

## GIZA

**Mark Lehner**

In the *1991–92 Annual Report* I communicated the discovery of two bakeries in our excavation of Area A to the south of the Sphinx. At the risk of augmenting an in-house reputation for being obsessed with ancient Egyptian bread pots, I offer an update on the bakeries of the Pyramid Age that we discovered at Giza. In September–October 1993 National Geographic provided the funds to go to Egypt and to recreate a bakery like those we discovered for experimental baking with ancient methods using emmer, barley, and wheat flour.

Our ancient bakeries were composed of low stone rubble and Nile clay walls with a marl floor in rooms measuring about five and a quarter meters (north to south) by two and a half meters (east to west). In both rooms we found a cache of bell-shaped ceramic pots, long recognized as bread molds in Egyptian archaeology and labeled with the name *bedja* in the Old Kingdom tomb scenes. The ancient Egyptians began to use bread molds of this type just about the time that the pharaonic state emerged around 2900 B.C. They continued to use them until near the end of the Old Kingdom, about 2200 B.C. While some have suggested that pot-baked bread was for special occasions—festivals, temple offerings, etc.—the Old Kingdom bread mold has been found as a major component of ceramic corpora in sites of all kinds from Egypt's traditional southern border at Elephantine to First Dynasty outposts in southern Palestine. Egyptians in many different settings desired and produced their pot baked bread.

Old Kingdom tomb scenes show the pots placed rim to rim as a kind of portable oven for baking in open pits. Our *bedja* pots were unusually large, as much as thirty-

five centimeters in diameter and up to thirty-five centimeters in depth. Put together in the manner of the tomb scenes they would create an interior space seventy centimeters in height. If the dough would swell to fill the entire space, this would produce a huge loaf of bread. Indeed, certain tomb scenes show offering bearers carrying huge conical bread loaves of the shape that would be produced by our pots. As I reported previously, we seem to have found all the essential tools required for the production processes depicted by Old Kingdom scenes and figurines: Both bakeries originally had three large ceramic vats in the northwestern corner, presumably for mixing dough. We further presume that a fireplace in the form of an open platform in the opposite southeastern corner was for stack heating the pots, a preliminary step often illustrated in figurines and wall art. Rows of holes at the bottom of a shallow trench along the eastern wall must have been for holding the dough-filled pots that were covered by another pot placed upside down. Hot coals and embers in the trench provided the heat that baked the bread.

The problem with this scenario is that there is little or no evidence that the ancient Egyptians of the Pyramid Age used bread wheat, *Triticum aestivum*, which is high in gluten, giving the elasticity that allows air pockets to expand during baking to give the crumb its lightness while producing a crispy crust. According to paleobotanical evidence recovered from our site and most ancient Egyptian sites prior to the Ptolemaic period, the Egyptian cereal grains were barley, which has no gluten, and emmer, which has a small amount of gluten. The volume of the bread molds indicates that this must have been a leavened bread, but even so, the lack of gluten would suggest that the large loaves formed in our bread molds would be so heavy as to be almost inedible, much less suitable for festive occasions.

Our problem may relate to a lexical as well as an archaeological issue. Every beginning Egyptologist learns the term *it* for barley, *bdt* for emmer, and *zwt* for “wheat.” What are the relationships between the ancient Egyptian and modern scientific categories for grain products? Simply, what is *zwt*? It is possible that, as in certain Mesopotamian agricultural records, bread wheat was only a small percentage of total grain crops, (used, perhaps, as a kind of starter dough?), and that it is less visible in the archaeological record.

