Builders of the Pyramids

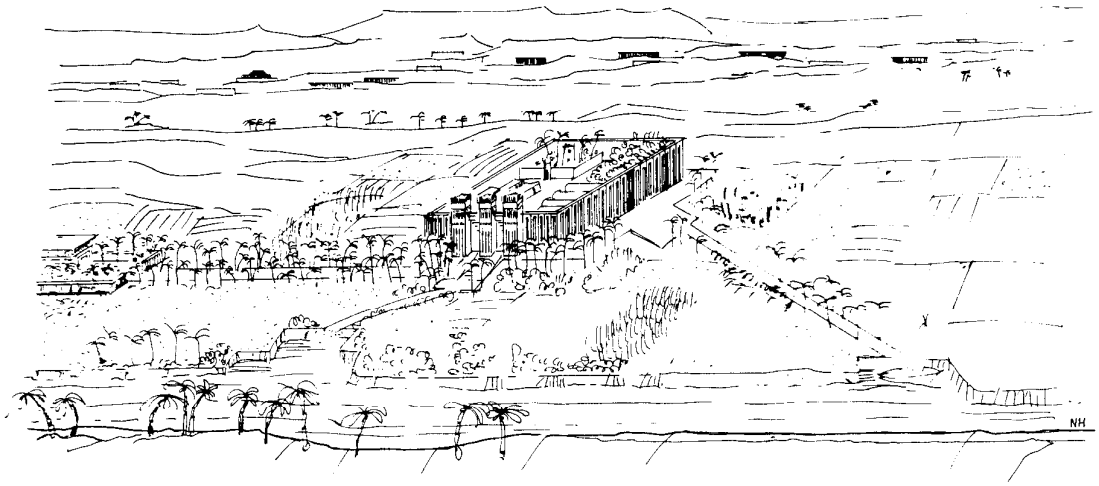
RAINER STADELMANN

THE REIGN of King Neterikhet Djoser (Zoser), at the beginning of the Third Dynasty (circa 2650 BCE), was a watershed in Egyptian history, the beginning of a magnificent and creative period that seems to emerge abruptly from the darkness of Early Dynastic times. The Egyptians acknowledged this fact, despite their conception of the world, which characterized history as a regular and perpetually recurring cycle. In the Turin Papyrus of the early Nineteenth Dynasty, one of the few documents from ancient Egypt that was intentionally written as a history, Djoser's name alone is written in red. He was thus exalted as the actual founder of the Egyptian state even above Menes (possibly the same as Aha), the traditional first monarch and unifier of the country. (See "Unification and Urbanization of Ancient Egypt" earlier in this volume.)

It is remarkable that the exaltation and veneration of Djoser were not based on outstanding military achievements, or on his having pacified the country; rather, he was honored as the originator of building in stone, a fame he shared with Imhotep, who was his master builder and possibly his son. Yet the discovery of stone as a durable construction material, and even the invention of monumental architecture, would probably not have sufficed to account for Djoser's unique position. These developments went hand in hand with the evolution of architectural forms and their symbolism. Djoser's monumental burial complex in the form of a step pyramid, surrounded by stone chapels, cult structures, and spaces for the hereafter, mirrored Egypt in durable material for all eternity. The pyramid in its center is at once both a tomb and a royal palace for the hereafter. But it also models Egyptian society, with the king and court at the top, and beneath them progressively increasing numbers of royal functionaries, the administration, the artisans, and the rural populace at the base. In the stone structures and courtyards around the pyramid, the king was to celebrate for all eternity that which was considered to be his prime task in the here and now, namely, the maintenance through the cult of the order that the gods had established.

ORIGINS

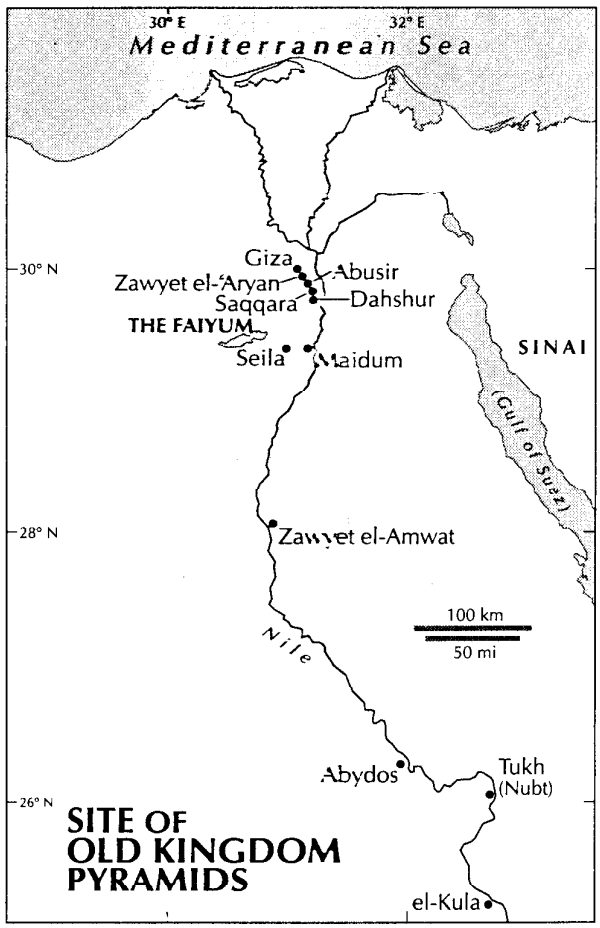
This remarkable transformation of a vision of the state into architecture did not emerge from nowhere. By the time of Djoser, Egypt had been united for almost five hundred years. The nominal unification of the kingdom under Menes through the foundation of the royal citadel called "White Walls Fortress" (later Memphis, modern Mit Rahina) and the inauguration of the state necropolis of Saqqara on the escarpment above the royal citadel lay at least three hundred years in the past. Unification had involved fusing the ancient nomadic conceptions of the ruling clans of Upper Egypt with those of the peasant, or perhaps already urban, people of the Delta. The Upper Egyptian conquerors secured the victory of the idea of an all-encompassing territorial state over the constantly recurring



The Nile Valley near Memphis as viewed from the east, showing the palace and the necropolis of the First Dynasty. DRAWING BY N. HAMPIKIAN; COURTESY OF RAINER STADELMANN

tendency toward separatism. The city-states of Lower Egypt contributed a more developed culture, knowledge of writing, and cultural and trade links with Syro-Palestine. These divergent traditions were incorporated, and thus preserved, in forms of funerary architecture that were deeply influenced by the landscape and by physical conditions. Because of its extraordinary state of preservation, its significance, and the insights it provides into the Egyptians' image of their state and their society, this architecture constitutes the principal source for the history and understanding of the Old Kingdom.

