal may have been the most desirable fuel for bakeries.

Ceramics: More Evidence for Beer in Area AA

Dr. Anna Wodzińska led the ceramics team of Edyta Klimaszewska-Drabot, Elham el-Tawiel, Małgorzata Korzeniowska, Mohamed Naguib, and Mahmoud el-Shafey in an intense season of pottery processing—basic sorting, documentation, and analysis—to complete the ceramics from this year's excavations, as well as pottery left from some previous seasons. After this first essential processing step, the ceramicists can go on to more detailed analysis, as Anna did with pottery from Area AA, the production and storage facility on the western edge of the site.

Several notable findings emerged from her work on this set of pottery. Most intriguing is her conclusion that a brewery almost certainly functioned here along with the bakery. In the Pedestal Building pottery assemblage Anna found

especially large quantities of beer jar sherds compared with other ceramics, and compared with the relative proportions seen elsewhere across the site. The jars were probably stored here, waiting to be filled with newly-brewed beer.

Anna also concluded that a variety of breads were produced across the town. The bread molds and bread trays in Area AA were different from those used in the Western Town and in the Gallery Complex, which may have served as a barracks.

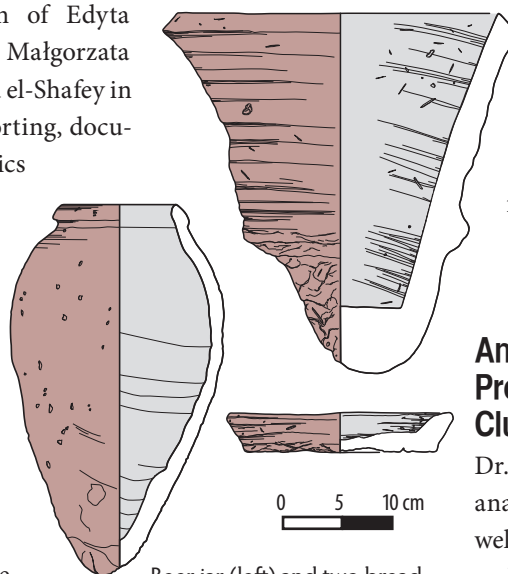
Lithics: A Plethora of Scrapers

Sabine Boos, a graduate student at the University of Tübingen, joined us this season to begin work on her dissertation on the Lost City site lithics (chipped stone tools). These knives, flakes, and scrapers were essential tools of Old Kingdom Egyptians, used for domestic purposes as well as in workshops.

Sabine began her research by developing a database for the lithics in Area AA. One feature stood out: scrapers, particularly triangular scrapers, were especially abundant here compared with other areas of the site. Most of these tools had been repeatedly re-sharpened, a technique that removes small chips from the dull cutting edge to provide a new sharp blade. How were the scrapers used? We know from studies of wear patterns on tools from other sites and periods that scrapers were used in removing flesh from bones, leather working, decorticating plant material, and other tasks. Since they were used for so many different purposes—and we probably do not even know all of them—we cannot point to a specific activity. In future seasons, however, Sabine hopes to examine the microwear patterns on the scrapers and compare these with replica stone tools that have been used for specific activities.



Triangular scrapers from Area AA



Beer jar (left) and two bread molds from Area AA

... and Elsewhere

Animal Bones: Meat Processing, Clues to Dating

Dr. Richard Redding, faunal analyst and Chief Research Officer, welcomed two new members to the archaeozoology team this season: Dr. Lisa Yeomans, faunal analyst,

and Rasha Nasr Abd el-Mageed, who trained with Richard in 2010 in the AERA-ARCE Analysis and Publication Field School.

Lisa found evidence of food processing in a large sample of bone from ancient pits found in the northern end of Area EOG (see map page 15) in 2006. One pit contained bones of at least 38 sheep and goats with few bones from other species. The bones had all been smashed into small pieces, perhaps to extract the marrow by boiling. Or the bone fragments may have been used in stew for flavor and to maximize their food potential. This may also have been a way to eke the most food value out of older livestock with tough meat, since none of these were young animals.

In deposits from another pit, Lisa found evidence for an initial stage of fish processing. She identified the bones of the spiky pectoral girdle from at least 12 individuals of a large species of catfish. The pectoral spines were probably removed before gutting so as to avoid injury.

