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# Location of the Old Kingdom Pyramids in Egypt

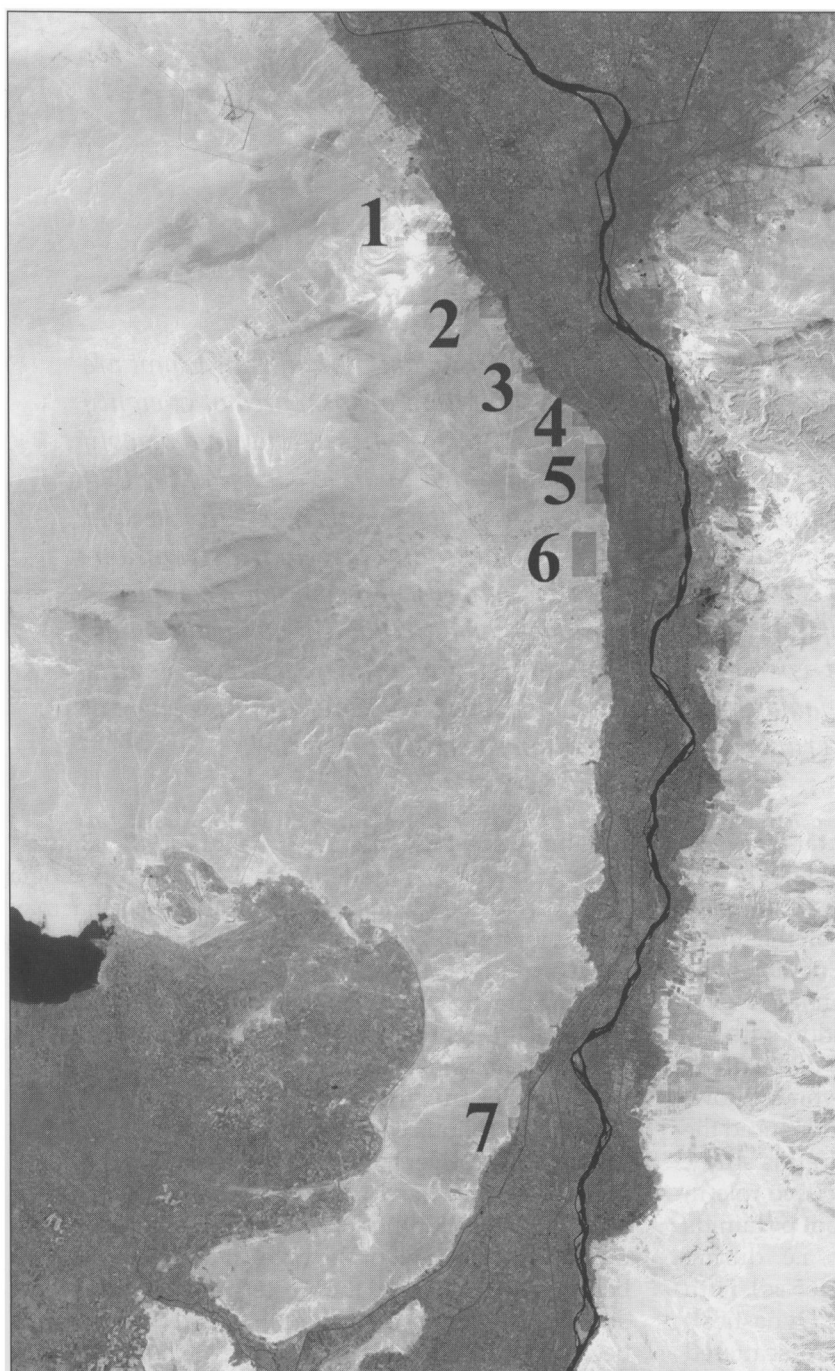
Miroslav Bárta

*The principal factors influencing the location of the Old Kingdom pyramids in Egypt are reconsidered. The decisive factors influencing their distribution over an area of c. eighty kilometres were essentially of economic, geomorphologic, socio-political and unavoidably also of religious nature. Primary importance is to be attributed to the existence of the Old Kingdom capital of Egypt, Memphis, which was a central place with regard to the Old Kingdom pyramid fields. Its economic potential and primacy in the largely redistribution-driven state economy sustained construction of the vast majority of the pyramid complexes in its vicinity. The location of the remaining number of the Old Kingdom pyramids, including many of the largest ever built, is explained using primarily archaeological evidence. It is claimed that the major factors influencing their location lie in the sphere of general trends governing ancient Egyptian society of the period.*

For millennia, megaliths and monumental arts were commissioned by the local chieftains and later by the kings of Egypt. The ideological reasons connected with the construction and symbolism of the pyramids were manifold, and in most cases obvious: the manifestation of power, status and supremacy over the territory and population, the connection with the sacred world and the unlimited authority of the rulers (O'Connor & Silverman 1995). One may wonder, however, what the decisive factors were that influenced the specific locations of these monuments. In this study, the reasons that may have played a decisive role in the spatial distribution of the Old Kingdom pyramids (built during the 27th–22nd century BC, i.e. during the Third (2649–2575 BC), Fourth (2575–2465 BC), Fifth (2465–2323 BC) and Sixth (2323–2150 BC) Dynasties<sup>1</sup>) will be discussed. These monuments are scattered along the western bank of the Nile from the city of Cairo about 80 km southwards, reaching the northern frontier of the Fayum Oasis (Fig. 1).

From the Old Kingdom period twenty-two pyramids are known that served as tombs for the deceased kings. These were studied with varying degrees of detail and accuracy. The following are the principal sites (north to south): Abu Rawash, Giza, Zawiyet el-Aryan, Abusir, Saqqara, Dahshur and Meidum (for detailed information on each of the Old Kingdom

pyramids see Edwards 1993; Fakhry 1961; Hawass 2003; Lehner 1997; Stadelmann 1985; 1990; Vallogia 2001; Verner 2002; Dodson 2003). The reasons that may be put forward to explain their location and arrangement are numerous but may be divided into two basic groups: practical and religious. It will be argued that whereas the general pattern in the distribution of the pyramid sites may be due mainly to practical reasons, the intrasite structure might have been largely influenced by religious concepts as well. By default, there were certain universal preconditions that every burial place of the king had to meet: a clearly distinguishable place set off from other parts of the cemetery, location on the western bank of the Nile, in transitional zones between the valley and the Western Desert plateau, yet above the valley itself. When finished, the pyramids became an inseparable part of the local topography, a feature which is also sometimes indicated by their names such as 'Horizon of Khufu' in the case of the pyramid complex of Khufu in Giza (Richards 2000; Bradley 2000, 18–32). Their characteristics — the highest places on the western horizon — expressed clearly the idea of the transition and connection between the profane and divine world personified by the king and his achievements (Arnold 1997). Dealing with the overall site distribution, this study focuses on practical factors, which, fortunately enough, may be



**Figure 1.** Location of the pyramid fields of the Old Kingdom period: 1) Abu Rawash; 2) Giza; 3) Zawyiet el-Aryan; 4) Abusir; 5) Saqqara; 6) Dahshur; 7) Meidum.

better verified by praxis and the sober evaluation of the pertinent, predominantly archaeological data.