In the narrow river valley of Upper Egypt, most graves were sited on the low desert slopes of the valley, where they were not threatened by the annual inundation. They were originally shallow pits marked by a mound of sand that hardly rose above the desert surface. At the beginning of the First Dynasty, under Aha/Menes at Abydos, the homeland of the ruling family, this simple grave type was deepened and expanded for the graves of the highborn. At first, two further brick-lined chambers were set beside the central burial chamber. Later builders boldly created a single wide and deep chamber, also lined with brick, which contained a wooden chamber intended as a shrine for the king's burial. The chamber may have contained a statue instead, if the Abydos tombs were in fact cenotaphs. These tombs were covered only by a



very low mound of sand that would scarcely have been noticeable in the undulating desert. Each tomb was, however, related to a monumental niche paneled enclosure for the cult near the edge of the valley.

The early tombs of the ruling elite in the city-states of Lower Egypt have either not been found or were lost in the sandy ridges (turtle-backs) of the Delta, which have all been subsequently leveled. It would have been senseless to dig deep pit-tombs in a region so regularly flooded by the Nile. Perhaps under the influence of Syro-Palestine, there developed a type of aboveground house-tomb with niche-paneled outer walls. Admittedly, this tomb type is first identifiable in the great niched mastabas of the First Dynasty at Saqqara, which begin suddenly in the reign of Aha, and in the contemporary tomb of a prince at Naqada (ancient Nubet). They are well-developed burial structures of the Lower Egyptian house-tomb type; they have massive superstructures with uniformly thick walls and measure up to 164 feet (50 meters, 100 ancient Egyptian cubits) long, 49–66 feet (15–20 meters, 30–40 cubits) wide, and over 16 feet (5 meters, 10 cubits) high. Their whitewashed, niche-paneled facades above the escarpment at Saqqara would have impressed the people in the citadel and residence of the White Walls as magnificent representations of royal power and presence. It is therefore likely that these awe-inspiring structures were the Lower Egyptian house-tombs of the Lords of the Two Lands, as the rulers of Egypt were known.

THE COMPLEX OF DJOSER

It was Djoser who boldly abolished this territorial distinction between Upper Egyptian royal tombs (and cenotaphs) at Abydos and Lower Egyptian house-tombs. He combined them harmoniously in a single enclosure and tomb that brought together differing forms, respecting both landscape and tradition. In architectural terms, he reversed—no doubt unconsciously—the evolution of the great mastabas. The latter derived from enclosures that were filled in and walled up, so that the enclosure walls became the outside walls. Djoser's complex separated this solid enclosure into its component parts. The facade was once again a niche-paneled enclosure wall. The inner mound became the towering step-pyramid tomb. The solid courtyards became broad open courts, and the small offering chamber became a funerary temple. The complex's grandiose scale and the replacement of brick by stone construction produced the world's first monumental architecture.

Although contemporary sources tell us little about Djoser—his buildings, statues, and images in reliefs are the only reliable witnesses to him—we may be certain he himself provided the stimulus for this new image of the king in this world and the next, with the support of his master builder Imhotep. Recent detailed architectural studies have shown that the tomb complex was not initially planned on such a colossal scale, but rather grew over two or more decades and underwent several phases of construction and changes of plan. The enclosure was originally designed to be only half its final size, though even at this stage the principal elements of the complex had already been established: the niche-paneled stone enclosure wall, the royal tomb with the funerary temple on its north side, the south tomb by the south enclosure wall, the large court for the cult between the two tombs, and the small festival court in the eastern part. The superstructure of the king's tomb was surely planned from the beginning to be a mastaba with three steps. Both tombs were oriented east–west, so that the large court was demarcated on its north and south sides by two large, high buildings.

Only in the second building phase, after the three-step mastaba and the tomb substructure had been completed, was the superstructure enlarged into a six-step pyramid. Progress in building techniques can be seen in the transition from the first to the second phase. The step mastaba was built with relatively small, easily handled stone blocks, scarcely larger than bricks, laid in horizontal courses. The step pyramid was planned at first to be higher, but not much larger in area, than the completed step mastaba. When this phase began, large blocks could be maneuvered. There had been amazing advances in construction techniques, including labor-saving ones, notably building in inclined planes, with the outer layer sloping about 18°–20° inward,

producing an external inclination of 70°–72°. This saved much work in preparing the facing blocks and facilitated maintaining the angle of slope.

Through the expansion of the step mastaba into the step pyramid, the royal tomb came to dominate the complex, whereas the south tomb retained its form of an elongated mastaba, oriented east–west, only a little higher than the southern enclosure wall. The presence of two tombs with largely identical substructures has provoked much discussion. The fact that this dualism continued in the southern pyramids of later pyramid complexes does not simplify the problem. Both tomb chambers, located at the bottom of shafts 92 feet (28 meters) deep, were constructed of large granite blocks, but only the northern chamber is big enough to have been used for a burial.

On rediscovery in the 1920s, the southern chamber proved to be empty and showed no signs of any interment, whereas in the nineteenth century the top of Djoser's gilded cranium and other human remains were discovered in the north tomb. The granite chamber was reached through round openings in the top; these were sealed by granite plugs weighing several tons, which must previously have been suspended in the antechamber above. It is noteworthy that the empty chamber of the south tomb was protected in the same way as the north chamber, in which the king was buried. Whatever it contained—most probably a gilded portable wooden statue—the dummy south tomb was accorded the same cultic significance as its counterpart. This fact supports the view that it symbolized the Upper Egyptian royal tomb, which had perhaps already for generations been a cenotaph at Abydos.

Around the burial apartments of the north tomb, and to a lesser extent around the south tomb, run complexes of subterranean galleries for the storage of immense quantities of provisions for the hereafter. A further complex of galleries branches to the east side of the burial shafts located under the pyramid and in the south tomb, forming a right-angled enclosure around an outcrop of rock. The gallery walls were decorated with blue-green faience tiles imitating the pattern of wall matting and hinting at vaulted halls. These are an otherworldly transposition of a royal palace with its rush-mat-hung corridors and rooms. Fine reliefs on the west wall of the eastern corridor of the east galleries show the king leaving his palace in the hereafter in order to ascend to the land of the living, make sacrifices, and perform the cult in the festival court and the chapels, thus accomplishing the essential tasks of an Egyptian king in both this world and the next.

In the first phase of construction, Djoser provided burials for the closest members of his family within his monument. On the east side of the step mastaba were excavated eleven shafts 98 feet (30 meters) deep, leading to the east galleries already mentioned. This is a striking, perhaps unique feature in the architecture of royal tombs, which otherwise—whether pyramidal or rock-cut—provided only for the burial and preservation of the king's mummy. Queens and princes were generally buried outside the pyramid complex proper. Djoser's provision for his two queens beneath his tomb suggests that he owed his legitimacy to his marriages with the princesses Hetephernebty and Inetkaues (Intkaes). Both are also mentioned with him on the numerous boundary stelae dedicated to the necropolis god, Anubis, which defined the funerary enclosure at the beginning of the work. This treatment is unique as well.

