

Studies in Honor of
William Kelly Simpson



VOLUME I
Museum of Fine Arts, Boston

*Studies in Honor of
William Kelly Simpson*

VOLUME I



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The Discovery of the Satellite Pyramid of Khufu (GI-d)



ZAHI HAWASS

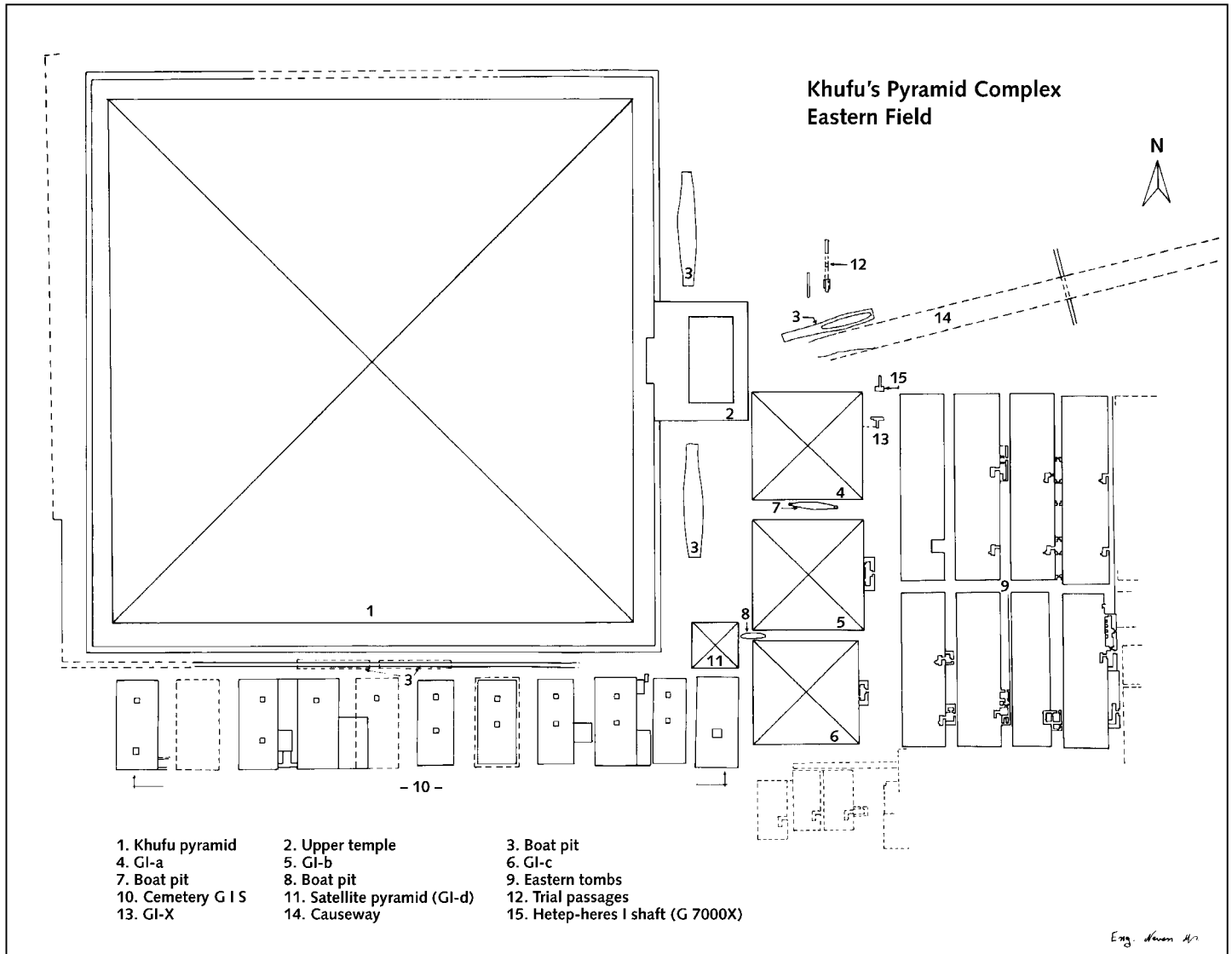
IT GIVES ME GREAT PLEASURE TO DEDICATE THIS NEW DISCOVERY TO Professor William Kelly Simpson. I have known Kelly since 1969, when he was the Co-Director of the Pennsylvania–Yale Expedition at Abydos. I was Inspector of Antiquities for the Expedition then, and after that association became a very close friend of Kelly's. In 1975 he invited me to visit the Museum of Fine Arts and see the excellent collection of which he was curator. Kelly had been publishing the mastabas that Reisner discovered in the eastern and western fields by the Great Pyramid at Giza, and when I became Inspector of Giza, I was able to see him at work on his superb volumes of *Giza Mastabas*. In 1992, Kelly was in Egypt and came to the site to see the recent discoveries on the plateau. We had just discovered the new pyramid discussed below, and Kelly was impressed with this find, even more so because it was unexpected. While Giza has supplied several discoveries about which I could write in honor of Prof. Simpson, it is perhaps this one that might mean the most to him, and I offer my article in honor of his scholarship and friendship.¹