Each of the Old Kingdom pyramid complexes consisted of five essential components: the valley temple, the causeway, the pyramid temple, the cult pyramid and the pyramid itself. The valley temple was

built at its eastern end, closest to the valley. It was the true entrance into the complex, usually situated near the water. From the rear part of the building a causeway ascended on the rocky plateau of the Western Desert leading into the mortuary temple. Here the priests performed daily ritual offerings for the soul of the deceased king. Adjoining the western end of the temple was a pyramid protecting the proper burial place of the Egyptian king. The pyramid itself was the most monumental element of the pyramid complex and as such it necessitated the major expenditure of economic resources of the state and physical labour. The size of individual pyramids is given in Table 1.

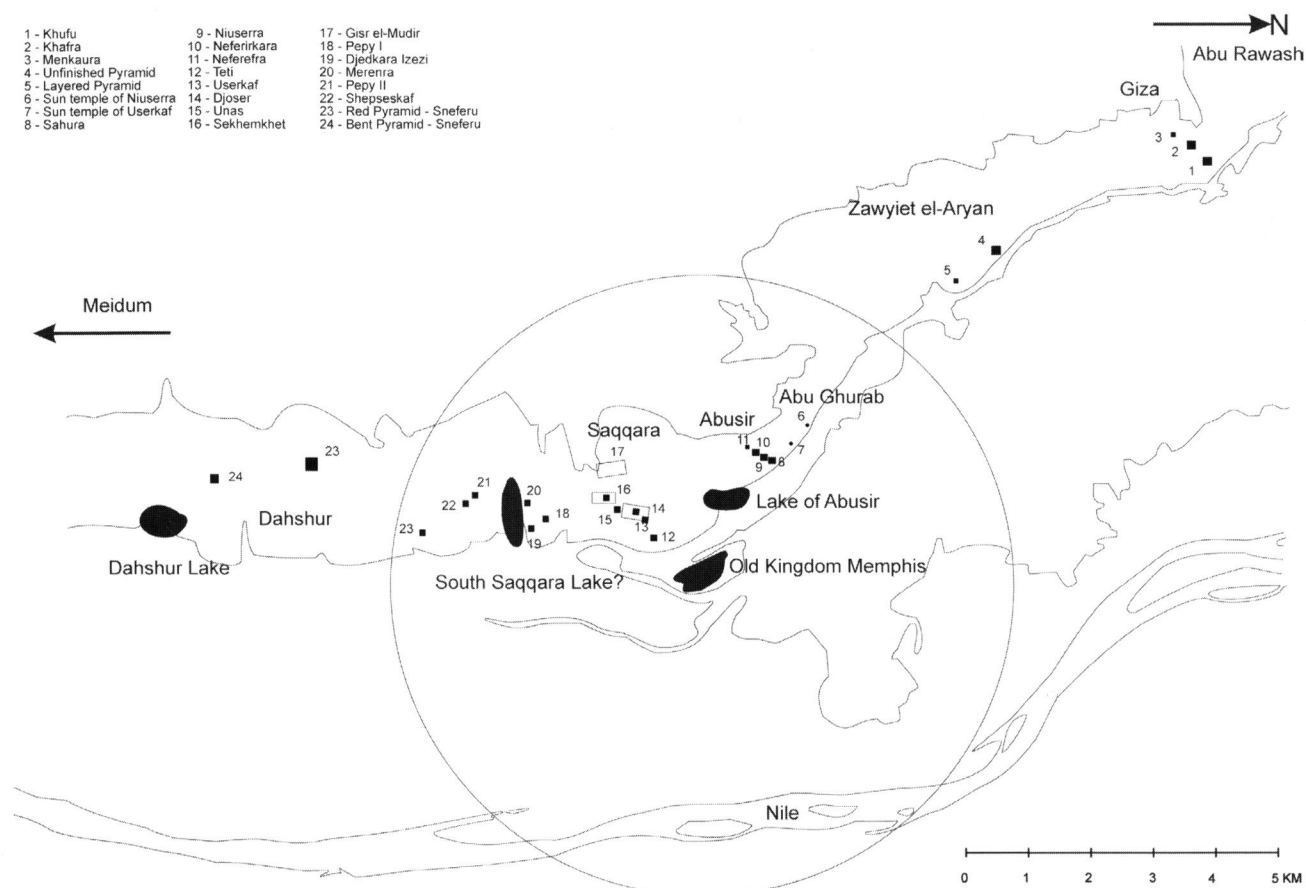
Perusal of the list of twenty-two pyramids and their size shows that fifteen of them (about 75 per cent) were situated relatively close to Memphis, at a distance up to 7 km. These are the sites of Abusir, Saqqara and Dahshur. Interestingly, each of these three sites was probably accessible via semi-permanent lakes lying in their close vicinity (Fig. 2).<sup>2</sup> The remaining six monuments, about one-fourth of the analyzed monuments, were located a considerable distance from Memphis — at Abu Rawash, Giza, Zawyiet el-Aryan and Meidum (Fig. 2).

#### **Abusir and Saqqara (and Ancient Memphis)**

Beyond any doubt, one of the major factors influencing the location of the pyramids was their relative location in relation to Memphis (O'Connor 1974, 19) which played a central role in the state economy and administration (Smith 1975). This is not a surprising conclusion if we bear in mind the dominant redistributive character

of the ancient Egyptian economy (Helck 1975, 3–138). The centre imposed a rigid and sophisticated taxation system on the whole country. The collected surplus guaranteed not only the state activities and buildings but also kept running a vast administrative system supervised by the elite group of officials close to the king.

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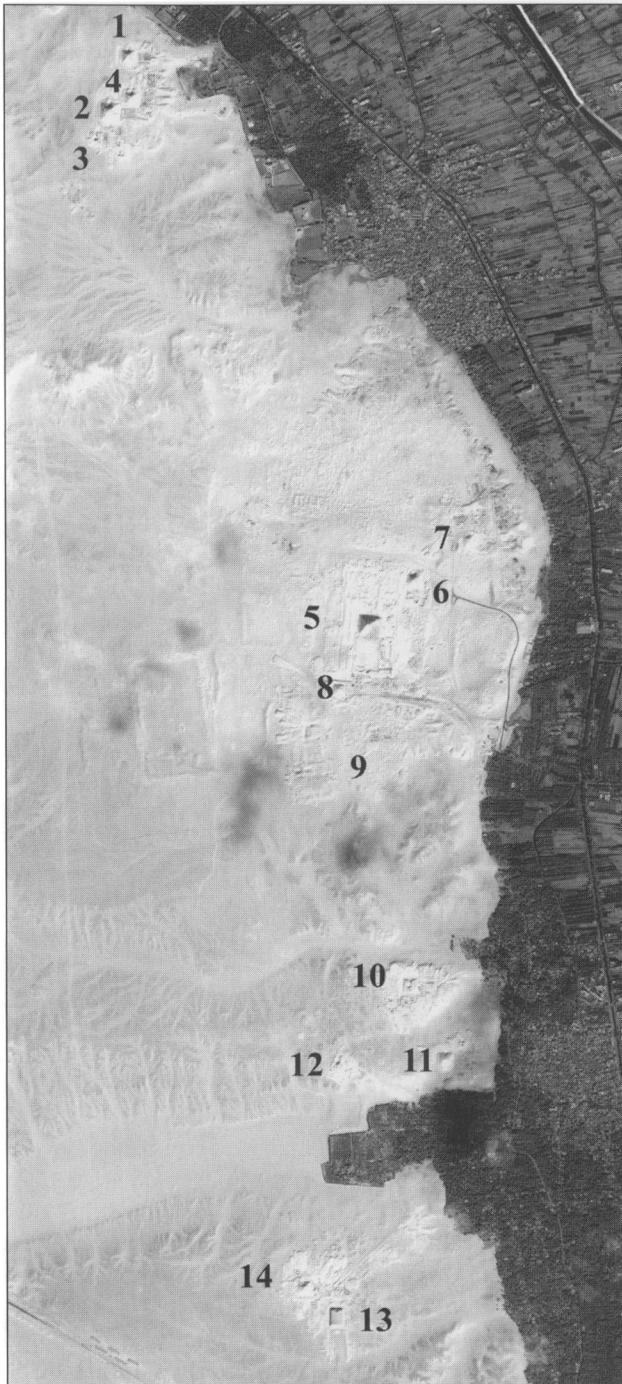