Richard and Rasha completed the ongoing analysis of animal bone from House Unit 1, a large residence in the Western Town district of the Lost City site. We believe it was home to a high level scribe and a scribal workshop. Richard and Rasha found that the fauna was dominated by very young cattle, one of the most desirable meats in ancient Egypt, which we would expect to find in an elite residence. With this discovery they also helped resolve a question that had lingered since 2004: does House Unit 1 date from the same period as an adjacent trash dump, “Pottery Mound?” The faunal remains were identical to those in Pottery Mound and thus probably came from House 1. Two leopard teeth also turned up in House Unit 1; the only other area where we have found leopard teeth is next door in Pottery Mound. Therefore, our working hypothesis is that the residents of House Unit 1 discarded their garbage in Pottery Mound.

Osteology: Completing a Database Body by Body

During the last ten years the Osteo team, under the direction of Jessica Kaiser, excavated about 400 burials, most of which are from a Late Period cemetery cut into and overlying parts of the 4th Dynasty Lost City site. With a demanding schedule in the field, the osteologists rarely have time to carry out all the lab work that the skeletal remains need. But this season Johnny Karlsson, an osteo team veteran, worked in the Giza Field Lab to complete much of this work. Using photos the team takes in the field for creating drawings post-excavation



Val Steele collects a sample of plaster in a bin in House Unit 1 for residue analysis. The plaster may contain residues of lipids from food stored or processed here.

and specialized software, he completed the drawings of about 200 coffins, and drew most of the skeletons that had not yet been done. In addition, he digitized the cuts or boundaries of all 400 burials, accomplishing another season goal: updating the site plan with the position and boundaries of all the burials excavated so

far. Johnny also re-examined all the skeletal remains in order to record age, sex, and pathologies in a standardized manner.

The osteo work this season produced no surprising results or important breakthroughs, but was critical for documenting the Late Period population. When the team has the whole assemblage in the osteo database, they can explore the health status, mortality, and living conditions of the Late Period population buried at Giza and compare them with other populations.



0 5 10 cm
Catfish pectoral spines from the Lost City site

Objects

In addition to pottery and chipped stone tools, we recover many other kinds of objects from the Lost City site, Khentkawes Town, and Menkaure Valley Temple—a vast array including ground stone, bone, and copper tools; stone vessels; palettes; weaving tools; jewelry; decorative objects; gaming pieces; and tokens. These open a window onto daily life activities and crafts during the 4th Dynasty. Some objects are the only traces of grinding (cereals or pigments), weaving, and leather-working.

This season the objects team of Ana Tavares and Emmy Malak continued their ongoing efforts to document this unwieldy array of diverse objects and reached an important milestone. They completed their study of objects from the Royal Administrative Building (RAB)—a large enclosure used for production and storage of crafts and food. Because of the very large, diverse assemblage of objects in the RAB, Ana and Emmy now have a good overview of the complete corpus of object types and different kinds of activities they represent at the Lost City site as a whole.

New Directions

Environment and Climate

Much paleoenvironmental evidence points to a significant drying trend around the end of the 4th Dynasty, which would have had important implications for life in ancient Egypt. Dr. Roger Flower, of University College London, joined us to assess our area for potential evidence of environmental conditions and climate during the Old Kingdom.

Roger worked with the sizable collection of drill cores that we had taken over the years in a variety of locations. These long columns of stratified sediments encapsulate a record of the organic and inorganic materials that accumulated at Giza over time. By processing and analyzing samples of sediments in the cores microscopically, Roger was able to look for the remains of microfauna, such as ostracods and foraminifera (siliceous micro-algae and plant spores), indicative of former lakes, pools, or wetland areas.

At the same time, Roger tested the relative magnetic susceptibility of the samples—a simple, non-destructive method that determines the proportions of magnetic minerals in the stratified sediments of the core. Since Nile alluvium has a relatively high magnetic susceptibility because of its magnetic mineral content, the test can indicate if the sediments were carried by Nile waters.

Roger's preliminary results indicated Nile alluvium in the flood deposits in the northeastern part of the Lost City site, as we already assumed. But there was no evidence in any of the samples of aquatic microfauna indicative of wet habitats.

His results from the cores in the basin at the Khentkawes Town East (κκτ-ε) (described on pages 6–9) provided a test, albeit inconclusive, of our hypothesis that the basin was a harbor ultimately connected to the Nile. Roger found very little or no evidence for Nile-borne sediments, neither microfauna nor magnetic susceptibility, from the lowest sediments in the drill cores of the κκτ-ε basin. Some of the cores gave a hint of enhanced magnetic mineral content, but the deposits are not extensive enough to be definitive proof of Nile sediments.

