

THE HISTORY OF THE EGYPTIAN PYRAMIDS

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Many of us have visited the famous pyramids of Giza and were stunned by their size and age. Nevertheless the beautiful and, to some, mystical Sphinx equally draws special attention. Despite enormous research efforts over time, archaeologists from all over the world have not yet been able to piece together the technical details how these huge pyramids were built. The question also remains for what reason the ancient pharaoh's ordered to create the eye catching Sphinx.

With this article we hope to shed more light on the history of the pyramids of the Old Kingdom created 4,500 years ago. And for those who have been to Giza, we hope to recollect and visualize their fond Egyptian memories.

Historic Overview

The first pyramids were built in the Old Kingdom period during the time of the 3rd dynasty, which lasted for 75 years until 2,561BC. This was about 600 years after the first recorded era of Egyptian history - the Pre-dynastic Period. The Old Kingdom consisted of 12 dynasties and lasted for about 1,500 years and had over 100 kings, some of which only ruled for a short period of time. Only from the 18th dynasty about 1,500BC the Egyptian kings were called pharaohs. During that time the Lower and Upper Egypt kingdoms were not always combined and had different rulers, but during the 3rd to 6th dynasty, and again during the 12th dynasty, these kingdoms were united and ruled from Lower Egypt.

It has to be said that today there are still various archaeological calendars quoting different years of reign to the numerous early kings and later pharaohs. We have chosen the first established detailed list of ancient Egyptian rulers created by German Egyptologist Juergen von Beckerrath. The 13th dynasty lasted for 150 years until 1,648BC and had about 50 kings. The 14th dynasty consisted of various smaller kingdoms in the Nile delta. It is worth noting that no pyramids were built thereafter. The rulers of the New Kingdom resorted to a different burial philosophy and chose rock tombs to protect them both from grave robbers and also building material thieves, which they have seen during their lifetime already happening to the pyramids built close to 2,000 years earlier.



The First Pyramid

The first pyramid prototype was built by Imhotep for King Djoser at Saqqara 40km south of Cairo, close by the Nile River. At that time it was usual that the king's eldest son built his father's pyramid. This first structure was built in three phases as a stepped pyramid with six platforms.

Before that rulers were interred in underground shafts with a small burial chamber. This shaft was covered by an unfired mud brick building with various rooms, called mastaba. In the second phase this structure was superimposed by three bigger mastabas. In the third phase two further steps were added, creating a 60m high pyramid with six stepped layers and a ground level length of 125m.

With this first pyramid, the philosophical and religious concept of ruler burials had changed. Pyramids became the symbol of the king's divinity, afterlife survival and his celestial power after death. The series of steps symbolized a stairway to heaven and down again for future afterlife visits. This concept of heavenly ascent was confirmed in various pyramid texts found, as well in some carved invocations. Unfortunately the actual burial rituals performed at the time are not yet known in detail.

King Djoser introduced with this pyramid two important architectural and religious changes. First, the construction of a funerary temple to practice the cult of the divine king and secondly the so-called "serdad" room with a statue

of the deceased king inside, connected to the outside world via small hole in the wall.

In total four stepped pyramids were built in 3rd dynasty. The last mid-sized pyramid for King Huni was the first to be converted to a straight line true pyramid.

Pyramid Refinement

The pyramid architecture was perfected by King Snofru during 4th dynasty, who was in power for 35 years until 2,604BC. Having been inspired by his predecessor's deeds, he seemed to be determined to refine the pyramid layout and had three pyramids built, two at Dahshur and one at Meidum.

His first attempt, the so-called Obelisk Pyramid, was topped by a massive obelisk. The second pyramid, the so-called Bent Pyramid, was started with a too aggressive angle of 54 degrees and had to be decreased by 11 degrees half way up to release structural pressure. After 15 years of construction this pyramid was left unfinished.

During those times the pyramids took on their final form as expression and importance of the king's solar cult. Therefore new annexes were added, including satellite pyramids for their queens, enlarged funerary

temples in front of the pyramid with processional ramps connected to the valley temple. Those valley temples also had ship landings, which were connected by a specially built canal to the Nile to transport the huge amount of building blocks originating from the Aswan quarries.

By 2,500BC the typical pyramid architecture, burial complex layout and construction techniques were so refined, that Egyptian architects felt ready for the next step, the mega pyramid raising up to 150m above ground, representing for over 4,000 years the biggest single structures built on earth.