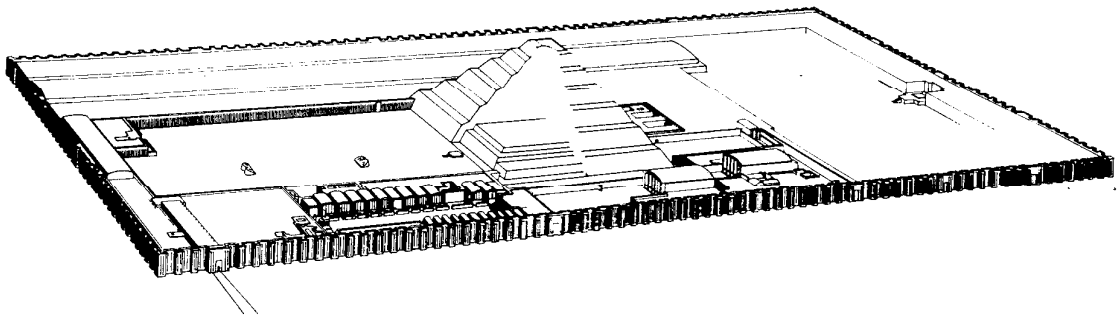
Djoser appears later to have changed his plan to bury the royal family with himself. Only in the five northernmost galleries were the walls paneled with wood or stone. Several complete and fragmentary alabaster sarcophagi were found, but no remains of burials were discovered, except for that of a child. The other six galleries were later filled with the staggering number of about forty thousand stone vases of all types and materials, including numerous vessels bearing the names of kings of the First and Second dynasties. It is difficult to say why Djoser assembled such enormous amounts of costly vessels and where he obtained them. Perhaps they were collected from the plundered tombs of his predecessors. Alternatively, he could have gathered unused wares from royal workshops, or they may have been festival deliveries from the estates of his predecessors, sent from all over the country to mark the completion of his unique

tomb. If so, they would show that Djoser's epoch-making significance was recognized in his own time.

The extension of the step mastaba into a six-step pyramid some 205 feet (62.5 meters) high not only changed the proportions of the complex but also affected the existing structures. The increase in the area of the pyramid involved building over the small funerary temple and the entrance to the tomb on the north side. Among all the solid dummy buildings on the east side of the enclosure—chapels and national shrines characterized only by their facades—the funerary temple was the only functional structure. The daily sacrifices for the dead and performances of hymns and prayers necessary to the king's ritual survival took place there. In order to replace the temple at a suitable scale, it was necessary to extend the precinct significantly northward, and a site had to be created for the delivery of sacrificial animals and of immense quantities of provisions, which were stored in massive underground magazines along the south wall (still largely unexcavated). A monumental sacrificial altar on which the daily offerings were presented dominates the northern courtyard. The entrance to the funerary temple and the sacrificial areas overlooks and protects a small chapel, the so-called *serdab*, which abuts the north side of the pyramid. This structure contained the only preserved near-life-size statue of Djoser, an expressive image of the unapproachableness and divine dignity of the immortal king.

On the west side, the expanded enclosure included a broad strip demarcated by a massive stone structure. This was hitherto thought to consist of additional magazines, but it now seems more likely to have been the Lower Egyptian tomb of one of Djoser's predecessors, perhaps Horus-and-Seth Khasekhemwy. The incorporation of this tomb and its cult into Djoser's complex casts further light on his and Imhotep's intentions and their desire to create a unique monument. The complex was to serve as a model, a representation in stone, not just of the royal residence, as has been thought, but of all of Egypt. The south and north tombs—that is, Abydos and the king's residence—were the religious centers of the royal cult. The south courtyard defined by them and the chapels of the small ceremonial courtyard represented the land of Egypt and its shrines; they formed the world of the living and the stage on which were performed the king's everlasting cult actions. The northern extension incorporated the rich Delta marshes, in religious terms the sacrificial landscape of the northern sky, while to the west was the "sacred land," the world of the dead. This order, transformed into stone for perpetuity, was surrounded by a high niche-paneled wall to defend it from chaos and disorder. The wall had fifteen gates, but only a single entrance. The precise orientation of the complex toward the north, broadly parallel with the direction of the Nile, connected it with the world's axis, whose pole was the pyramid with the royal tomb, the king's palace for eternity.

These conceptions were evidently not present in this form from the beginning, but matured



Pyramid complex of Djoser and burial pit under the step pyramid. COURTESY OF RAINER STADELMANN

during the work. The Turin Papyrus gives Djoser nineteen years, barely adequate for the construction of the pyramid complex. Because of the nature of Old Kingdom dating methods, however, this number might conceivably be doubled. The unfinished state of the complex may possibly have been intentional, perhaps to let the king postpone the divine summons to the hereafter by pointing to the need for additions required by the cult, or perhaps to give Djoser's own society evidence of his continuing creative activity. It is in any case remarkable that hardly any royal tomb or cultic construction was ever completed, not even those of such long-lived kings as Ramesses (Ramses) II.

Djoser's ambitious project set the development of the state in motion. The ruling clan and court of the First and Second dynasty kings had been able to erect their brick structures without difficulty, because they had required a limited number of workers and a modest administration. A project like Djoser's required far more extensive organization. Although the leader of the project continued to be a prince, Imhotep, who received his authority as leader of construction and administration directly from the king, he called upon capable master builders to make the plans and calculations, administrators to organize the gangs of workers, and officers to oversee quarrying and construction, some of whom had risen from the ranks of the specialized work teams.

The number of workers involved was smaller than has been generally estimated. Perhaps no more than five to seven thousand men—much less than 1 percent of the total Egyptian population of perhaps two million—worked on Djoser's tomb complex. The rural populace would scarcely have been affected by the building of the pyramid. If this percentage is correct, even the imposts and deliveries of supplies for building and for the teams of workers would have been kept within bounds. It was the new class of people—the administrators of the royal family and of the court, the bureaucracy of court and capital, and, not least, the master craftsmen and specialized workers who lived in the capital and the pyramid city and worked as priests and employees of the funerary temples—that brought the state into being and stimulated it to ever greater achievements.

THE LATER THIRD DYNASTY

It seems as if, after this trial of mental energy, history required a pause for reflection on the next goal to pursue. None of the pyramid complexes of Djoser's successors, whose names are almost all we know of them, advanced beyond the initial stages. Only that of his immediate successor Sekhemkhet can be attributed with certainty. Sekhemkhet was practically unknown until the discovery of his unfinished pyramid. If the body of a child found in the entrance of the south tomb of his unfinished pyramid is his, Sekhemkhet may have been a grandson of Djoser who died prematurely. A graffito on the niche-paneled enclosure wall names the great master builder Imhotep, who may have begun the building. A pointer to the future may be seen in the fact that this pyramid was planned to be one step higher than its predecessor, whereas its enclosure was smaller; only the beginnings of a funerary temple are preserved.