**Figure 2.** Location of the individual pyramids in relation to Memphis.

Equally importantly, the collected resources played a substantial role in the form of prestations in kind paid to workmen participating in the construction of the pyramids (Müller-Wollermann 1985; Bárta 1998). The advantages of construction sites within a short walking distance from the residence were obvious: there was a large human workforce nearby, a series of workshops supplying basic working implements and complexes of store-rooms delivering beer, bread, fish (i.e. the most ubiquitous staples of the ancient Egyptian diet), cloths and sandals for the workforce on a daily basis.

The city of Memphis, according to tradition, was founded by the legendary king Menes at the beginning of the unified Egyptian state, housing all the principal state offices and the residence of the king (for summary see Malek 1997; Wenke 1997, 42–3). Some time later the kings of Egypt established their cemetery at Saqqara (during the Second Dynasty). Already at this time the city and its hinterland represented an impressive and very capable economic and demographic support system for any state project. This is attested by the vast cemeteries on both the western

and eastern bank of the Nile at North Saqqara and Helwan (Emery 1949–58; Saad 1951). Whereas at North Saqqara there were found dozens of large-scale tombs of wealthy officials of the state, in Helwan, more than ten thousand of First and Second Dynasty graves of lower-ranking officials and commoners were excavated by Z.Y. Saad (for summary see Jeffreys & Tavares 1994, 147ff.). Royal mortuary monuments, with superstructures built largely of mudbrick in combination with stone, appeared in Saqqara during the Second Dynasty. They are represented by the Gisir el-Mudir enclosure (dated provisionally to the reign of Khasekhemwy) and at least three royal tombs built in the area of the causeway of Unas and south of it (Raven *et al.* 2004, 99–100; Dodson 2003, 37–9). The pinnacle of this development can certainly be seen at the Third Dynasty Step pyramid of king Netjerikhet Djoser, the first monumental complex constructed exclusively out of stone. This structure continued in the tradition of the Second Dynasty kings buried in Saqqara and was located to the north of the Second Dynasty royal tombs, close to the large wadi running north towards the lake of Abusir (Raven *et al.* 2004,



**Figure 3.** Satellite image showing location of the principal royal mortuary monuments in the area of Abusir and Saqqara: 1) Sahura; 2) Neferirkara; 3) Neferefra; 4) Neusera; 5) Netjerikhet; 6) Userkaf; 7) Teti; 8) Unas; 9) Sekhemkhet; 10) Pepy I; 11) Djedkara Isesi; 12) Merenra; 13) Shepseskaf; 14) Pepy II (Bárta et al. 2003).

100). This lake most likely provided the main means of access to the cemetery for the greater part of the

**Table 1.** Location and pyramid size of the indisputable Old Kingdom complexes. The pyramid complexes of the following kings are not included: Sanakht and Huni of the Third Dynasty, Baka of the Fourth Dynasty, Shepseskara and Menkauhor of the Fifth and Userkara of the Sixth Dynasty. Their location is in most cases unknown. Also not included is the controversial 'Abu Rawash pyramid' (Lepsius No. 1), a structure of a debatable meaning.

Ruler	Volume in cu. m	Site
Netjerikhet Djoser	330,400	Centr. Saqqara
Sekhemkhet	33,600	Centr. Saqqara
Khaba	47,040	Zawyiet el-Aryan
Sneferu 1	638,733	Meidum
Sneferu 2	1,237,040	Dahshur
Sneferu 3	1,649,000	Dahshur
Khufu	2,583,283	Giza
Radjedef	131,043	Abu Rawash
Khafra	2,211,096	Giza
Menkaura	235,183	Giza
Shepseskaf	148,271	South Saqqara
Userkaf	87,906	Centr. Saqqara
Sahura	96,542	Abusir
Neferirkara	257,250	Abusir
Neferefra	29,575	Abusir
Neusera	112,632	Abusir
Djedkara	107,835	South Saqqara
Unas	47,390	Centr. Saqqara
Teti	107,835	Centr. Saqqara
Pepy I	107,835	South Saqqara
Merenra	107,835	South Saqqara
Pepy II	107,835	South Saqqara

third millennium BC (Bárta 1999b, 113–16). Given the assumed location of ancient Memphis during the Old Kingdom, to the east of the northern Saqqara plateau, the distance between its centre and Abusir necropolis was no more than 4 km (Fig. 3). The same holds for the South Saqqara cemetery, only Dahshur being somewhat more distant (about 7 km). The location and proximity to the settlement thus may well apply for a majority of the Old Kingdom complexes.

These cemeteries lacked, however, one of the principal requirements — a suitable bedrock capable of sustaining the incredible weight of the huge pyramid constructions of the Fourth Dynasty Kings. The Saqqara bedrock consists of several geological units. A large part of the subsurface is formed by Tertiary (Upper Eocene) sediments and limestones (called *tafl* locally: Said 1975, 12–13). On the surface are large

accumulations of layers composed of chert and gravels (Youssef *et al.* 1984, 128–31). This kind of bedrock is fragile by nature and tends to crack.

How are we to explain the location of the remaining 25 per cent of the pyramids? When analyzing this problem it may be profitable to look more closely at local geographical features in relation to the size of the pyramids. Clearly, the rulers of the Third and the Fourth Dynasties were — typically for royal mortuary architecture — attempting to build large pyramids of ever-increasing size (Hornung 1982, 37–8). This trend is well attested by the pyramids at Meidum, Dahshur, Giza and Abu Rawash. All of them, with the exception of Dahshur, were built farther away from Memphis in places with specific characteristics that provide the information necessary for a better understanding of their location.<sup>3</sup> The key factors which led to the choice of these remote locations will now be examined. Practical and symbolic requirements led to genuine new solutions that are clearly reflected in the archaeological record and the pattern of the created landscape. The specific issue was the way the necessity of finding suitable bedrock for the gigantic Fourth Dynasty projects interfered with the religious requirements that needed to ignore logistic and economic factors.