Pyramid Layout

Everything in ancient Egypt had a meaning and cultural significance. The three different axes of a pyramid each had a specific reason. The vertical axis, as link between earth and heaven, represented the king's ascension and connection to the gods. The polar axis from north to south running parallel to the Nile, demonstrated the unity of the Lower and Upper Kingdoms, and symbolized the governing tasks of the ruler. The celestial axis from east to west represented sun rise and sun set, symbolizing daily life and future resurrection.

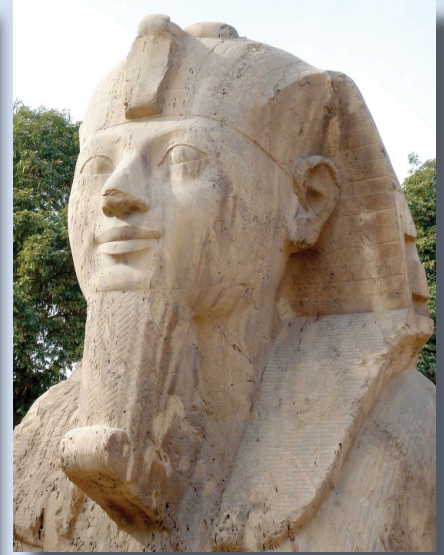
The entrance to the burial chambers was always situated on the north side. At first these burial chambers were carved into the underground bedrock, only later burial chambers became part of the core pyramid body with hidden entrances lying ten to twenty meters above ground.

They contained the king's sarcophagus, which was always facing west towards sun set.

The sarcophagus



First pyramid erected as step pyramid with mud bricks for King Djoser 4,700 years ago



were often placed into the burial chamber during the pyramid's construction, as it was too large to pass through the small corridors left to place the king's embalmed mummy.

The first step pyramids had no valley temple and processional ramp, but instead they had on their south side a tomb for the king's four viscera urns containing the inner organs, such as lung, liver, stomach and other intestines. Each of these jars was protected by a specific god - god Anset for example was depicted as human, god Hapi as ape, god Kebechsenuef as falcon and god Duamutef as jackal. These tombs might also have been used as *cenotaph*, representing a symbolic burial place for cult ceremonies. Later the south tombs developed into the satellite pyramid on the southeast side, which some times were also used for queens.

Funerary Temples

Funerary temples were situated always on the east side of the pyramid and had developed from

small offering chapels to huge richly decorated temples for the important annual ceremonies. They had many rooms with walls covered with detailed colored bas relief and colorful paintings and adorned by statues of the deceased and his family. Besides serving as a ship landing for building material, valley temples are assumed to be used for the embalming process of the king's body.