THE PYRAMIDS OF SNEFERU

A new impulse and new ideas emerged with the accession of Sneferu (Snefru), the first king of the Fourth Dynasty, about 2625. In pyramid construction and in state and social organization, he and his sons and grandchildren completed the work Djoser and Imhotep had begun. Again we know little about the origins and person of Sneferu. His mother, Meresankh, was probably a secondary wife of Huni, the last king of the Third Dynasty, but the paternity of kings was never stated explicitly in the Old Kingdom.

Alongside pyramid building, the main events of Sneferu's reign were campaigns to Nubia and Libya that brought back a sizable booty of cattle and people, who were presumably settled in the thirty-five crown estates—villages and towns in the Faiyum and the Delta that the king founded. He constructed a new royal palace, perhaps near Dahshur, with high palace gates of cedar; increased shipbuilding; and produced life-size royal statues in copper and gold and an especially large wooden harp. Amazingly, the building of pyramids is not recorded in surviving documents, even though it must have been the

principal undertaking of any reign. Perhaps pyramid building was one of the king's regular duties that went unmentioned, like the daily ritual that ensured that the sun rose and set and that the seasons succeeded one another and thus guaranteed the advent of the inundation of the Nile. There can be no doubt that Sneferu was the most prodigious builder of antiquity. During his reign of about fifty years, he constructed three major and two minor pyramids with a total volume of some 5 million cubic yards (more than 3.6 million cubic meters) of stone, about 1.3 cubic yards (1 million cubic meters) more than the Great Pyramid of his son Khufu (Cheops) at Giza. Nonetheless, Egyptian tradition regarded Sneferu as the archetypal good king, and in folk stories, he addressed his subjects as "friend" or "brother."

Maidum

Sneferu probably erected his first pyramid—a small step pyramid without internal chambers at Seila on the eastern edge of the Faiyum—as the symbol of his residence there. It may have been topped by a standing or seated statue of the king. Some six miles (ten kilometers) to the east at Maidum, facing the Nile Valley, Sneferu constructed his first pyramid complex, whose towering step pyramid attained the proud height of 279 feet (85 meters) in its second phase of construction. Toward the end of his long reign, Sneferu had this step pyramid transformed into a true pyramid. Even today, its towerlike shape looms 213 feet (65 meters) high over the Nile Valley. Its peculiar outline is the result of its complicated constructional history and the reuse of its stone, which began in antiquity.

Scholars occasionally continue to claim, without any evidence, that Huni began the original step mastaba at Maidum. This assumption is based solely on two genuinely awkward facts: first that if the Maidum pyramid is included, Sneferu constructed three mortuary pyramids; second, there is no clear reason why the Maidum pyramid should have been abandoned. Yet unquestionably, no Old or Middle Kingdom pyramid was ever usurped or taken over by another king or even completed for a predecessor. On the death of a king, the necessary cult installations for the burial and sacrifices to the deceased were undertaken in the greatest haste, after which the entrance corridor was closed. The construction teams were put to work at once on the successor's monument. This is, for example, the explanation of why even the lowest courses of the granite facing of the pyramid of Mycerinus (Menkaure) were not dressed.

The reason that pyramids were never taken over was surely the awe inspired by the office of king, a position that could not be usurped during the Old Kingdom. All that is said about struggles for the succession or seizure of the throne by force is the unproved interpretation of modern historians. We do not know how the succession was arranged during the Old Kingdom, since no title held by princes clearly designates an heir to the throne. Except for Neferirkare Kakai, who appeared as the heir during the reign of his brother Sahure at the expense of the latter's own sons, no Old Kingdom king is explicitly mentioned by name as heir. The only indication of who was to succeed might have been that no tomb was prepared for the heir in the cemetery of his father's princes because, as successor to the throne, he was to build his own pyramid. Another reason why pyramids were never usurped or taken over was surely the fact that, as recent excavations at Dahshur have shown, roughly every tenth facing block (and probably an even higher percentage of those in the core) was inscribed with the names of the king (as the patron), the names of his teams of workmen, or a date from his reign. This practice, which was in origin purely administrative, became in retrospect an ineradicable claim to ownership.

Whereas the towering form of the step pyramid at Maidum looked back to the Third Dynasty, the changes in the pyramid complex and in the system of tomb chambers heralded a new and dynamic development. Like Early Dynastic tombs, Third Dynasty pyramid complexes were oriented north–south to fit the course of the Nile and the landscape. With Sneferu, there appeared an east–west orientation to follow the course of the sun, which by then had been firmly established for almost two millennia. The rise and triumph of the sun-god, Re, was closely associated with the monarchy of the Fourth Dynasty. Sneferu chose the programmatic Horus name Nebmaat, "Lord of the World Order," an epithet subsequently reserved for Re alone. His son Khufu identified himself so closely with the

sun-god in his pyramid complex and his tomb that his sons and successors adopted the new royal title Son of Re.

The solar east-west orientation is emphasized by a new component of the pyramid complex, the long causeway leading from the east—the land of the living—to the pyramid tomb. Its entrance gateway developed into the valley temple, the cult center of the pyramid city in which the goddess Hathor was venerated with the king as a local deity. From all the cult structures of Djoser's time, the new pyramid complex retained only the funerary temple and the south tomb, in the form of a small step pyramid adjacent to the main pyramid. The temple was aligned with the course of the sun and moved from the north to the east side of the pyramid. There was, however, no proper funerary temple at Maidum, because the king was not to be buried there. Instead a stela sanctuary was erected with two tall stelae representing the king and, as it were, substituting for his body.

The system of chambers in the pyramid was different from that of the Third Dynasty. The entrance or exit remained on the north side, as was the case throughout the Old Kingdom, for the king wished to ascend from within the underground rock along the corridor emerging toward the imperishable stars of the north sky, where he was to meet the sun-god in his bark. The burial chamber, however, was no longer at the bottom of the shaft but was set above ground within the solid pyramid. The beginnings of a three-chamber system of royal burial apartments can already be seen in First Dynasty tombs. Initially, the two antechambers or side chambers served as storage rooms for the most essential grave goods for the dead king in the tomb chamber. By Djoser's time, these chambers had acquired religious functions. The ascent to the starry sky began in the antechamber, which was therefore decorated with stars, while the east gallery was a model palace for the hereafter. In the Fourth Dynasty, this canonical linear sequence became a vertical layering, which was perfected in the pyramid of Khufu.