With some of these questions in mind we took advantage of Dr. Edward Wood’s volunteer services. Ed is a pathologist who has built a business, Sourdoughs International, from his interest in one of the worlds oldest cultigens, yeast. The authors of *World Sour Dough Breads of Antiquity*, Ed and his wife Jeane curate a collection of wild and domesticated varieties of yeast that they have “captured” from places as diverse as China, Saudi Arabia, and a bakery in modern downtown Giza. Ed, who contacted me shortly after we found the bakeries in 1991, was intrigued by the possibility—granted remote—that yeast spores from the Pyramid Age could be reactivated the way scientists have revived beer yeast from an early nineteenth century shipwreck. We were both interested in understanding more about Old Kingdom baking. Ed brought to Egypt a supply of both emmer and barley flour that he had irradiated to kill any lingering modern yeast. With a dish of flour and water, Ed successfully enticed and captured wild yeast from the balcony of his room in the Mena House Hotel at the foot of the Great Pyramid (he thought the yeast might have been lurking nearby in date palms).

Our experiment was limited by the schedule of the National Geographic team who were investigating a story on Egypt’s Old Kingdom. While certain controls were enforced, we did not have the time required for more than a few repetitions

and modifications of the experiment. We were trying to replicate in the space of two weeks a process that the Egyptians had used for over four hundred years!

Our site was on private land some distance from the foot of the Saqqara Plateau. The top of the Djoser Step Pyramid looked like an upside down bread pot rising over the horizon. I kept our map of the ancient Giza bakeries close at hand as a template. We had gathered sand, mud, water, and broken limestone. It was a bit surprising to see that it took the team—two men with donkeys, five laborers, and two professional builders—about two and a half hours to build the low walls of one bakery. We had spent weeks compulsively mapping walls of the same size and composition. We built a high-fidelity copy, including the contours of the floor, the vat emplacements, the open fireplace, and a canopy supported by posts that corresponded with post holes in the original.

Meanwhile we had to equip ourselves with a set of pots that matched the Old Kingdom bread mold, as well as large vats similar to those we found in situ. We purchased ready-made vats from the pottery market in Old Cairo. These were approximately the same size, but slightly different in form, as the ancient variety. We wanted to be closer to prototype in the bread molds, and for this we went to a potter in the neighborhood called Batn el-Baqara, “Belly of the Cow,” where cement, lime, and ceramics are produced. Our potter usually produces wheel-turned vessels of finely levigated clay, whereas bread molds were handmade, probably around a conical form, from clay that was heavily tempered with chaff and sand. As it turned out, the thirty odd pots in our consignment did not match the bread mold in thickness of the walls, porosity of the clay, or exterior profile. Chris Sloan, Art Director for National Geographic, imported both clay and chaff to his room in Mena House where his window sill became a work bench for manufacturing sample ceramic fabrics, models of bread molds and one complete bread mold, much to the shock of those who cleaned his room!

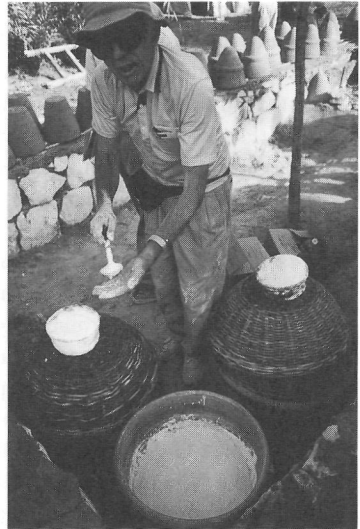
It was very insightful to see the full complement of vats and bread pots laid out along the low walls or set within the space of the bakery. The low walls all around must have served as “counterspace” for keeping the empty pots and finished bread. Ed Wood’s requirements for sourdough gave rise to other insights. It was clear, for example, that we needed separate containers for water, flour, and ferment (fig. 1)—perhaps the reason for the three vats in the northwestern corner (fig. 2). A separate vat, of which there was evidence along the western wall of one of our bakeries, was probably for mixing these ingredients. Even the design deficiencies of our bread pots provided insights, for example, the sharp inflections of the exterior walls of the pots are important for the ancient practice



**Figure 1. Ancient bakery A7d with cache of bread molds and three vats in the northwestern corner**

of stacking about a dozen pots over an open fire in order to preheat them. We believe we may have resolved the question of why the ancient bakers needed to stack-heat the pots over an open fire. The high porosity and thickness of the walls of the ancient pots provided a significant control of ambient heat to prevent scorching the crust before the crumb is baked through. We may have shed new light on the reason for making bread in large pots as opposed to simply slapping dough against a hot surface to make flat bread.