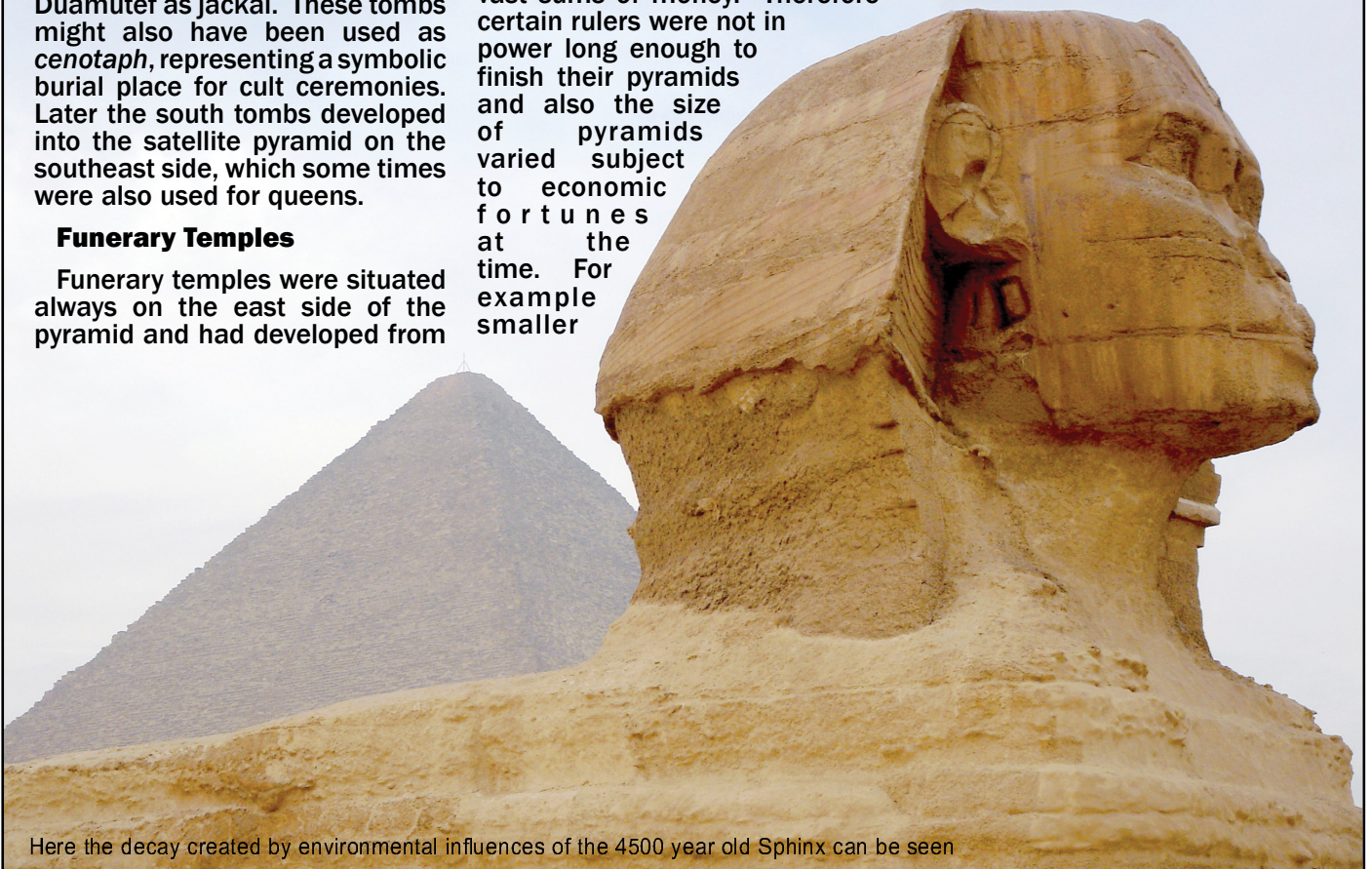
Later Pyramids

The building of large pyramids took a lot of time, consumed enormous resources including vast sums of money. Therefore certain rulers were not in power long enough to finish their pyramids and also the size of pyramids varied subject to economic fortunes at the time. For example smaller

pyramids were built during the 5th dynasty with lesser detail, lower quality materials, which was certainly a sign of decline in political power and a weakened economy.

To this time pyramids did not contain any texts on walls in the burial chambers. The so-called pyramid texts only started to appear on walls of funerary chambers as innovation with King Unas the last ruler of the 5th dynasty.

A further change happened in the 6th dynasty, when architects started to use unfired bricks to



Here the decay created by environmental influences of the 4500 year old Sphinx can be seen

build pyramids, and as outer layer used quality limestone slabs for the necessary neat look. Also the size of pyramids increased again during the 6th dynasty, but they did not match the Giza pyramids with their heights of close to 150m.

With brick built pyramids, funeral chambers became more complex and the size of funerary temple increased as well. The last big pyramids were built by King Amenemhet III at Hawara during the 12th dynasty. Only few smaller pyramids were constructed during the 13th dynasty and thereafter only the Nubian rulers constructed a huge number of very small pyramids in Sudan, which can not be compared to the Egyptian genius architects accomplishments.

How were pyramids built?

Despite all the research done so far, we do not know yet how ancient Egyptians achieved to built these huge pyramids. Still today there are various theories on the technical process of pyramid construction. Were the ancient Egyptian master builders using huge frontal mud brick ramps to transport the millions of two and a half ton heavy solid limestone blocks? Or were they using zigzag type side or encircling ramps?