Organic Residues: Fingerprints of Ancient Food and Drink

Unlike most of our material culture, residues left from foods and other liquids are largely invisible, but they can be recovered through special extraction procedures. Dr. Val Steele, of Bradford University, joined our lab team to determine the potential for recovering residues from ceramics and plasters at the Lost City site, with the goals of determining the functions of some enigmatic structures and of finding evidence for beer production.

Unglazed pots have numerous pores that absorb foods and other liquids that are stored or cooked in them. Residues of these liquids can survive thousands of years in pottery sherds, but most of their components degrade over time. The most stable components, fats, waxes, oils, resins, etc.—known collectively as lipids—are the materials that archaeologists target. They collect samples by drilling a small amount of ceramic from the interior and exterior surfaces of the vessel. They extract the residues with organic solvents and then analyze them using gas chromatography-mass spectrometry.

Val sampled pottery vessels that span most of the main categories found at Giza, such as beer jars, storage vessels, and vats. The residues on the beer jars and vats may offer evidence that these were indeed used to store and brew beer.

The plaster on walls and floors associated with food processing, like ceramics, can also sequester residues. We hope that the plasters in several enigmatic areas of the site might reveal how people used these spaces. Val took samples of plaster from a number of features possibly used in brewing beer, and from the floor of a structure that might have been used for drying fish. For now all these samples remain in Egypt as we seek permission to process them.

Dr. Richard Redding, AERA archaeozoologist and Chief Research Officer, works in our Giza Field Lab on animal bone from House Unit 1. In the background his assistant Rasha Nasr Abd el-Mageed sorts animal bone. Rasha trained with Richard last year in the Analysis and Publication Field School.



Bricks and Mortar: House E Reconstruction Project

Following the 2011 excavation season, we began a project to conserve and restore House E, one of the priests' houses in the Khentkawes Town (KKT), where we have worked since 2005 mapping and re-excavating the settlement that Selim Hassan first excavated in 1932. As archaeologists we try to reconstruct what happened in the past. Reconstructing, even partially, an ancient building in real bricks and mortar generates many new insights and understandings, as well as further questions.

Building on our 2005 and 2006 pilot conservation program on the small Eastern Town House (ETH) in the Lost City site (described on page 30 and visible in the satellite image on page 6) we decided to conserve and reconstruct House E, which Lisa Yeomans and Hanan Mahmoud excavated in the spring of 2009.

Our 2011 House E project, under the direction of Ana Tavares with architect Günter Heindl and archaeologist Ashraf Abd el-Aziz, included experimental archaeology, conservation, and reconstruction. Ashraf produced the mudbricks for the reconstruction while also experimenting with different techniques for preparing the bricks. Before we began building, we meticulously mapped and documented the

ancient structure. We then encased each wall with mudbricks and buried the ancient remains in sand. We reconstructed the lower part of the walls and floors above the buried remains. Since Khentkawes Town is laid out on a sloping bedrock surface left from earlier quarrying, we had to accommodate the slope, while maintaining level courses of brick. Like the ancient Egyptian masons, our team laid the cross walls from the south, with each successive course extending farther north. Pages 28–29 show the conservation and construction process.

Building a partial replica of House E brought up many questions about how people lived in the ancient house. Perhaps the most puzzling feature was the pronounced slope of the floors. Did the residents really live on such an extremely tilted surface? The use and flow of space is also intriguing. Our reconstruction, for example, accentuated how terribly constrained access must have been through the southern entrance with its zigzag series of small spaces and four doorways. As we made our way through the entrance, we discovered how awkward it was to physically navigate, compared with our observations based on the map alone.

In future years we hope to restore much more of the town.



Left: House E at the end of excavations in 2009. Below: The replica at the end of the 2011 conservation project. In future seasons we plan to reconstruct the silos (visible in the photo on the left) and add features such as door sockets. In the right background below, the mortar mixing operation can be seen, with the water tanks on the slope and the mixing pit below. View to the south.



BRICK BASICS

The humble mudbrick was the main building block at the Lost City site, the Khentkawes Town, and most ancient Egyptian settlements, but the bricks could vary a great deal. Ashraf Abd el-Aziz has documented the many variations in size and composition of Old Kingdom mudbricks at Giza and other areas as part of his mudbrick typology study, launched in 2004.