### Meidum

The Meidum complex of the first Fourth Dynasty king Sneferu is the first ancient Egyptian royal funerary compound that has the canonical number of components: the valley temple, the causeway (not yet roofed, however), the mortuary temple, the cult pyramid (at the southwestern corner of the pyramid) and the pyramid itself protecting the burial of the king (Fig. 1:7). Very important also is its east–west orientation, anticipating the course of the sun in the sky during the day. This alignment was followed by all subsequent royal tombs of the Old Kingdom. The location of the monument seemingly so far away from the residence in Memphis may be due to several factors. It was probably the first time that a high-quality limestone bedrock (the Qurn and Wadi Garrawi cenozoic beds) able to carry the weight of the pyramid played a major role (Said 1990, 464). The most important factor, however, is indicated by the archaeological evidence. Though we lack any remains of an extensive settlement in the area, the vast cemeteries close to the Meidum site such as Tarkhan (Petrie *et al.* 1913; Petrie 1914; Wildung 1986, 234), Gerzeh (Petrie *et al.* 1912; Gomaa 1977, 556), Harageh (Engelbach & Gunn 1923) and Riqqeh (Engelbach 1915) indicate more than adequately the existence of a large settlement(s) in the area (compare

O'Connor 1974, 24). Moreover, Tarkhan is very likely the site where the god Sobek was worshipped during the Old Kingdom, implying that there existed a sufficient demographic base for support of the cult (Zecchi 2001, 24–5). Thus we can accept the notion that Sneferu was led away from Memphis both by the favourable geological qualities of the place and the already-established economic and demographic background suitable for his large-scale project.

The existence of a contemporary extensive settlement seems to be confirmed by the study of G. Dreyer and W. Kaiser (1980) dealing with the small pyramids distributed irregularly all over the Egyptian territory and tentatively dated to the beginning of the Fourth Dynasty, most likely to the reign of Sneferu (Verner 2002, 168–73). Their conclusions clearly show that these edifices were purely symbolic buildings and had no internal structures (see also Lauer 1961). Several theories have been put forward to explain their existence: cenotaphs (symbolic graves of the queens), symbols of the primeval mound referring to the mythical act of creation, precursors of the later sun temples, symbols of the royal presence and dominance in the provinces or markers of the royal cult (Wilkinson 1999, 277–8; Verner 2002, 173; Radwan 2003). Scrutiny of the evidence, however, shows that in all cases they were located in the vicinity of the major settlements and power centres of the ancient Egyptian state (generally Wilkinson 1999, 328ff., Piacentini 1993 for Zawyiet el-Mayitin). The location of the northernmost site is to the west of Meidum, near Sileh (the others are located at Elephantine, Edfu, Hierakonpolis, Ombos, Abydos and Zawyiet el-Mayitin). In most cases they were situated at higher altitudes that allowed for unobstructed visibility despite their relatively low heights ranging from 4 m to 8.25 m (Radwan 2003, 111).

A recent survey of the evidence suggests that the area of Fayum was divided among at least three local power centres during the Old Kingdom, one of them being situated close to Sileh (Ćwiek 1997, 17–22; Zecchi 2001, 89–91). This lends additional support to the possible practical symbolism of the small pyramids and their relevance as indicators of major royal economic centres. This conclusion gains in importance when we compare the siting of these pyramids with location of the major irrigation basins (*hawd* in Arabic) of ancient Egypt, necessary for its extensive agriculture — they are almost identical (Lehner 2000, 298–307). Thus again, the interdependence of these monuments and the major economic and (therefore) political centres seems to be established.

The position of the Meidum pyramid on a satellite picture of the area shows clearly that it is situated



at a place where the Nile valley and the Fayum Oasis come closest together (Fig. 1:7; Verner 2002, 161). This evidence seems to favour the conclusion that Sneferu had no problems with local conscription during the building of the Meidum royal necropolis and that the area of Meidum together with the eastern tip of the Fayum Oasis provided the necessary demographic and economic base for a pyramid building project of such a scale (compare Piacentini 1997).

A closer look at the location of the Meidum cemetery shows one more striking feature in the spatial distribution of the funerary structures. Whereas the pyramid itself seems to form the southernmost point of the early Fourth Dynasty cemetery, the remaining tombs built for members of the royal family extend over a kilometre to the north with a slight northeast curve at its northern end (Petrie 1892). Its resulting shape shows that the northernmost part of the cemetery was no more than some 4.5 km from the vast cemetery at Gerzeh. This cemetery is located at the junction of a modern road coming up from the Nile valley westwards and heading towards the Fayum oasis (called Darb Gerza, Map of Egypt Sheet 74/630, 1, 25,000, Atfih). This was still at the beginning of the twentieth century a famous caravan road connecting the Nile valley with Fayum. The strongly prolonged shape of the Meidum cemetery is very unusual in the light of the contemporary evidence that Egyptians tended to build royal and important non-royal cemeteries in clusters of rather densely distributed tombs. It was not quite so, however, in this case. Only one explanation accounts for all the evidence: that the architect of this pyramid cemetery sought to place it as close as possible to the main part of the existing cemetery that served this particular settlement

## Dahshur

In the sixteenth year of his reign Sneferu decided to transfer his burial ground to Dahshur, further to the north (Fig. 1:6, Verner 2001, 365–72). The reasons for his decision are unknown. Maybe the king wished from the inception of the project to build a new, larger pyramid (the square-shaped base of the Bent pyramid measures 188 m compared in length to 144 m of the Meidum pyramid) and one that in its shape was the first true pyramid. Another factor may have been the relative proximity of Memphis. When the Bent pyramid building reached a height of about 46 m, cracks appeared within the masonry and the architect was forced to reduce the steep slope of the side-walls from 54° to 43°. Finally, the decision was made to start the third, so-called North pyramid. This pyramid was

conceived as an even bigger construction (the length of the base being 220 m) but the slope of the walls was from the very beginning lessened to 43°. This pyramid probably became the final resting place of the king. In Dahshur we encounter for the first time explicit problems connected with the bedrock. The huge projects of the Dahshur pyramids seem to have been complicated by the local *tafla* bedrock which was quite unsuitable to bear the immense weight of the individual gigantic structures. This may have led the architects to expand the built area of the base of the third pyramid and to decrease the slope of the walls.

In the tremendous amount of building work by Sneferu one may observe the profound changes that took part on different levels of culture and society precisely at the same time. These are to be seen within the context of the overburdened state economy: a vital part of the resources seems to have been directed towards the state building projects of the pyramids. Inevitably, this tendency led to the economization in non-royal mortuary cults and architecture. It is at Meidum for the first time we can observe three new, socially-significant classes of pottery which evolve and expand the inventory of Old Kingdom vessels: miniature bowls and plates and the so-called Meidum ware. Whereas Medium ware was probably invented to imitate expensive stone vessels for the cult and funerary equipment of the wealthy officials of the day (Bárta 1996, 150), miniature vessels may have been designed exclusively for the upkeep of daily cults for both royal and non-royal persons, miniature plates intended as receptacles for symbolic amounts of food and miniature bowls for beverages (Bárta 1995).