Another innovation at Maidum that points to the future is the creation of a cemetery for princes in regular rows to the northeast of the pyramid. This cemetery contained the double mastabas of Sneferu's sons and their wives, among them the couples Nefermaat and Itet (Atet) and Rahotep and Nofret. At the northeast corner of the pyramid complex, some way from the princes' tombs, is a large single mastaba evidently built in haste. A prince whose name is unknown was buried in it, probably the crown prince from early in Sneferu's reign who died young.

The Two Pyramids of Dahshur

We can only guess why in his fifteenth year Sneferu abandoned his flourishing residence with the highest step pyramid, which had just been completed, in order to begin a new residence and pyramid barely thirty miles (fifty kilometers) to the north. Perhaps it was found difficult to administer from far away in Middle Egypt the colonization of the Nile Delta and links with ports on the north coast, as well as the trade routes to Sinai and Palestine, which supplied vital raw materials, notably wood for building and copper. The new site at Dahshur offered all that was needed. The Faiyum and the rich land of Middle Egypt were close. A natural lake basin for a harbor made the northern provinces easily accessible. On the east bank there was an old settlement with a trade route leading to Sinai, while on the west a wadi led toward the oases, and there were favorably situated quarries for pyramid construction on both sides of the Nile.

Apart from these pragmatic reasons, another consideration may have been just as important: at the end of such a costly project, king and court faced hitherto unsuspected problems. Theoretically, the essential task of the king's reign—to construct a residence for himself and his contemporaries in the hereafter—was completed. In practical terms, an army of workers and specialists and the entire administration of the state were unemployed and lacked a goal. Some great new project had to be started. This emerged in the bold plan to build a pyramid without steps but with almost the same steep inclination as that of the step pyramid, and the grandiose height of 300 cubits (over 492 feet/150 meters).

The designers planned bold improvements for the burial chambers of the new pyramid, whose final form has led to its being called the Bent Pyramid. The corbel vault devised at Maidum was here to reach the height of 49 feet

(15 meters), creating an airy eternal abode for the sun-king. Changes necessitated by damage suffered during construction make this pyramid's chamber system complicated and difficult to grasp. As we have seen in connection with Djoser's tomb, earlier conceptions located the king's eternal life deep in the underworld. The deepest of the three burial chambers had therefore to be sited within the solid rock. This chamber can probably be associated with the conception of a chthonic hereafter based on the necropolis god Sokar, whose name survives in that of the oldest royal necropolis (Saqqara). The angle of slope of the entrance corridor was determined by the notion of ascent in a straight line to the circumpolar stars. It therefore had to begin deep in the rock in order to emerge at the desired point, not too high in the pyramid's north face. The middle chamber is connected with the idea of the royal ascent to the sky, which is symbolized by the high placement of the burial chamber, as well as by the ascent through the burial corridor.

The site chosen for the pyramid unfortunately

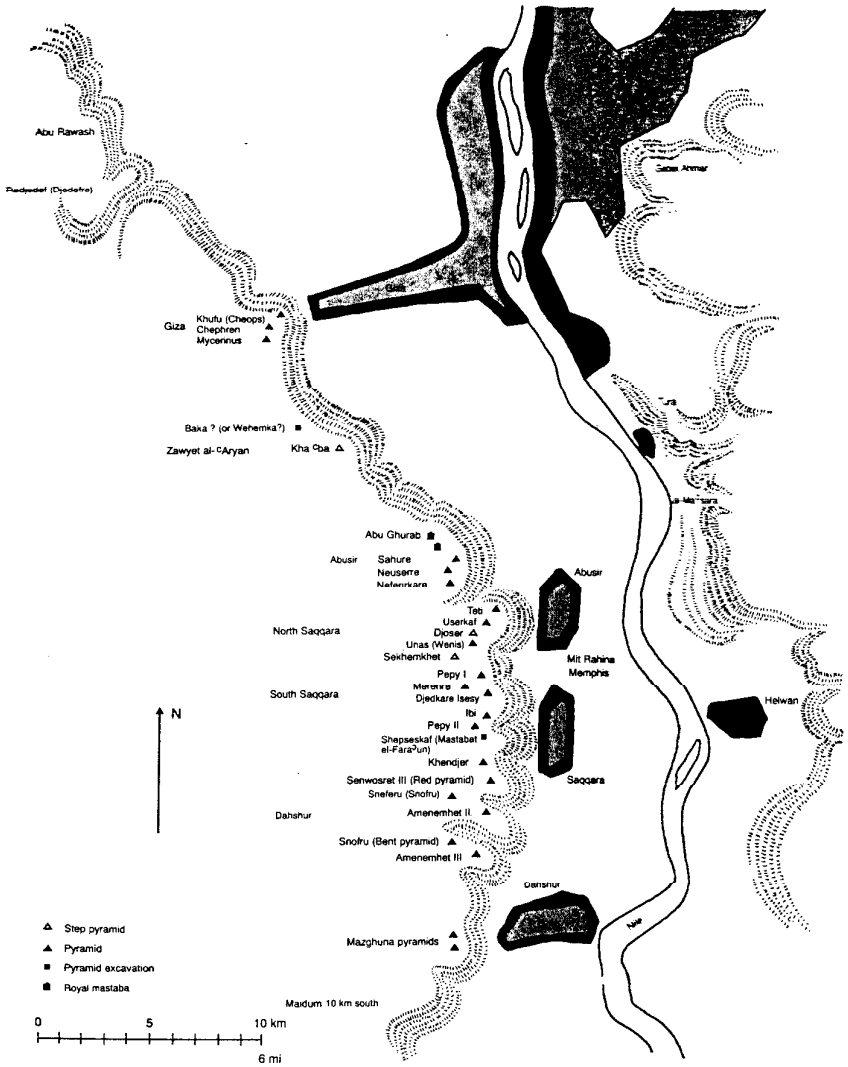


Diagram showing locations of pyramid cemeteries from Tell Abu Rawash to Maidum. COURTESY OF RAINER STADELMANN

provided a poor foundation for a structure of its size. As with Djoser's pyramid, the builders sought to avoid excessive difficulty in excavating the shaft—74 feet (22.5 meters) deep and 8.4 square yards (7 square meters) in section—by selecting a site on stratified, marly ground. This site proved unable to bear the weight. As the pyramid rose quickly, alarming cracks appeared in the three chambers and in the corridor. At first, minor repairs were attempted, but it soon became clear that both of the lower chambers and the entrance corridor were seriously endangered and could not be saved in this way. The function of the two chambers was purely symbolic: they were intended to serve the king in the cult and as an abode after death. As a spirit, he could pass through walled-up rooms and corridors, so they were filled with stones for stability. This fill blocked the entrance to the burial chamber, so the builders dug a second corridor from the west. Because the upper chamber, which was to be the burial chamber, was sited so high and religious dictates required the access corridor to slope upward, the latter emerged nearly 108 feet (33 meters) up the pyramid's west face.