When we built a replica of the Eastern Town House in 2005, Ashraf oversaw the brickmakers. Our goal was to build with bricks like those used in the original: fairly small (22 x 18 x 8 cm [8.7 x 7.1 x 3.1 inches]) and tempered with sand rather than organic material. This season we had quite a different challenge: the original bricks used to build House E (and much of the Khentkawes Town) were much larger (34 to 41 cm long, 16 to 20 cm wide, 9 to 12 cm thick [13.4 to 16.1 inches, 6.3 to 7.9 inches, 2.4 to 4.7 inches thick]) and tempered with straw.

We tried different teams of brickmakers and different techniques with varying results. One team produced good bricks but too slowly. The faster team produced uneven bricks. Another team used a mixture with too much fine silt (clay) and not enough straw temper so when the bricks dried they cracked badly. Another team placed the bricks to dry directly on the sand so they acquired a thick crust of sand that was very hard to remove and prevented the bricks from lying flat.

As in all experimental archaeology, the devil lurked in details. When the brickmakers used too much water in their mix, the bricks slumped and sagged as they were released from the mold, altering their final dimensions. The deviations in shape, or caked sand, were a great source of irritation for the masons. The misshapen bricks would not fit straight and true into a course of the wall, so the masons ended up trimming with trowel blades and even hand saws, slowing their work.

Despite the frustrations with our brickmaking experiment, our bricks were ready by mid-April. We could begin building!



Straw for temper



Dumping Nile silts into the mixing pit



Mixing straw with Nile silt mud and water



Filling the brickyard one brick at a time



Packing the mud mixture into the molds

REBUILDING A HOUSE BRICK BY BRICK

Steps proceed clockwise



Step 1: We cased the ancient walls with skins one-brick-thick for their protection and to provide the necessary height and stability for the reconstruction.



Step 2: We then filled the rooms with sand and laid a mudbrick surface above.



Step 6: We left the brick courses exposed on the outer walls of the house to show the building technique. Günter Heindl and Ashraf Abd el-Aziz stand in the house entrance.



Step 5: We plastered the floor and the inner walls of the house.



Step 3: We built new internal walls directly above the originals, but with the weight distributed onto the modern skin-walls.



Step 4: We installed two small monitors above the ancient walls to record humidity and temperature variations over a period of one year. Ana Tavares, director of the conservation project, positions the monitors.



Günter Heindl, architect for the conservation project.



The beginning: Mark Lehner surveys the Giza Plateau in 1984.

Bringing the Lost City Back to Life: Status Report

We believe that the ultimate goal of our archaeological work is to reconstruct what happened in the past, and, ideally, determine how and why. In fact, over the last few years it has become increasingly clear that the act of reconstruction is fundamental to developing and testing our theories about ancient Egyptian society.

Three years ago, during long-range planning, we proposed several ways in which we could move forward using both ancient and modern technologies to bring the Lost City of the Pyramids back to life. Relying on AERA's own Geographic Information System (GIS) as the foundation, we envisioned rebuilding the Lost City virtually using modern graphics software and the expertise of AERA's team of archaeologists. In contrast to this high-tech approach, we also proposed a parallel program of building modern life-size copies of the Old Kingdom structures using materials and techniques identical to the ancient ones. While these two approaches to reconstructing the ancient structures of everyday life appear to be radically different, both challenge us to answer basic questions about the Lost City, questions so fundamental that they force us to redefine our terms and refine our theories of the ancient past.

Ultimately, the foundation for any of these reconstructions is accurate information. Over the years, AERA's team of GIS specialists has been building up a comprehensive geo-database of the monuments and features of the Giza Plateau. Most recently, AERA's GIS team completed geo-rectifying—matching the image to a set of geographical coordinates—more than 66 maps and profile drawings covering most of the Western Cemetery, in association with Prof. Peter Der Manuelian of Harvard University and director of the Giza Archives Project at the Museum of Fine Arts in Boston. Over the next year, the GIS team will add data collected by Mark Lehner and David Goodman going back decades. With some supplementary survey work, we hope to compose the most accurate map to date of the Giza Plateau, fulfilling the original mission of the Giza Plateau Mapping Project back when we began in 1984.