The architecture of non-royal tombs develops in line with these changes. Scrutiny of the early Fourth Dynasty evidence shows that before Sneferu's building activities in Dahshur, tombs for members of the royal family in Meidum covered the incredible size of several thousand square metres (the tomb of the vizier Nefermaat and his wife Atet [M 16] covering an area of 6048 sq.m., mastaba M 17 5512 sq.m., and M6 of Rahotep and Nofret with 3203 sq.m.). Their contemporary counterparts from Saqqara are smaller but still cover impressive areas — their sizes range from 470 to 1431 sq.m. Sneferu's cemetery for family members in Dahshur, however, shows strict standardization in terms of size, approximating about 600 sq.m. of built area. Moreover, it is during the reign of Sneferu that the first offering formulas (the so-called *htp dj nswt* formula) appear in the non-royal tombs. Last but not least, the substructure of the tombs undergoes a profound reduction in size, resulting in a single burial chamber underground, which contrasts with

the previous development of large-scale subterranean rooms imitating the ground plan of a house. Finally, starting from the reign of Sneferu, the location of the tombs of the highest officials of the state depended heavily on the siting of the king's mortuary complex — a rule that remained in operation for the most part of the Fourth Dynasty (Roth 1993, 42ff.).

### **Giza, Abu Rawash and Zawyiet el-Aryan**

The pyramids of the three principal kings of the Fourth Dynasty — Khufu, Khaba and Menkaure — at Giza represent one of the landmarks of the contemporary pyramid fields topography (Fig. 1:2). There is no doubt that it was even more striking after their completion almost 4500 years ago. Khufu, son of Sneferu and Hetepheres (I) was the first king to choose the Giza plateau and launch a single building project unparalleled in the history of the ancient Egyptian state. Khufu's successful overcoming of the initial obstacles resulted in a pyramid with a base of 230.33 m, originally 146.6 m high with a volume of some 2,500,000 cu.m. of built stone, by far the largest completed funerary monument attested from ancient Egypt.

For this project, Khufu found the sole one feasible solution: he was forced to move northwards as far as the Giza plateau where the only suitable bedrock limestone formation was located (Said 1990, 459ff.). This prospective building site guaranteed success for the largest single building project in Egyptian history. Only the solid limestone bedrock of the Moqattam and Maadi formations could sustain the weight of the colossal pyramids of three Fourth Dynasty rulers (Lehner 1985). Aside from such architectural necessities, there were also unavoidable economic needs for the realization of such a project. There was only one issue to be resolved: the economic basis that would make up for the distance from Memphis.

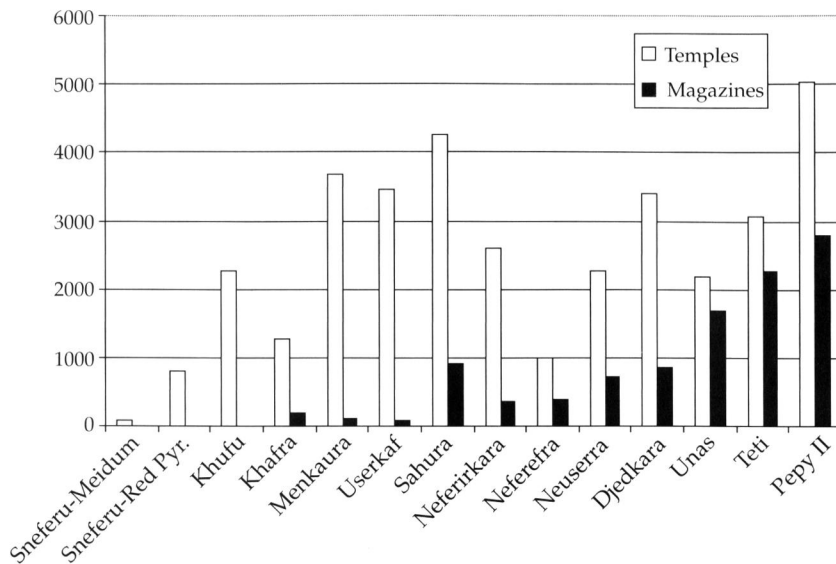
Given the meagre archaeological evidence indicating some kind of limited settlement within the Giza area (Covington 1905; Martin 1997, 279–88), it seems likely that the plateau was not densely populated prior to the Fourth Dynasty. Under such circumstances the state administration had to make sure that the workforce of several thousand had suitable accommodation, and had to arrange for a large number of workshops for bread and beer production, and magazines for storing dried food and fish, the most common staples of the ancient Egyptian diet. All these installations had to be built anew in the vicinity of the construction site. This is one of the most important arguments against the theory of residence transition suggested by Stadelmann (1981, 76–7).

From what we know it seems likely that the city of Memphis remained in its original location for most of its Old Kingdom history (leaving aside its expansion southwards to the area of South Saqqara during the twenty-fourth century BC).

Modern excavations led by Mark Lehner immediately to the southeast of the Giza cemetery (in the vicinity of the local village Nazlet el-Saman) brought to light huge complexes of breweries, bakeries and installations for drying fish, designed to provide the basic staples of the ancient Egyptian diet (Hawass 1996, 53–67; Lehner 1997, 236–7). Moreover, in the past few years his excavations have exposed spacious structures designed to accommodate the workforce working on pyramid construction (Lehner 2002; 2003a,b). According to preliminary calculations related to the excavated areas, it is estimated that the buildings currently revealed served as night shelter for no fewer than 1600–2000 workmen. The excavations have shown a wide spectrum of amenities necessary for a fully-fledged and efficient long-term settlement (i.e. settlement lasting, say, for several decades): accommodation that functioned as self-sustaining units (Gallery IIIa), a manor for the overseer of the building project, magazines and bakeries, silos, a royal administrative building and the Eastern town for the permanent labour force.

Logically, such an ambitious project as Khufu's pyramid complex represented a challenge not only for the king himself, but above all for the administrative system and the economic vigour of the country. There are even some indications that Khufu followed the tough retrenching policy introduced by his father: it is probably not by chance that the mastabas of his family members built around his pyramid are strictly standardized and the decoration of most of the contemporary tombs is limited to the simple slab stela (Manuelian 2003, 167–9).

Khufu's immediate successors seem to follow what in the meantime became a well-established practice: keeping close to stable and reliable limestone bedrock while changing the burial site with every new king. Radjedef built a pyramid north of Giza at Abu Rawash (the pyramid base being 106 m), only a few kilometres north of Giza (Fig. 1:1). The pyramid itself occupies a very favourable position atop a limestone plateau overlooking the region. Clearly, the architects encountered serious obstacles when building the causeway connecting the valley temple with the mortuary temple. The expenditure of labour was, however, compensated again by the high-quality bedrock. As in the case of Meidum, here also there must have been the necessary economic base serving the project: the



**Figure 4.** Built area of the known mortuary temples of the Old Kingdom kings compared to the area taken up by the store-rooms within the temples.

plateaux to the east and northeast of Radjedef's pyramid were occupied by non-royal tombs dating to the period of the First–Fourth Dynasties (Klasens 1975). These were major factors that probably compelled the architects to choose this site despite the fact that the causeway down to the cultivation zone was about 1750 m long. (Khufu's causeway, itself exceeding the Old Kingdom average for a causeway length, was only 740 m long).

Moreover, Radjedef is well-known as the king who introduced the fifth element essential to the official royal titulary, namely the royal name 'son of Ra' emphasizing the link of the king with his mythical father, the son god Ra. More importantly, the site of the Abu Rawash plateau, some 160 metres above sea level, was by far the highest location for an Old Kingdom pyramid and Radjedef was thus closest to his father travelling daily across the sky (c. 52 m a.s.l. Khufu pyramid at Giza, Bent pyramid of Dahshur 50 m a.s.l., Djoser's Step pyramid 55 m a.s.l. etc.: Jeffreys 1998, 67; Fig. 4). Last but not least, the pyramid was very close to the principal cult place of Ra at Heliopolis on the east bank of the Nile. It was probably at this time that the ultimate association of the majority of the Fourth Dynasty kings with the cult place of Re in Heliopolis was born.