After the settling, the builders did not dare to overburden the corbel vault of the burial chamber by connecting it directly to the planned air shaft of the second chamber, linking them instead by means of a rather awkward communicating corridor. On the outside, the builders attempted to stabilize the great mass by constructing a thick sloping outer mantle of masonry and by reducing the angle of slope twice. In the end, all of these attempts to save the project proved to be in vain. After fifteen years of work, this boldest of pyramid projects had to be abandoned. Sneferu decided to construct a third pyramid and at the same time modernize the Maidum pyramid by converting it into a true pyramid.

For Sneferu's third great pyramid, the Red Pyramid of North Dahshur, the ground was carefully sounded out and the area increased to 275 yards square (220 meters square). The technique of construction in inclined courses, which was taken over from step pyramids and had not proved adequate for a true pyramid, was abandoned in favor of horizontal courses. The angle of slope was reduced to 45°, producing a final height of 200 cubits (344 feet, 105 meters), making this the third-highest pyramid after those of Khufu and Chephren (Khafre, Rekhaef). Everything about this structure appears harmonious, calm, and majestic. The system of chambers, too, gained clarity and harmony through their being arranged in sequence. They scarcely descend below ground level, even though, as a result, the entrance is located some 98 feet (30 meters) up the north face, no doubt creating difficulties for the burial itself and the subsequent sealing of the corridor. The burial chamber, an impressive hall some 27 feet (8.35 meters) long and 48 feet (14.65 meters) high, whose perfect corbel vault surpasses in sublimity even the Grand Gallery of the pyramid of Khufu, lies almost 30 feet (9 meters) higher than the antechambers. No stone sarcophagus was to cramp the sun-king's freedom. The foundations of a hastily completed funerary temple in front of the east side of the pyramid and the sad remains of a mummified corpse found in the burial chamber prove that Sneferu was ultimately buried in this pyramid.

THE PYRAMIDS OF GIZA

The Complex of Khufu

The time of bold experimentation was not past. Sneferu's son and successor, Khufu (Cheops), returned with both élan and extremely thorough preparation to the dream of a pyramid 300 cubits high—the monument now generally known as the Great Pyramid. As the site for his gigantic undertaking, Khufu selected a commanding outcrop of rock near modern Giza, at the same time moving his residence far to the north. In order to avoid a building disaster like that of the Bent Pyramid, the structure was built on solid rock. The accurate orientation of the pyramid toward the north; the leveling of the corners to just under 1 inch (2 centimeters) and the setting of their angles to a mean variation of only 2′48″; and the measurement of the sides, whose lengths vary by only about 2 inches (4.4 centimeters), all compel admiration, particularly when the tools available are taken into account: measuring rods and lines that had to be continually recalibrated, and simple levels and plummets. Even with the most modern tools it is possible only to match

this precision, not to surpass it. In contrast to the low 45° angle of slope of Sneferu's last pyramid, the builders dared to construct Khufu's pyramid at 51°50′40″. This corresponds in Egyptian terms to 5.5 handbreadths back from 1 cubit (which equaled 7 handbreadths). With a side of 440 cubits (755.81 feet, 230.37 meters), the pyramid originally attained a height of 280 cubits (480.94 feet, 146.59 meters), close to the ideal height of 300 cubits. The pyramid is to this day 455.22 feet (138.75 meters) high.

The design of the corridor-and-chamber system within the pyramid is as perfect as the surveying and workmanship of the superstructure. The three burial chambers of the pyramid have hitherto been assigned to successive changes of plan. But it does not do justice to the builders who designed and built this unique monument with such perfection to assume that they did not have a plan for the pyramid's irreducible feature, the system of burial chambers that was the occasion and goal of the whole undertaking. Moreover, the external construction and its measurements fit seamlessly with the design of the chamber system. The identification of the three-chamber principle in royal tombs provides further evidence for a unified planning of the pyramid. It also excludes the pyramid mysticism that has assumed epidemic proportions in recent years and according to which the chamber system of Khufu's pyramid is supposed to conceal arcane knowledge or secrets, or even further treasure chambers called "chambers of knowledge."

The chamber system of the Khufu pyramid is a further development of the ascending stairlike order visible already at Maidum. All three chambers and the great corridors lie atop one another in a steep ascending line parallel to the vertical axis of the pyramid; this, too, is proof that the design is unified. The steep ascent and the high position of the king's burial chamber correspond to this period's conception of the solar hereafter, in which the king became one with the sun-god.

A section of the granite quarries at Aswan, 600 miles south of Cairo. The extraction and transport of hard stones such as this were prerequisites for constructing the principal pyramid complexes. Blocks weighing as many as one hundred tons were quarried and incorporated in their structures, especially in the associated temples. COURTESY OF JOHN RUFFLE

Khufu accordingly called his pyramid complex "Horizon of Khufu." It is, however, characteristic of Egyptian thought that older ideas of a hereafter in the dark of the earth were not abandoned. In accordance with these concepts, the rock-cut chamber was cut more than 98 feet (30 meters) deep into the ground. This chamber remained incomplete, perhaps deliberately or perhaps because of technical difficulties. Work at the end of a narrow corridor 328 feet (100 meters) long with virtually no air supply, utilizing copper chisels and stone hammers by the light of smoking torches and oil lamps, must have been hellish. For this reason, too, the corridor that was to lead south from the rock-cut chamber to a projected south tomb under the pyramid was never completed. The function of the south tomb was taken over by the middle chamber, on whose east side is a niche for the king's *ka* statue.

Because all aspects of the hereafter, with their cult spaces and the south tomb, were included within the mass of the pyramid itself, the only external part of the pyramid complex was the funerary temple, today reduced to its basalt pavement. Traces in the pavement show that the temple consisted principally of a broad pillared courtyard and a chapel for sacrifices. Fragments of statues in many different hard stones and of limestone reliefs in an austere style provide evidence that it was once richly decorated.

The necropolis was as thoroughly and strictly planned as the pyramid complex. Five large rock-cut pits to the east and south of the pyramid once contained Khufu's funerary boats (which are not solar barks, as was once maintained). In recent decades the two southern ones have been discovered quite well preserved. On the east are the three pyramids of the king's mother, Hetepheres, and his two principal queens, Meritites and Henutsen, the mothers of Khufu's sons and successors—Redjedef (Djedefre) and Chephren. The pharaoh's own sons and daughters received enormous solid stone double mastabas to the east, apportioned strictly according to age. The high dignitaries of the court and the pyramid's master builders—even Prince Hemiun (Hemiunu), the son of the king's brother Nefermaat—were assigned positions in the western cemetery. The king intervened in the very design and decoration of the tomb chapels, which uniformly contained only the most important offering scenes. At Giza large-scale sculpture of notables, which had achieved a high point at Maidum in the two statues of Rahotep and Nofret, was deliberately restricted to a few exceptional individuals, such as the powerful overseer of buildings works and Prince Hemiun. Even the highest of the other dignitaries had to be content with portrait heads (the so-called reserve heads) in their burial chambers. Thus, for the first and only time, all of state and society were integrated into the severe order of the royal necropolis and into the conception of the king's destiny in the hereafter so that they would be available to serve him eternally, making them perpetually assured recipients of royal favor and offerings from the king's central funerary temple.