The elucidation of these and other mysteries of the Egyptian bread pot must await a fuller discussion. In the end we did produce edible bread from various combinations of barley and emmer, albeit a bit too sour even for most sourdough tastes (the sourness is easily remedied). While much of the data is anecdotal, the insights are useful for interpreting our ancient bakeries. We have some clues as to why this kind of production was so common in Old Kingdom Egypt. The exercise reinforced an awareness that specific attributes of specific artifacts are not trivial. Rather they are the keys to artifact function, the knowledge of which contributes to understanding the structures of everyday life that are the fabric of any society and economy.



*Figure 2. Ed Wood tests his sourdough culture in middle vat of reconstructed bakery. The two flanking vats contained flour and water*

### **Field Season 1994–95**

Our next field season is scheduled for December 1994 through February 1995. We will return to the site of the bakeries with a more complete understanding of how they functioned. We will hopefully not find more bakeries. Given some indication that every large household and institution in ancient Egypt could have granaries, bakeries, breweries, and other industries attached in a modular fashion, it may be that the real story of this site is to be gleaned from the large mudbrick building that is, perhaps, the hub of the institution to which the bakeries are attached. This will be the focus of our excavations in area A7 as we also will continue to investigate our other excavation areas to the south of the Sphinx.

### **Digitizing the Nile Valley Floor**

The analysis of the archaeological data from the AMBRIC/Cairo Waste Water Project by our colleagues, Zahi Hawass and Michael Jones, is crucial to the assessment of our excavations at Giza. Widespread remains of ancient settlement under the modern town along the entire length of the Giza Plateau are indicated. During a trip to Egypt in early May 1994 to begin to prepare for next year's field season, I had the opportunity to see the large limestone and basalt wall that was discovered this year by modern construction activity about five hundred meters to the east of the location of the Khufu Valley Temple. The location and orientation of the wall must be added to the evidence for areas of settlement, harbors, canals that fed the Giza Necropolis, and the possibility of a Nile channel that ran close to the Giza Plateau. Some of these large features may have left traces in the current

topography of the valley floor near Giza, even though we now know that there has been two to four meters of alluvial aggradation since the Pyramid Age. We can learn something about the structure of the settlement along the base of the Giza Plateau by relating these contours to the locations of the pyramid complexes, to features like the wall, and to evidence from the waste water project and our own excavations to the south of the Sphinx.

Because of these interests, we began at the Oriental Institute Computer Laboratory to digitize the contours of the valley floor in the 1:5,000 map series of the greater Cairo area, an invaluable data set that includes one meter contour intervals for the sites of most of the Old Kingdom pyramids. We have made the data set available to the projects working within the area we have so far covered. The composite map and three-dimensional imaging that we have produced, after digitizing the contours on each large map sheet, can be used for the analysis and illustration of the ancient river courses. The Egypt Exploration Society, under Harry Smith, Lisa Giddy, and David Jefferies, has begun to relate the eastward migration of the Nile to the settlement patterns in the area between the Saqqara Plateau and the ruins of ancient Memphis at Metrihina. Combined with the results of the AMBRIC data at Giza, the emerging picture of the Nile during the Old Kingdom, as Jefferies pointed out to me, is important for understanding the locations of pyramid complexes in terms of proximity to desert edge lakes and residual river channels that the pyramid builders may have used for access to the pyramid harbors. This reconstruction is likewise important for our knowledge of settlement patterns in the northern "capital zone" over the entire course of Egyptian history.

### **Acknowledgments**

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