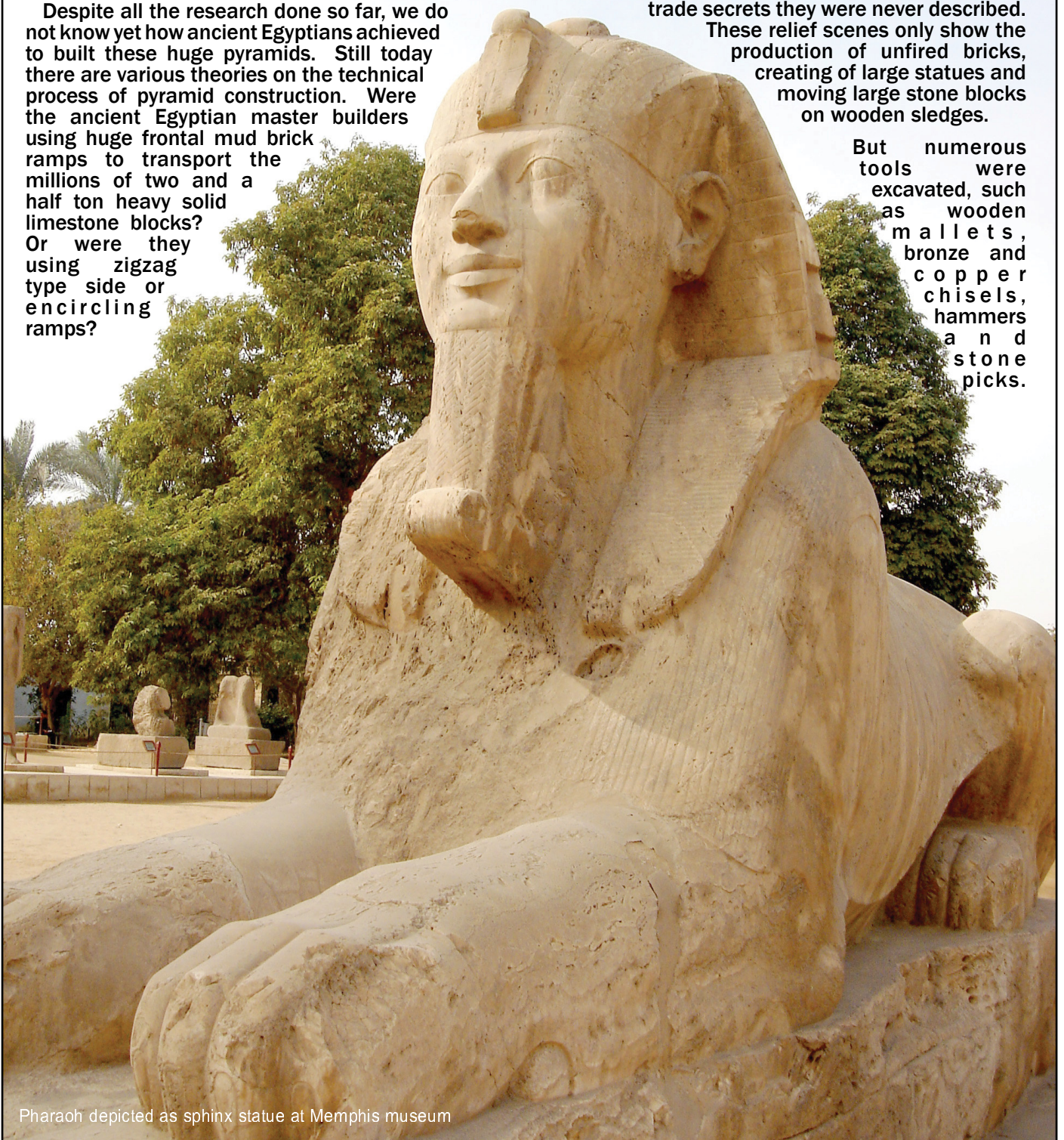
Herodotus an ancient Greek writer mentioned that they used machines but without giving further details of them. Were these probably lifting devices to hoist the massive stone blocks? Or were they moveable wooden side ramps possibly used to move these blocks from one level to next? Many of these and other questions still remain. The use of huge frontal ramps are questionable, as the large volume of material necessary would need to have been removed after completion of the pyramid. Such material dumps were ever found.

Unfortunately the building process of pyramids was never depicted on any of the many reliefs or painting covering the walls of funerary temples and mastabas, which contained all possible scenes of daily life, except building of pyramids. It was possibly a too sacred act to show, or for fear to share these

trade secrets they were never described.

These relief scenes only show the production of unfired bricks, creating of large statues and moving large stone blocks on wooden sledges.