Building Old Kingdom Replicas

In the fall of 2005, we built a replica of the Eastern Town House (ETH) as a pilot project to conserve the structure. After studying archaeological conservation projects around the world, conservator Ed Johnson and project architect Günter Heindl concluded that the best approach

would be to bury the original under a protective bed of clean sand one-meter-thick and then above this layer construct an exact replica that would allow scholars to see and study the building. They raised the walls to one meter high, the same height as the remaining original architecture. The bricks were identical to the ancient ones in size and composition, made according to the results of Ashraf Abd el-Aziz's work on the Old Kingdom bricks (described on page 27). Günter experimented with different recipes for mixing the plaster to be used on the walls of the replica, while conservator Ed Johnson built several segments of mudbrick walls elsewhere on site to test the effects of weathering and erosion over time. So, while this pilot project produced a reproduction of an Old Kingdom house that visitors can explore, it also served as a laboratory, allowing us to test our ideas about how these structures were built and how wind and ground moisture might have affected them.

This spring, Günter, Ashraf, and Ana Tavares followed up on the ETH pilot project by starting the reconstruction of House E in the Khentkawes Town site (KKT) (described on pages 26–29). The KKT, one of the earliest known planned settlements in Egypt, is



Left: A mudbrick test wall segment shortly after it was erected in 2005 to test the effects of weathering and erosion over time.



Right: The wall in March 2011, showing damage from ground moisture and rain.



Rebekah Miracle,
AERA GIS specialist

by itself an important case study in the development of urbanism. By rebuilding House E, the AERA team not only further explored variations in the composition of Old Kingdom mudbricks (which are quite different from the bricks used in the Lost City site), but they also tested their own ideas about how this house fit into the surrounding architectural landscape.

3-D Models

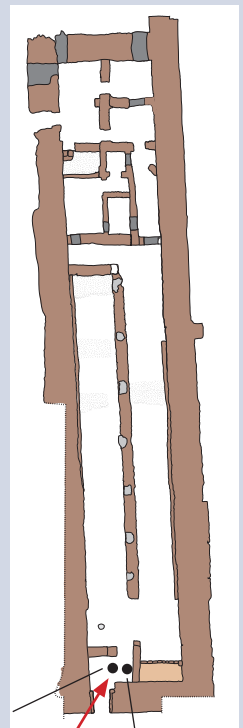
Through our physical reconstructions we have gained insights into ancient materials and techniques and gotten a real sense of the size, layout, and flow of the ancient structures. Digital 3-D reconstructions offer another set of insights. Over the years, Dr. Wilma Wetterstrom, AERA's Art and Science Editor, has digitally modeled the ETH, House Unit 1, and a portion of Gallery Set III, which may have served as barracks, in the Lost City site; and House E in KKT. She creates the models with Google SketchUp software, using the dimensions of the original structures as starting points. To complete her "buildings" she has to use best guesses about many aspects of these structures, since the originals are literally in ruins, often no more than a few feet high, lacking roofs and ceilings, doors, and many other features. With modeling software, she can try out different sets of parameters and explore how each would affect the structures. With a digital walk-through, we can see how different possibilities might have worked. We tested Günter's proposal that the galleries had barrel vaulted roofs with

Wilma's digital model of Gallery III.4 and the adjacent rooms covered with barrel vaults (as shown this spring on the front and back covers of *AERAGRAM* 11-2). In the model, which is built with the dimensions that Günter proposed, we could explore a variety of questions. How would openings in the vault affect natural light in the galleries? How did the light conditions change through the day and through the seasons? Would a ladder to the upper level at the gallery entrance obstruct traffic flow into the lower hall? How much usable space was available under the arching vault?

The advances that AERA has made over the last few years with its GIS, conservation program, and 3-D modeling only represent the first steps toward bringing the Lost City of the Pyramid Builders back to life. The next step will be a 3-D model of the whole site, and later the Giza Plateau. Rebekah Miracle, AERA GIS specialist, will build upon Wilma's work using GIS and 3-D modeling software to create a site-wide model that we will be able to walk through. Future survey will continue to improve AERA's GIS map of the Giza Plateau, which in turn will be used in creating the large 3-D model.

The modeling process will be informed by the insights we gain trying our hand at actually building the structures we excavate. All in all, each of these approaches informs the others, each adding further detail, each revealing greater complexity, and breathing life into the Lost City of the Pyramids.

Below: A view seen in the 3-D SketchUp model of Gallery III.4 showing the entrance vestibule (front wall removed). The map of Gallery III.4 shows the viewer's location. By looking at the entrance from different angles in the 3-D model we can see more clearly than with a 2-D map how a ladder to the upper level could somewhat constrict the flow of traffic. This view prompts us to consider how movement of people and goods might have been managed.