Khafra returned to Giza and built the second largest pyramid in Egyptian history, this time with a base of 215 m, a height of 143.5 m and a volume of 2,211,096 cu.m. To strengthen his ties with the sun god he moulded a natural knoll into the shape of a Sphinx and to the east of it built a sanctuary dedicated

to the sun god Ra. His successor Baka left for another site, Zawiyet el-Aryan (Fig. 1:3; Edwards 1994). It is estimated that his unfinished pyramid had had a base of about 210 m. According to archival photographs from the time of Barsanti's excavations it seems that even this pyramid was started on a suitable and solid platform of highest-quality limestone (Valloggia 2003, 231). It is difficult to provide a sound argument for the choice of this site (once during the Third and once during the Fourth Dynasty) which is half-way between Abusir and Giza. The site has as yet been little explored. It may be said that its location with regard to Memphis resembles that of the Dahshur pyramids (it is about 8 km away) but with much better bedrock. Thus the relative proximity to Memphis, good bedrock plus other, at present unknown, site features may have played a decisive role.

The last pharaoh who returned to and situated his monument at Giza was Menkaura (pyramid measuring 102 × 104 m in ground plan, 65 m high, volume 235,183 cu.m.). In this context it is interesting to observe, that no later kings built their monument on the same site. Each of them chose a new site. An explanation for this may lie in the 'waste factor'. Undoubtedly, not only the construction but also the subsequent clearing of the site, including the removal of the building ramps and the stone refuse, required a considerable amount of time. This problem may have been acute especially during the huge construction projects of the Giza kings, who, moreover, used the site next to that where the pyramid was being built as the quarry for the building material for the project (Lehner 1985; Klemm & Klemm 1993, 50–52, 53–9). According to calculations made by Jean-Philipp Lauer, the volume of the ramp used for the construction of the pyramid of Khufu was not less than 1,560,000 cu.m., compared to the 2,583,283 cu.m. of the pyramid itself (Lauer 1989). More recent studies suggest what appears to be a more realistic scenario based on a combination of several types of ramps (and possibly other devices, too). According to Lehner, there was a principal quarry delivery ramp leading to the pyramid (in this specific case to the pyramid of Khufu in Giza) which was used for transportation of the building material. At the pyramid itself, spiral wrap-around ramps were used. This scheme implies a much lower



volume of building material in their construction, although the total amount was still quite substantial (Lehner 2003c, 40–41). Quite recently, Isler rejected the use of both linear and spiral ramps in the construction of the Great pyramid of Khufu (except for the material delivery ramp, see Isler 2001, 211–21) and indicated that most of the stone blocks may have been put into place using levers, wedges and slideways, tumble with masonry and raised by means of stairways (Isler 2001, 246–66). This simple fact may have made the site practically inaccessible for several years after the building itself was successfully accomplished. Moreover, when considering the internal disposition of the Dahshur and Giza sites (the sites with the largest pyramids) one can note the relatively large distance separating each of the two pyramids on the site. This makes it probable that the question of refuse may actually have played a significant role in the post-construction management of the site. Interestingly, this feature seems to be much less in operation during the following period when much smaller pyramids were constructed, producing, undoubtedly, much less debris.

At any rate, Goedicke was able to show that the resulting plan of the three Giza pyramids was closely associated with the temple of Ra in Heliopolis. Prolongation of the line connecting their southeastern corners leads directly to Heliopolis, to its primary cult centre (Goedicke 1995). The ‘solar character’ of the Giza royal necropolis is emphasized by the Sphinx and the temple built to the east of it. According to the prevalent opinion, the Sphinx was a symbol of royal authority *par excellence* depicting the king Khafra as an embodiment of the god Atum, possibly in his aspect of the setting sun (in Egyptian theology equaled with the process of dying) (Lehner 2003b, 173–89).

### The Fifth and Sixth Dynasties: Abusir and Saqqara

With Menkaura began a new trend leading to distinctly smaller pyramids. Again, practical reasons such as the location of the pyramid in regard to the economic base and the quality and availability of the suitable bedrock must be taken into consideration. All of the extant pyramids of his and the following period are situated in the immediate vicinity of Memphis at the sites of Abusir (Fig. 1:4) and Central and South Saqqara (Fig. 1:5). Nevertheless, the decrease in monumentality was to be compensated for since it is also during his reign that the pyramid substructure was enriched by a complex of storerooms. At Menkaura’s pyramid there were six. Shepseskaf’s pyramid possessed five of them in its substructure and later on their canonical number was three (Roth 1993, 45). This

feature also corroborates a significant shift in the philosophy behind the mortuary complexes of the kings. Shepseskaf is the first king of the Fourth Dynasty who decided to return to the area of Memphis and built his monument (shaped to resemble a mastaba) some distance from that of Djoser, at South Saqqara. There is no satisfactory explanation for the specific location of his monument but it was certainly located close to the major economic base provided by the Residence. Equally important may have been the proximity of the tomb to the Fourth Dynasty founder Sneferu in Dahshur — Shepseskaf might have been the son of one of the lesser wives of Menkaura and therefore not a fully legitimate possessor of the throne. The proximity to Sneferu may have been considered an additional support to his legitimacy. Last but not least, rich sources of limestone necessary for the construction of his monument were available in their vicinity (Verner 2002, 258–9).

Userkaf, the first king of the Fifth Dynasty, returned to central Saqqara, preferring to show his adherence to the previous development, and built his pyramid complex outside the northeastern corner of Djoser’s enclosure. One of the principal innovations of his time was the construction of the so-called sun-temple dedicated to the cult of the sun god Ra in Abu Ghurab, north of Abusir, a distance of some 3 km to the north from his pyramid (a policy that was pursued by the majority of the Fifth Dynasty kings). From the time of Userkaf and his Abusir successors we have relatively rich textual evidence for the intensive material support of the Heliopolis priesthood in the form of extensive land endowments (Wilkinson 2000, 152ff.).

It seems that sometime around the beginning of the Fifth Dynasty, during the reign of the second king Sahura at the latest, another major change in the conception of the royal mortuary complex occurred. Hand in hand with the sudden decrease in pyramid size there went a tendency to emphasize the decoration program of the complex, thus favouring a symbolism of the royal tomb set not by its sheer size and monumental impression, but by the elaborate and much more thoughtful and extensive decoration programme on the walls. The clearest example is set by the complex of Sahura, founder of the royal necropolis in Abusir. His temple comprised some 370 running metres of decoration, whereas several of the most important kings of the Fourth Dynasty seem to have paid little attention to this component. (Sneferu, the biggest pyramid builder, reserved only 64 running metres for the decoration of his complex, his son Khufu 100 m and the direct predecessor of Sahure, king Userkaf, only about 120 m of relief decoration: Arnold 1999, 98.)