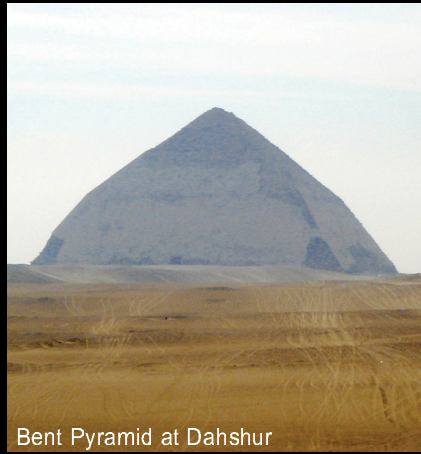
But numerous tools were excavated, such as wooden mallets, bronze and copper chisels, hammers and stone picks.



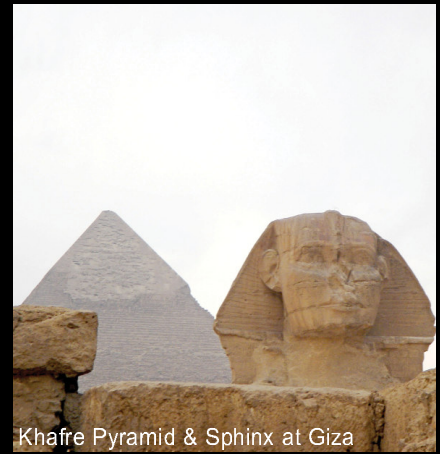
Pharaoh depicted as sphinx statue at Memphis museum



Menkaure Pyramid at Giza



Bent Pyramid at Dahshur



Khafre Pyramid & Sphinx at Giza

Ancient master builders used a special ruler called the *cubit*, which was divided into seven *palms* and four *fingers*, 7.5cm and respectively 1.9cm long, so a *cubit* measured 0.524m.

Experts have calculated that the biggest pyramid in Giza, that of King Khufu, better known by his Greek name Cheops, needed possibly 20 years to build plus 10 years for ground preparation and construction of the canal and port landing plus ramp. Various ancient and modern sources differ in their judgment on labor resources needed for this, so these assumptions vary from a 100,000 to 15,000 workforce. One modern expert calculation concludes that 30,000 workers could put 180 blocks per hour in place. And 18 workers could drag these 2.5 ton blocks 18m per minute up the ramp, which had an average length of 500-1,000m.

Interestingly no slaves were used, but skilled artisans and stone masons plus compulsory peasant workers during the Nile flood season, when farming was impossible. Workers were organized in so-called *phyles*, gangs of four groups, each with

supervisors and specific gang names. Workers received food three times daily, and every 10 working days they got one day off.

For the Giza pyramids we know that the limestone came from the nearby Tura quarries situated in Cairo today's Maadi and Helwan suburbs. The granite slabs for burial chamber ceilings and walls came from the Aswan quarry on the other Nile side. These slabs also covered the lower parts of the smaller pyramid of King Menkaure in Giza, as still can be seen today.

Mastabas – Royal Court Tombs

The first mastabas had the entrance to the underground burial chamber via the roof and had no doors to the offering rooms. Later doors were introduced and the entrance to burial chamber was via the ground floor offering rooms. These rooms included an offering chapel for ceremonies and sealed room with deceased statue and various store rooms for furniture and other items believed to be necessary for the after death life.

The mastabas of the 1st & 2nd dynasty were built with unfired bricks and were situated mainly

at Saqqara south of Cairo and at Abydos in Upper Egypt. The typical mastaba size measured 40-60m in length and were approximately 20m wide.

In the 1st dynasty mastabas were built with a palace like wall facade, but 2nd dynasty mastabas were erected with plain walls. Mastabas were also used for high ranking officials, other than royal family and members of the royal court. The inner walls were decorated with elaborate polychrome bas reliefs depicting daily life scenes of the deceased life and family history.

The famous Mereruka mastaba at Saqqara had 32 rooms and was the largest mastaba with over 1,000m² of detailed bas relief covered walls. From the 4th dynasty mastabas only had one underground burial chamber, but multiple ground floor rooms with false door stela of deceased facing west behind an altar in the main room for the important ceremonial meals.

In Giza a necropolis next to pyramids was found with over 300 private mastabas. For highly ranked civil servants it was a great honor to be buried close to the deceased king.



Typical mastaba relief scenes of day-to-day life



Mastaba relief scenes of sacrifice goods delivery

The Most Telling Stories – Bas Relief Scenes

The immense number of polychrome bas relief covered mastaba walls offer the only, but very rich, information source of ancient Egyptian daily life. They depict in detail many agricultural, working, hunting and fishing scenes. The agricultural scenes show various activities, such as: sowing, plowing, harvesting, wine and beer making, food preparation and slaughtering. They are also depicting many food items in the process, such as: corn bushels, barley bread, huge jars, various fruits, grape bunches and dates.