Man carrying basket

3-D view
Man on ladder climbing to 2nd level



Ladder to loft level

AERA-Egypt Center NGO: It's Official

The AERA-Egypt
Center in Giza

While the last year has seen plenty of changes in Egypt, AERA-Egypt and its home base in Giza have continued to grow and prosper. On April 11, 2011, AERA-Egypt was officially recognized as a foreign NGO (nongovernmental organization) by the Egyptian government, which permits AERA-Egypt to record our purchase of the AERA villa property with the Egyptian Registry and Documentation Office, beginning the process of transferring legal title to AERA's name. In addition, longtime AERA team member and Field Director Mohsen Kamel will now take over as AERA-Egypt's official representative.

With the elevation of AERA-Egypt's legal status in Egypt, we can now move forward with AERA's long-term vision to develop the AERA-Egypt campus on the current villa property. The plan for this set of structures was first visualized by Jon Jerde and John Simones of the Jerde Partnership in 2009. While preserving the existing historic villa at the center of the property, this plan has evolved to incorporate six new buildings, the largest of which will be a dormitory containing sixteen double rooms at the back of the property. Near the northwest corner of the compound, a second structure will house the director's suite as well as five single rooms for senior staff and visiting scholars. A narrow building bordering the long driveway will contain brand new dining and kitchen facilities as well as workrooms on either side of the main entrance to the AERA-Egypt campus. A support building has already been completed next to the villa. Finally, a domed lecture hall seating about 100 people will form the centerpiece of the campus, overlooking the convergence of walkways from both entrances into the AERA-Egypt grounds.

The benefits of this plan are clear. The large-scale dormitory and the subsidiary housing for the director and senior staff will permit us to house all of our team members and staff in our own facilities, cutting down on the cost of maintaining our crew in rented apartments nearby. Moving our



Rebekah Miracle, GIS specialist, helps Brittany Hughes digitize field drawings in the busy GIS computer lab in the AERA-Egypt Center.



In the AERA-Egypt Center library Amelia Fairman (standing) gives a lecture for team members on the excavations she supervised in the Menkaure Valley Temple.

current kitchen and dining hall out into dedicated structures will free up valuable office and meeting space in the existing villa. Similarly, the lecture hall will permit the library, which now has to serve double-duty as a classroom, to expand with permanent shelving for our growing collection of monographs and journals. Following traditional Egyptian practice, most



Students in the 2010 Analysis and Publication Field School prepare maps on the rooftop work area of the support building at the AERA-Egypt Center.

of the rooftops on the new structures will be accessible and include open and shaded spaces for work and recreation.

As we work and live in our villa, we come to realize that we may want to adapt this vision for the future. For instance, in the searing heat of Cairo in spring and summer, we appreciate the large, shady mango, acacia, and palm trees that currently dominate the property. So we hope to preserve them when we build. We are restoring the old fountain in the garden, with its central lion head spout and basin surrounded by five frogs, symbols of regeneration in ancient Egypt. These considerations as well as local building laws might dictate some changes to our original plans.

However, we have already made progress toward our ultimate goal. In 2010, we finished the first improvement to the AERA-Egypt Center: the support building with laundry facilities, storage, and sleeping rooms for our household staff, capped by a rooftop classroom and work area. We completed this structure in just 75 days at a cost of \$30 per square foot.

This experience has allowed us to calculate the potential cost of building the remaining structures in our long-term plan for the AERA-Egypt Center (see table on right). With



The frog fountain (right), north side of the AERA-Egypt Center villa, and the main lawn.



The pergola along the east side of the AERA-Egypt Center is a popular place for working and relaxing.

the help of our friends and supporters, we intend to carry out this plan in stages, starting with the large dormitory and the director's housing. By building these structures one at a time in the off-season, we hope to create a world-class facility for our expeditions and field school programs.

Watercolor sketch of the first draft plan for the AERA-Egypt Center, generously designed by the Jerde Partnership, a visionary architecture and urban planning firm based in Los Angeles.



Preliminary Estimates for Building Costs

Dormitory*	\$150,000
Director's house*	\$50,000
New kitchen*	\$150,000
Pedestrian entrance and high wall.....	\$10,000
Lecture hall*	\$60,000
Total	\$420,000

*Build and furnish

Thanks to Our Benefactors

We are grateful to generous donors whose major gifts made it possible for us to establish the AERA-Egypt Center: the Waitt Family Foundation, the Ann and Robert H. Lurie Foundation, the David H. Koch Foundation, the Charles Simonyi Fund for Arts and Sciences, Peter Norton and the Isambard Kingdom Brunel Society, Dr. Marjorie Fisher, and the Urban Land Institute tour members on behalf of Bruce Ludwig.