As at Giza, the Abusir pyramids of Sahura, Neferirkara and Neferefra were very likely built (i.e. situated in the necropolis) according to a single master plan. Verner was able to show that their northwestern corners lie in a line which runs directly to the north-east and intersects the Giza pyramids line precisely at Heliopolis, in the sun temple of Ra (Verner 2002, 302–3). Jeffreys, however, claimed that the area of the pyramid fields starting with the Abusir monuments in the north were not visible from Heliopolis. This may provide some explanation for the existence of the sun temples in Abu Ghurab that were built by the Fifth Dynasty kings of Userkaf and Neusera (sun temples of Sahura, Neferirkara, Neferefra and Menkauhor have not yet been discovered) (Kaiser 1956; Winter 1957; Verner 2003). These temples, the southernmost royal monuments visible from the sun temple in Heliopolis, may have acted as translation points connecting the Abusir and Saqqara (Shepseskaf) royal complexes with Heliopolis. Visibility may not only have played a significant role for the pyramid complexes of the first six kings of the Fifth Dynasty. The local topography shows that the setting of the sun temples was such that they may have been visible from Memphis. Thus they transferred the 'heliopolitan solar presence' to the royal Residence and the true centre of the country. This tradition came to an abrupt end during the reign of Djedkara, precisely at the time when the cult of Osiris appears to have won primary attention and started a new development both in religion and within society. From now on, the religious role of the king receded in favour of Osiris, the god of the Egyptian Netherworld (Goedicke 2000, 408–9).

Besides the relief decoration, the shift in priorities found its material expression in the storerooms. Generally, starting with the reign of Sahura, there was a strong tendency towards increasing the area reserved for storerooms within the mortuary complexes. This indicates that the daily cult carried out in them gained in importance. In the case of the Sahura complex the storerooms take up 916 sq.m. of the whole 4246 sq.m. of the temple's area. This policy stands in a marked contrast with the previous Fourth Dynasty development (compare Fig. 4). Sneferu's Red pyramid temple in Dahshur covered an area of about 800 sq.m. with virtually no store rooms. Khufu's temple covered an area of more than 2000 sq.m. following the same trend. Storerooms start to appear during the reign of Khafra but only occupy less than 200 sq.m. of the 1265 sq.m. of the temple's built area. This tendency is illustrated not only by the built area covered by these structures in individual mortuary temples but also by the papyrus archives recovered in the mortu-

ary temples of Neferirkara (Posener-Kriéger 1976) and Neferefra (Verner in prep.). Their content shows clearly the importance of the regular shipments of provisions for the offering cult of the king. Figure 4 illustrates the linear growth of the built area of the storerooms from the reign of Neferirkara onwards. The increased size of the magazines met one further important requirement that arose in the society: most of the items that were stored in the store-rooms and offered on the altars within the temples were subsequently relabelled as revenues paid in the process of 'reversion of offerings' to all officials associated with the temple administration. Their numbers were steadily increasing with the onset of the Fifth Dynasty (Bárta 1999a). It is probably not by chance that from the beginning of the Fifth Dynasty the royal annals seem to emphasize endowments made by the kings to the individual temples of gods throughout the country (Wilkinson 2000, 152ff.).

Scrutiny of the evidence provides similar results for the varying size of the square pyramid bases. Starting with the pyramid at Meidum, we can observe its gradual increase during the reign of Sneferu, starting with a length of 144 m in Meidum and finishing with the 220 m long sides of the Red Pyramid. The pyramids of Giza continued this trend with a side of 230.4 m for Khufu and 215.2 m for Khafra. Given the original layout of the descending corridors, it is very likely that the dimensions of the base of Khufu's pyramid may originally have been planned to be even larger (Verner 2002, 226–7). Only two generations later, however, the pyramid bases become substantially smaller and standardized. This trend seems again to be initiated by the first king of the Fifth Dynasty, Userkaf, his pyramid base measuring only 73.3 × 73.3 m. The majority of the following pyramids measure 78 × 78 m in ground plan. The likeliest reasons for the refocusing of the state policy applied to the construction of the pyramid complexes may be sought within the sphere of practicality (i.e. qualitatively bad bedrock in the vicinity of Memphis) and a gradual shift of emphasis from monumentality to decoration and symbolism manifest in the sophisticated decoration of the individual parts of the royal complexes.

The archaeological record contemporary with the transformations dated to the beginning of the Fifth Dynasty indicates other major changes within society. The data obtained from inscriptions in the non-royal tombs tell us quite clearly that at the time of the transition from the Fourth to the Fifth Dynasty there was a crucial change in the administration of the country. Before the Fifth Dynasty the highest administrative offices of the state were in the hands of the members

of the royal family, but from now on officials of non-royal origin of significantly lower rank assumed high if not some of the highest offices in the state. This trend finds its reflection (or cause?) in the fact that Userkaf, the first king of the Fifth Dynasty, decided to marry his daughter Khamaat to an official of non-royal origin, an unprecedented action. These officials were concerned not only with the administration of the state and of the Residence but also with the control of the royal mortuary complexes (Bárta 1999a).

Fifth Dynasty pyramids declined significantly in size and there was a clear trend towards their standardization. This trend attains its peak during the Sixth Dynasty when the ground plans of the pyramids were strictly standardized (with bases measuring 78 m). It was during this period that the smallest Old Kingdom pyramids were built (Fig. 4). Simultaneously, storerooms in the mortuary temples take up by far the largest portion of the built areas. It is probably no accident that all late Fifth and the Sixth Dynasty pyramids were built in Central and South Saqqara, close to the late Old Kingdom settlement centre of Memphis (Jeffreys 1998). There are many indications that precisely during this period the pyramid complex emphasized different priorities other than monumentality and grandeur. The internal structure of the temple was governed by an explicit trend towards extensive decoration, large area store-rooms and the religious Pyramid Texts, which provide additional religious and magical power for the kingship, being placed on the walls inside the pyramids.

In the Fifth and Sixth Dynasty, development in the royal sphere was amply reflected (if not anticipated) on the non-royal level. In contrast to the preceding period, from now on non-royal cemeteries developed more loosely with significantly less dependence on royal tomb location. From the reign of Neusera one may observe a marked increase in wealthy tombs of the highest officials of the state, incorporating even some elements of the royal architecture (Bárta forthcoming). It is no wonder that shortly thereafter burial chambers inside the pyramids became decorated with the Pyramid Texts by which the institution of kingship attempted to distance itself from the rest of the population.

## Conclusions

It should be emphasized that the pyramid complexes and their basic characteristics were integral parts of both ancient Egyptian landscape and political life. As such, they amply reflect the evolution of principles that governed Old Kingdom society. Simultaneously,

Table 2. Overview of the pyramid platforms size.

Pyramid	Size of the base
Meidum (Sneferu)	144 × 144
Bent Pyramid, Dahshur (Sneferu)	189.5 × 189.5
Red Pyramid, Dahshur (Sneferu)	220 × 220
Giza (Khufu)	230.4 × 230.4
Abu Rawash (Radjedef)	106 × 106
Zawiyet el-Aryan (Baka)	180 × 180
Giza (Khafra)	215.2 × 215.2
Giza (Menkaura)	104.6 × 104.6
Saqqara (Shepseskaf's Mastaba)	99.6 × 74.4
Saqqara (Userkaf)	73.3 × 73.3
Sahura	78.5 × 78.5
Neferirkara	72 × 72 (after 104 × 104)
Abusir (Neferefra)	planned as 78 × 78
Abusir (Neusera)	78.5 × 78.5
'Headless Pyramid' (Menkauhor?)	c. 68 × 65
Saqqara (Djedkara)	78.5 × 78.5
Saqqara (Unas)	57.7 × 57.7
Saqqara (Teti)	78.5 × 78.5
South Saqqara (Pepy I)	78 × 78
South Saqqara (Pepy II)	78.75 × 78.75

however, they may also be considered as symbols of the religious landscape *par excellence*. Ancient Egyptian pyramid complexes were devised as places for communication with the gods, as resurrection machines for the immortal transformation of the king and, last but not least, as one of the principal means of identity for an ancient Egyptian and the kingship. Being located on the edge of the Western Desert, the pyramid complexes were conceived as bridges connecting the profane world with the hereafter through the unique architectural form and the person of the deceased king.