Egyptians only had three seasons, *Shemu* represented the summer, *Peret* the winter and *Akhet* the Nile inundation season. When it came to work, the bas relief scenes included the making unfired bricks, sculpturing of statues, transporting of huge statues and boat construction. In addition many religious scenes were shown such as burial processions, funeral banquets, worshipping, offerings and sacrifices. But social entertainment was not left out with games, concerts, dancing, musicians playing a harp and flute.

In all these scenes animals were always involved including some rare ones. So these reliefs also showed royal lions, even hyenas which were held as pets in ancient Egypt, desert oryx, baboons, bulls were worshiped as holy animals, and all the domesticated animals as well, cattle, swine, goats, sheep, dogs, birds, geese and many kinds of fish. All this can be seen in some of the

pictures accompanying this article.

Embalming Process

Similarly to the construction of a pyramid, the embalming process was not described in detail, possibly because it was an act too holy and represented such specific and secret know how to be described in writing. The embalming process was a long and tedious process, or better highly detailed ritual performed by highly skilled priests, which took over one month. Before that bodies were buried simply wrapped in animal skin or a papyrus woven mat in the desert sand. The environmental conditions with heat and dry climate quickly extracted all fluids and the body was fully dehydrated.

In Egyptian belief the body had to be conserved to be able to enter after life and from existing animal meat conservation techniques it was also known that organs had to be removed to prevent decomposing. In the Old Kingdom mummification was not yet perfected.

Only bones and some tissue survived in otherwise well preserved linen embalmment, as body organs were not yet removed. The body of the king was washed in the so-called purification tent or *ibw* and the embalming took place in the so-called house of regeneration or *per nefer*. This process alone took 15 days.

During the Middle Kingdom the next step of embalming was achieved with the removal of the brain, but this was only done for royal family members at the time. In the New Kingdom the embalming process was perfected with the removal of all organs. The result was perfectly conserved bodies with complete

skin and muscle tissue surviving in mummy bundles for over 3,500 years until today.

Other details were mentioned in some ancient sources about the embalming process. Bodies were treated with natron salt to extract all body fluids. Different to some reports it was recently confirmed that this was done with huge amounts of pure salt and not using natron based liquids. This process took between 35-40 days. The heart had to remain in the body, but was often taken out and treated for future conversation and enrolled in linen and then placed back. Some times it was replaced by a holy Skarabaeus beetle representing the heart.

After the organs were removed the empty spaces were filled up with linen or saw dust, seldom with mud from the Nile. The cut performed for this purpose was closed with linen, a wax plate, or for kings a gold plate was used.

Mummy masks depicting the deceased were already used in the Old Kingdom.

Some 37 linen rolled layers were used to enroll all body parts separately with each finger and even faces were especially modeled to look like the deceased. In addition various protective amulets were enrolled in the linen layers using a total of 4,800m of linen bands. Finally the outer linen enrollment was modeled to imitate the deceased clothing.

Important Rituals and Beliefs

It is important to understand that in Egyptian beliefs the building of pyramids represented a highly religious duty and was seen as a unifying belief in the king, who was the key supplier of food for the living worshipping him during his rein and after his death. The king was a guarantor of resurrection and life after death. Therefore this



The two largest pyramids built for Khafre & Khufu at Giza



Early, so-called Pyramid Text at Unas Pyramid in Saqqara.

strong belief in life after death and the daily offerings to the deceased king supplied the surviving court. As new kings created their own royal court with new civil servants and new farms and temples to supply them and prepare for eternity.