We know as little about the person of Khufu, who commissioned this marvelous work, as we do about other Old Kingdom kings. The fact that he was Sneferu's son is known only because of the accidental discovery of the funerary equipment of his mother, Hetepheres, in a shaft tomb at Giza. The queen had survived her husband by some time; on her death she was provisionally buried in a shaft tomb until her pyramid, the northernmost of the queens' pyramids on the east side of Khufu's pyramid, was completed. Khufu must have been one of the younger generation of Sneferu's sons and was probably born at Dahshur, coming to the throne at age twenty-five to thirty. His two much older brothers, Nefermaat and Rahotep, princes and master builders of the pyramids in Maidum and Dahshur, were already dead.

Khufu entrusted Prince Hemiun with the construction of his pyramid. His remarkable, dynamic tomb statue, now in the Roemer-Pelizaeus-Museum in Hildesheim, Germany, shows us an image of the men of the time of Sneferu and Khufu who constructed pyramids that reached up to the sky. Of Khufu himself we possess only one certain depiction, an ivory statuette from Abydos just 3 inches (7.5 centimeters) high. The smallest piece of Egyptian royal sculpture, it is a genuine masterpiece. The individual features of the aging king can also be identified in a greater-than life-size royal head with a tall crown in the Brooklyn Museum and in the majestic face of the Great Sphinx of Giza,

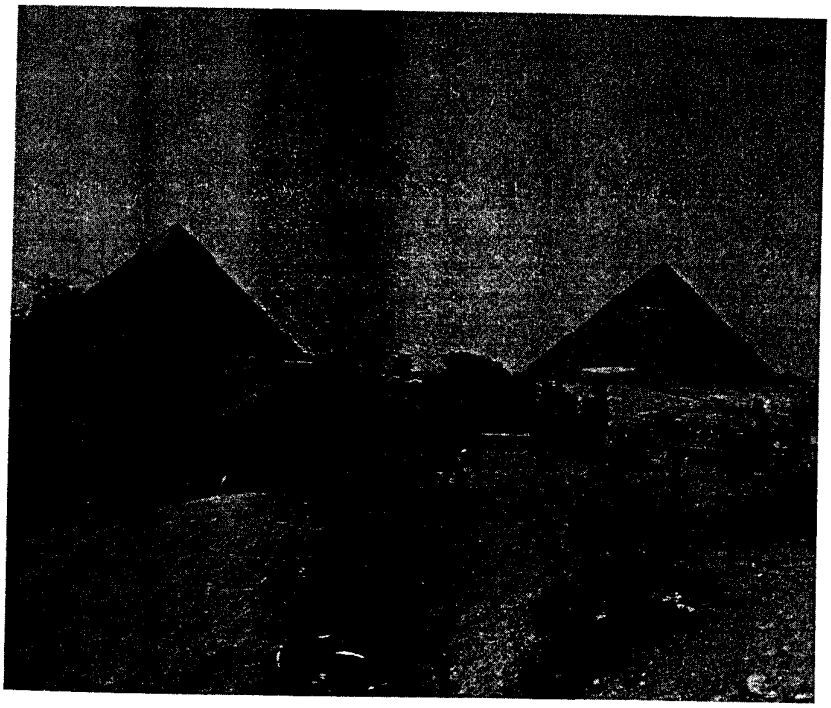
whose conception and iconography make it far more likely to be a creation of Khufu than of his son Chephren.

Never before or afterward in Egyptian history were the claims of divine kingship so thoroughly considered and perfectly displayed. It was possible to complete the project in the twenty-six-odd years of Khufu's reign because the projects of the previous half-century had provided a unique schooling for the administrators, master builders, and workmen, enabling them to achieve amazing feats, to tunnel more than a hundred yards or meters into the living rock, to prepare and store vast quantities of massive blocks so that they were always available for the construction teams, and to design ramps and transport routes that required a minimum of time and materials and yet did not interfere with the repeated surveying of the pyramid as it rose.

How all of this was done is still largely unknown, though recent studies have arrived at seemingly acceptable solutions. One of the builders' most impressive achievements was to transport granite blocks weighing up to 44 short tons (40 metric tons) for the roof of the royal burial chamber, to raise them more than 197 feet (60 meters), and to lay them without gaps between the joints. Such a feat could only have been accomplished by a highly specialized team of sappers. There was not room on the restricted worksite for hundreds of thousands of workers, slaves, or corvée laborers. New calculations point to a total work force of twenty to twenty-five thousand stoneworkers, laborers, and delivery and supply personnel, so that no more than 1 percent of the country's population was engaged in building the pyramid, though the workmen were employed all year round.

The Later Fourth Dynasty

The dominance of religion rather than the laws of architecture in the design of the pyramids and their chambers is demonstrated by their continuing evolution into the Fifth Dynasty, including the development of the funerary temple as a cult place in front of the pyramid. The burial-chamber systems within and the funerary temples outside harmonize in a such a way that a



"The Horizon of Khufu"—a view of the pyramids of Giza, Old Kingdom.
COURTESY OF JOHN RUFFLE

complicated structure of burial chambers corresponds to simple funerary-temple architecture, and vice versa. This is very evident in the complexes of Chephren and Mycerinus. Chephren, a younger son of Khufu, came to the throne unexpectedly after the early death of his brother Redjedef.

The pyramid of Chephren is the only one built by a successor of Khufu that was truly completed; it was intended to match his father's in height. The arrangement of its chambers is so strikingly simple that in the 1960s archaeologists and natural scientists used the most modern equipment to search—in vain—for further chambers. In contrast, the architecture of his funerary and valley temples is of a type not found again until the Fifth Dynasty. The rooms are surrounded by massive masonry walls, creating the impression either that the temple was enclosed in a solid cliff or that it was carved out from the heart of the pyramid and set down outside it. The majestic hard-stone statues that once decorated the funerary and valley temples contribute to this effect by depicting the king as the visible image of the gods.