We shall probably never know for sure what exactly were the factors governing the distribution of pyramid complexes over such a large territory. The space available for scientific excursus, however, is to a significant degree restricted by the specific Egyptian landscape, by innate, religious concepts and by the social environment. The arguments brought forward in this article add to a large variety of existing opinions and views. As in many cases, it seems feasible to suggest that the location of the pyramids may have been the result of several simultaneously applied strategies or preferences, combining both religious and practical aspects of the decision-making process of the

ancient Egyptian architects. Specifically, the pyramid complexes of the kings may be also called 'religion in stone' mainly because older and overcome features were almost never forgotten or replaced but modified, built upon and reinterpreted.

As suggested above, viewing the pyramid complexes of the Old Kingdom kings against the background of the social development of ancient Egyptian society seems to enhance significantly our understanding of their locations. This view suggests that it was not an isolated phenomenon; more likely it reflected complex and intrinsic values innate in contemporary ancient Egyptian society. There is little doubt that the locations of the individual cemeteries were not the result of a genuine plan realized over centuries; rather it was the result of various and differing diachronic priorities interacting at one particular point of time. The principal role was probably played by the location of the major economic centre, a central place (Christaller 1972) — Memphis — capable of sustaining the realization of such demanding projects in its vicinity of the cemeteries of Abusir, Saqqara, Dahshur and Zawiyet el-Aryan, followed by the site of Meidum, which was probably located close to another major centre of the time. As such, these monuments may be considered as materialized political statements of the ruling class. In turn, they also reflect natural development and growth within a society limited by its economic means and attained degree of administration that was surely one of the limiting factors in the creation of these monuments. These two central places were balanced by the relatively distant (in regard to Memphis) locations of Giza and Abu Rawash. The decision-making process of the ancient architects may have been in varying degree influenced by the existence of suitable limestone platforms capable of carrying the weight of some of the largest monuments (compare, for instance, the specific Fourth Dynasty trend introduced by Sneferu and Khufu with the later Fifth and Sixth Dynasty epoch). In such cases, the innate Egyptian tendency towards ever-increasing size in royal mortuary projects, formulated by E. Hornung as '*Erweiterung des Bestehenden*' (Hornung 1982, 37–8), prevailed and the economic criteria were simply overridden. It was only this typically ancient Egyptian equilibrium between symbolic and practical arguments that led to the emergence of the unique pyramid fields of the Old Kingdom. Once a new necropolis was established, it seems that the major factors influencing the location of the individual monuments were the political and religious requirements. The Fourth–Sixth Dynasties may be divided into two general periods. The Fourth Dynasty was dominated (after the Meidum and Dahshur stage)

by the large-scale building projects of the funerary complexes built on first-class limestone bedrock (Giza, Abu Rawash, Zawiyet el-Aryan) and the unambiguous preference for the cult of Ra in Heliopolis. Later on, during the Fifth and Sixth Dynasties, the pyramids themselves decreased in size, and were sited close to the Memphite residential area with its large population. The decorative preferences of the time became increasingly elaborate, and there was extensive wall decoration of the valley temple, causeway and mortuary temple. By the end of the Fifth Dynasty, there was further elaboration by inclusion of the Pyramid Texts in the pyramids of the kings.

The seeming intensification of the mortuary cult during the Fifth Dynasty is signalled by the increasing size of the storerooms within the mortuary temple (and, also, the increased number of priests involved in the daily cults and receiving their revenues). The emerging picture of the royal pyramid complexes of the Old Kingdom thus becomes more complex and vivid but simultaneously it is easier to comprehend against the background of the general characteristics of ancient Egyptian society of which it was an integral part. Worthy of emphasis is also the never-ceasing interaction between the dominant royal sphere and the opposing non-royal class. Again, one of the best demonstrations of this process is the funerary monument. It has been shown that throughout the Old Kingdom the dynamics of society, as instigated by requirements on the religious and political level of the ruling class, put considerable constraints on the ensuing tendencies and means of power presentation. Thus the power-holders were constantly compelled to keep up the pace of the innovative process that would set them apart from the rest of the population. On the other hand, the limitations of this were clear as well. In order to keep the majority of the administrative class (scribes, trained administrators, priests and military/expedition officials) loyal, they had to be given a share of the wealth appropriated by the ruling class. Later on, they even gained access to the royal Osirian afterlife (sometime during the Fifth Dynasty, likely under the reign of Neusera).

Old Kingdom society thus provides a classical example of the process of legitimization, linearization and promotion formulated by K.V. Flannery (1999). It is not by chance that the processes of linearization (imposing a sophisticated system of administration over politically most relevant areas of the country) and promotion (mastering the network of central and centralized institutions) attained their apogee under Sneferu and Khufu.

With the advent of the Fifth Dynasty, another major innovation takes place: the royal family steps back

and even the most important positions in the central administrative system are taken by the 'non-royals'. The final stage enters the scene with the advent of the Sixth Dynasty when the kings in various ways oppose the growing class of wealthy administrators and their families that successfully introduced the hereditary principle into the administration of the country and thus determined the way important state offices were transferred from one to another generation within a single family. The same trend may be tracked down in the tomb inscriptions: during the Fifth Dynasty we can observe the apogee of the ideal biographies, and at the beginning of the Sixth Dynasty biographies narrating individual careers of the officials enter the scene (with one earlier exception dated to the reign of Neusera) (Kloth 2002, 229 ff.). And again, characteristics of the pyramid complexes seem to be in accord with this historical, social and archaeological evidence.

We can clearly see that the final stage of this consistently positive development which began during the Third Dynasty (twenty-seventh century BC) caused the first general crisis of the Egyptian state in the twenty-second century BC. It was marked, among other things, by the disappearance of the large-scale pyramid complexes, the collapse of the central administration and its delinearization, lack of instruments of legitimization and weakening of the class of bureaucrats. Once again as elsewhere, the Renfrew *multiplier effect* and the *law of diminishing effects* have taken their toll. Many minute details of this process, however, and its specific manifestations remain to be clarified by fieldwork, interpretation of the written and other sources and tying them up into a meaningful unity of understanding of the location of the pyramid complexes.

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## Notes

1. The absolute dates used throughout the text are based on the exhibition catalogue *Egyptian Art in the Age of the Pyramids*, New York 1999, p. xx.
2. The seasonal character of the Lake of Abusir has been confirmed during 2004 season hand-auger drillings carried out by the Czech Institute of Egyptology.
3. The monument of Abu Rawash, likely to have been built for the Third Dynasty kings, is much disputed in this context and is not being considered owing to meagre and biased evidence.

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