SHARING OUR

Scholarly Publications for 2010–2011

LAUREL FLENTYE

“The Development of the Giza Necropolis in the Early Fourth Dynasty.” In *The Proceedings of the Abusir and Saqqara in the Year 2010 Conference*. Prague, Czech Republic, May–June 2010, in press.

“The Decorative Programs of the Pyramid Complexes of Khufu and Khafra at Giza.” In *Old Kingdom: New Perspectives, Egyptian Art and Archaeology 2750–2150 BC*, edited by N. and H. Strudwick. Oxbow Books, 2011.

MARK LEHNER

(and D. JONES, L. YEOMANS, H. MAHMOUD, AND K. OLCHOWSKA) “Re-examining the Khentkawes Town.” In *Old Kingdom: New Perspectives, Egyptian Art and Archaeology 2750–2150 BC*, edited by N. and H. Strudwick. Oxbow Books, 2011.

JOHN NOLAN

Mud Sealings and Fourth Dynasty Administration at Giza. PhD Dissertation, University of Chicago. 2010.

ANA TAVARES

“Village, Town and Barracks: A Fourth Dynasty Settlement at Heit el-Ghurab, Giza.” In *Old Kingdom: New Perspectives, Egyptian Art and Archaeology 2750–2150 BC*, edited by N. and H. Strudwick. Oxbow Books, 2011.

(and SABINE LAEMMEL) “Some Post-Old Kingdom Pottery from Giza.” In *Under The Potter’s Tree, Studies on Ancient Egypt Presented to Janine Bourriau on the Occasion of her 70th Birthday*, edited by D. Aston, B. Bader, C. Gallorini, P. Nicholson, and S. Buckingham. *Orientalia Lovaniensia Analecta* 204, Uitgeverij Peeters en Departement Oosterse Studies. Leuven, 2011.

ANNA WODZIŃSKA

(and M. FRENDR-MAJEWSKA) “Święto budowy piramid.” *Newsweek Polska* 2 (2011), 72–74.

“The Ancient Egypt Research Associates Settlement Site at Giza: The Old Kingdom Ceramic Distribution.” In *Old Kingdom: New Perspectives, Egyptian Art and Archaeology 2750–2150 BC*, edited by N. and H. Strudwick. Oxbow Books, 2011.

“Review: Egypt in the Eastern Mediterranean during the Old Kingdom. An Archaeological Perspective, by K. N. Sowada.” *Journal of Ancient Egyptian Interconnections* 3: 1 (2011), 13–15.

Lectures and Conference Presentations

LAUREL FLENTYE

“The Development of the Giza Necropolis in the Early Fourth Dynasty.” Abusir and Saqqara in the Year 2010 Conference, Prague, Czechoslovakia. June 2010.

JESSICA KAISER

“Bioarchaeology of the Wall of the Crow Cemetery, Giza.” Annual ASOR Meeting, Atlanta, GA, November 20, 2010.

“The Wall of the Crow Cemetery in Giza, Egypt: Remembering the Children.” SAA Annual Meeting, Sacramento, CA, April 1, 2011.

“Late Period Giza in Context: A View from the Wall of the Crow.” Brown bag talk at the Carsten Niehbur Institute, University of Copenhagen, Denmark, April 16, 2011.

“Raising the Dead: The Late Period Cemetery in Giza.” Department of Cross-Cultural and Regional Studies, University of Copenhagen, Denmark, May 17, 2011.

YUKINORI KAWAE

“Pyramid Builders.” Japan Society for the Promotion of Science, Cairo Center, February 2011.

“Data Acquisition and Interpretations of Khentkawes’s Tomb at Giza.” The Society for Near Eastern Study in Japan, Kokushikan University, November 2010, and the 15th Workshop of Western History, Osaka University, June 2010.

“4D Pyramid of Egypt.” The First Clematis Hill Lecture Meeting for Egyptian Archaeology, Shizuoka, Japan. October 2010.

“Future Heritage-4D pyramid Data.” G-Spatial EXPO, Pacific Yokohama, Japan, September 2010.

“House at the Pyramid Town at Giza.” 15th Annual Meeting of Japan Society for Western Asian Archaeology, Kokushikan University, Japan, June 2010.