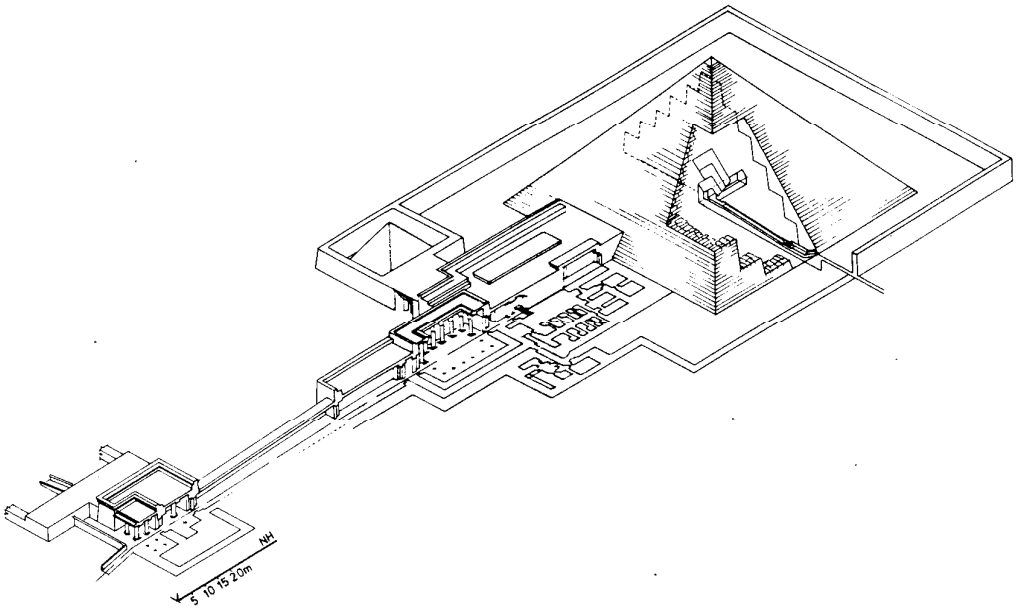
In contrast, the chamber system in the pyramid of Chephren's son Mycerinus is characterized by a grandiose succession of rooms comparable only with those of Khufu's pyramid, except that those of Mycerinus lead down into the rock. The design was perhaps already influenced by the concept of the god Osiris as the night sun. His funerary temple, like that of Khufu, consisted of a broad, open courtyard with an offering chapel. It must be recalled here that the eight-year reign of Redjedef came between those of Khufu and Chephren and the four-year reign of one of Redjedef's sons came between Chephren and Mycerinus, and that during these brief reigns large pyramids were also planned and begun.

The dynamic character of developments in this period can be seen in royal portraiture. The statues of Redjedef, the finest of the Old Kingdom, are individualized portraits that reflect anatomical study, perhaps under the influence of the reserve heads. Despite a certain melancholy, they radiate youth and humanity. In contrast, Chephren's sculpture, especially the great diorite statue with the Horus falcon in the Cairo Museum, is invested with the majesty of divine kingship. Its expression is rigid and haughty, looking past the viewer into the distance. In spite of idealization, this statue, too, is a masterpiece of individualizing representation, unmistakably an image of Chephren. The statues of Mycerinus are decidedly mannered and display a new canon of proportion: the king is an athlete, with a powerful chest and relatively small head, but with well-modeled, almost soft features. His portraits look forward to the royal image of the Fifth Dynasty, typical examples being the youthful, almost feminine depictions of Userkaf and Reneferef.

THE FIFTH DYNASTY

Supposed tensions in the royal family are not supported either by archaeological or by textual evidence. Biographies of officials show that the transition to the Fifth Dynasty was peaceful. The succession was probably again through a queen, Khentkaues, the mother of the first three kings of the Fifth Dynasty, Userkaf, Sahure, and Neferirkare Kakai; it is not known whether she was the wife or daughter of Shepseskaf, the last king of the Fourth Dynasty. Strangely, Shepseskaf built no pyramid, but an enormous stone mastaba at South Saqqara. It is unwise to hypothesize political or religious tensions on this basis, because inscriptions show that Shepseskaf supported the funerary cult at his predecessors' pyramids through endowments and decrees. Moreover, the form of Shepseskaf's name cannot be separated from that of Userkaf, the first king of the Fifth Dynasty, who once again built a pyramid as his tomb.

The Fifth Dynasty complexes show a major change of focus from the pyramid to the funerary temple. The pyramids became much smaller, and the dimensions and arrangement of the chambers acquired a canonical order that was not affected even by the addition of inscriptions (known as the Pyramid Texts) in the burial chamber and the central antechamber at the end of the dynasty. The funerary temples expanded, occupying the whole east side of the pyramid, which rises over them at a relatively human



The pyramid of Sahure at Abusir, Fifth Dynasty, showing the burial chamber, mortuary temple, and valley temple. DRAWING BY N. HAMPIKIAN; COURTESY OF RAINER STADELMANN

scale. Their interior walls are covered with reliefs, forming a rich, magically animated, decorative scheme depicting the king entering the world of the gods, his reception and rebirth through the goddesses of the sky, his triumph over the chaotic world outside Egypt, and the enormous daily offerings at the temple.

Administrative texts from the funerary temples of Abusir give detailed information about the bureaucratic system of the deliveries and distribution of vast amounts of endowed offerings, on which the employees, priests, and, ultimately, the entire population of a pyramid city lived. The offerings came primarily from the sun temples that every Fifth Dynasty king built near Abusir in addition to his pyramid temple. These were a kind of funerary temple for the daily descent of the sun-god in the west. Architecturally, they were comparable with the royal funerary temples, possessing a broad offering court that focused on an obelisk instead of a pyramid. The decoration in these temples suggests that the living king intended that their cult should guarantee the perpetual cyclical world order of the sun-god.

CONCLUSION

The conception of a world order based on the cycle of the sun had its origin deep in prehistory, but it underwent major change and development in Djoser's first great pyramid project. The appearance and triumph of solar beliefs at the beginning of the Fourth Dynasty and the apotheosis of the monarchy at the same time required the grandiose undertakings of the human spirit that are the great pyramids, through which state and society reached new levels of achievement. A new ethic appeared, which made the world order clear, comprehensible, and penetrable. This was no longer just the order of a ruling clan, but of a group of qualified, educated people, or scribes. It is striking that almost all the achievements of antiquity before the appearance of the Greeks—the mastery of stone, of technology, of medicine (the textbooks of Egyptian medicine go back to this date), of the literary form of the Wisdom text—were first discovered and put into practice in the pyramid age.

The sun-god had determined that the king should be his guarantor of world order. The king was a god not intrinsically but by virtue of his

office. He was the "good god," as one of his titles states, the great god of his necropolis, who ensured the survival of each of his contemporaries by making provisions for himself in the next world. Except in the colossal buildings, which seem completely to overstep the human scale, the royal image preserved in sculpture, in literature, and especially in contemporary nonroyal inscriptions is very human. This image applies as much to Sneferu as to Khufu. The rejection of Khufu was a typically Greek interpretation arising from the shock of contemplating the apparent human hubris of the great pyramids of Giza. Alongside the marvels of the pyramids, the graciousness of Egyptian deities, who did not require exclusive veneration, and the humanity of the kings remain the greatest achievements that Egyptian culture could transmit to later ages.

Translated from the German by Frederick H. Cryer

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