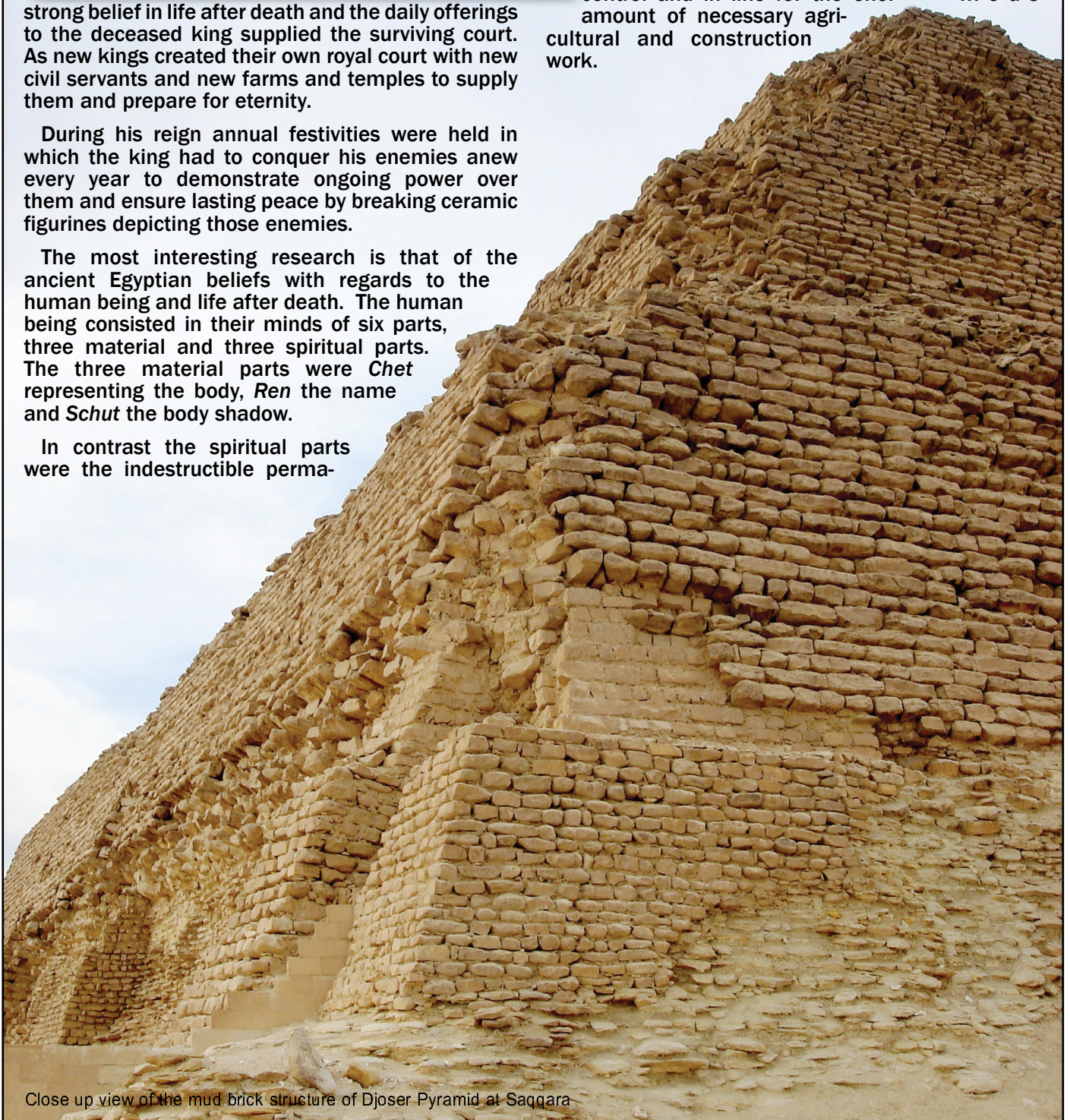
During his reign annual festivities were held in which the king had to conquer his enemies anew every year to demonstrate ongoing power over them and ensure lasting peace by breaking ceramic figurines depicting those enemies.

The most interesting research is that of the ancient Egyptian beliefs with regards to the human being and life after death. The human being consisted in their minds of six parts, three material and three spiritual parts. The three material parts were *Chet* representing the body, *Ren* the name and *Schut* the body shadow.

In contrast the spiritual parts were the indestructible perma-

nent life called *Ka*, the heart and personality called *Ba*, and *Ach* the soul. With birth the creator god Chnum created a duplicate body, and after death the *Ka* could freely move between the burial chamber and offering chapel to supply the deceased with food. The *Ba* leaves the body at death, depicted as bird with human head, and could change its form and move around, but always returned to the grave at sun set.

The *Ach* as soul or ghost of the deceased was depicted as a crowned ibis. In Egyptian belief the deceased had to come in front of a death penal of god Osiris, and his heart had to report all his deeds in life. Therefore all Egyptians aimed at an unquestionable life style not to fail the test. A perfect way to keep the two million population and subordinates at the time under control and in line for the enormous amount of necessary agricultural and construction work.



Close up view of the mud brick structure of Djoser Pyramid at Saqqara