“Building the Pyramids: Philosophy, Resources, and Man Power.” Tokyo Tanashi Rotary Club and the Tokyo Mita Club, Imperial Hotel, Tokyo, June 16, 2011, and Hatogaya City Hall, Saitama, Japan, June 17, 2011.

MARK LEHNER

“Khentkawes of Giza: New Light on a Well-Known Site.” The Third British Egyptology Congress, British Museum, London, September 11, 2010.

WORK

"Finding the Lost City of the Pyramids." Thoreau Elementary School, Kirkland, WA, October 8, 2010.

"Lost Egypt: Finding the Lost City of the Pyramids." Fort Worth Museum of Science and History, Fort Worth, TX, October 21, 2010.

"Adventures of Discovery: Sphinx to Khentkawes" and a "Pyramid Quarry Tour, Giza." Chicago Field Museum Board Tour, Mena House, Giza, November 11, 2010.

"Finding the Lost City of the Pyramids." The St. Thomas Forum, St. Thomas, January 20, 2011. Ivanna Eudora Kean High School, St. Thomas, January 20, 2011.

"Lost Egypt, Ancient Secrets, Modern Science," Exhibit Opening Tour. Oregon Museum of Science and Industry (OMSI), Portland, OR, January 21, 2011.

"Finding the Lost City of the Pyramids." Carl Sandburg Elementary School, Kirkland, WA, February 1, 2011.

JOHN NOLAN

"Sealings from Pyramid Age Egypt." SAA Annual Meeting, Sacramento, CA, March 30, 2011.

"The Cult of Menkaure and the Royal Funerary Workshop: New Seal Reconstructions from Giza." ARCE Annual Meeting, Chicago, April 1–3, 2011.

RICHARD REDDING

"The Workers' Town and History of the Giza Plateau." University of Michigan, Ann Arbor, September 10, 2010.

"Khentkawes Town." University of Michigan, Ann Arbor, November 10, 2010.

"A Tale of Two Sites: Old Kingdom Subsistence Economy and the Infrastructure of Pyramid Construction." UCLA, December 10, 2010.

Field Schools as Conservation: Giza and Luxor. American Institute of Archaeology, San Antonio, TX, January 8, 2011.

"Giza and Kom el-Hisn: Old Kingdom Animal Economy." Belgian Museum of Natural History, Brussels, June 30, 2011.

ANA TAVARES

"AERA: from the Sphinx to the Lost City." Wilderness Travel Tour, Mena House, Giza, January 12, 2011.

"An Old Kingdom Village House." ARCE Cairo, February 23, 2011.

"The AERA/ARCE Analysis and Publication Field School." ARCE Annual Meeting, Chicago, April 3, 2011.

"Excavating the Luxor Town Mound" (on behalf of Mohsen Kamel). ARCE Annual Meeting, Chicago, April 3, 2011.

ANNA WODZIŃSKA

(and M. OWNBY) "Levantine combed ware in the context of the Heit el-Ghurab settlement at Giza – late 4th Dynasty (Early Bronze III)." Egypt and the Near East – the Crossroads. International Workshop on the Relations Between Egypt and the Near East in the Bronze Age, Czech Institute of Egyptology, Prague, 1–3 September 2010.

"Imported Vessels from the Near East in the Context of the Workmen's Settlement at Giza, ca. 2540–2510 BC." Institute of Archeology, University of Warsaw, 1–3 December 2010.

"Ceramics and Bakeries. The Function of Bakery Rooms from Area AA of the Workmen's Village at Giza." Poles at Nile: Archaeological Research in Egypt and Sudan 2010/2011, Institute of Archaeology, University of Warsaw, June 13–15, 2011.

AERA in North England

Three AERA team members brought the Lost City of the Pyramids to the North East Ancient Egypt Society on Saturday, November, 6, 2010, in Hexham, England.

Freya Sadarangani presented the background of the project, the site in its context, and our excavation methods in her talk on "The Excavation of a 4th Dynasty Settlement at Giza." James Taylor gave a virtual site tour in his presentation, "The Lost City in Detail—Summary of the Major Findings." Angus Graham, who helped organize the event, gave a presentation on "Geo-archaeology at Giza and its Broader Context."

Thank You to Our Contributors

AERA has been able to achieve all that we have described here in our annual report because of the generous contributions of our benefactors and members. Each and every tax-deductible donation supports AERA's archaeological excavations, the publication of our findings, and educational programs aimed at advancing knowledge about our common human heritage. We are extremely grateful to the following foundations, businesses, and individuals who generously supported our work.

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