The Antiquities Department of Giza, of the Supreme Council of Antiquities, decided in 1991 to work on the east side of the Great Pyramid of Khufu.² George Reisner excavated this site and recorded most of the architectural components known on the east side of Khufu's pyramid.³ The Antiquities Department also worked in this area and, under Selim Hassan, cleared over 10 meters of sand located on the east face of the pyramid, in addition to excavating the Upper Temple of

¹ I would like to thank Mark Lehner, David P. Silverman, Jennifer Hauser, and Peter Der Manuelian for their assistance in the preparation of this manuscript. In particular, Mark Lehner deserves special thanks for reviewing much of the data presented below.

² This work was done by a team from the Giza Inspectorate of Antiquities: Alaa el Din Shahat, archaeologist; Abdel Hamid Koteb and Nevien Mohammed Mustafa, architects; Mostafa Waziry, Josef Nabieh and Esmat Abdel Ghany, assistant archaeologists; and Hasabala el-Taib, photographer.

³ G.A. Reisner, *A History of the Giza Necropolis 1* (Cambridge, Mass., 1942); G.A. Reisner and W.S. Smith, *A History of the Giza Necropolis 2. The Tomb of Hetepheres, Mother of Cheops* (Cambridge, Mass., 1955).



Khufu⁴ (see figs. 1–3). After Hassan’s excavation, the Antiquities Department prepared the site for visitors and erected a paved road in the area flanking the northern and southern part of the Upper Temple.

Recently, as part of an effort to prepare the site properly for visitors, and to clean and restore the existing monuments, the Antiquities Department decided to remove this road, thereby preventing cars and

Fig. 1. Overview plan of the Great Pyramid and Eastern Cemetery, showing the location of the satellite pyramid (no. 11).

⁴ S. Hassan, *Excavations at Giza 10. The Great Pyramid of Khufu and its Mortuary Chapel* (Cairo, 1960); H. Abu-Seif, “Dégagement de la face est de la pyramide de Chéops,” *ASAE* 46 (1947), pp. 235–43; Maragioglio and Rinaldi, *L’Architettura delle Piramidi Menfite* 4 (Rapallo, 1965).

buses from driving on the basalt pavement of the Upper Temple.⁵ During this work, the satellite pyramid of Khufu was discovered. It is located about 25.5 m southeast of the southeast corner of the Khufu Pyramid and about 7 m west of the subsidiary pyramids GI-b and GI-c. The satellite pyramid shares the same orientation to the cardinal directions and is found at nearly the same level as the Khufu Pyramid.

I. DESCRIPTION OF THE PYRAMID

The ruins of the satellite pyramid cover an area approximately 24 m square (fig. 4). The remains include fine, Tura-quality limestone blocks from the pyramid's outer casing and perimeter foundation, some of which remained in situ (see below), large blocks of cruder limestone and debris that filled the core of the pyramid, and a passage and chamber cut into the bedrock. All the masonry of the pyramid core had been removed from above the substructure when we excavated the pyramid. We found the passage and chamber unroofed and open to the sky.

1.1 Superstructure

What remained of the core of the superstructure as we found it was a U-shaped block of crude masonry and fill of debris that surrounded the substructure on the west, south, and east, and was open to the north. Two courses of irregular blocks remained of the core with debris fill between the blocks. The east and south sides had the most preserved foundation slabs and casing blocks of fine, Tura-quality limestone.

East side

On the east side, nine foundation slabs are in situ, with clear traces of the original pyramid baseline across their top surface. Five casing blocks are also in situ, but the foot of their outer sloping faces is broken away. A bottom course of squared-off core blocks is also preserved, standing above the foundation platform along much of the east side.

South side

We found eleven foundation slabs in situ on the south side of the pyramid with the pyramid baseline visible across their top surface. Farther in toward the core, there was a mass of debris and large irregular limestone pieces along the south side. Closer to the burial chamber, there are large limestone core blocks that were better squared and joined than those near the edge.

West side

Only one foundation slab remains in situ on the west side. The original pyramid baseline is clear on its upper surface. North and south of

⁵ The publication of this work with a map of the eastern field will appear shortly.



Fig. 2. The Upper Temple and Great Pyramid of Khufu, looking west, excavation in February, 1940.



Fig. 3. The Upper Temple of Khufu, looking north, excavation in February, 1940.

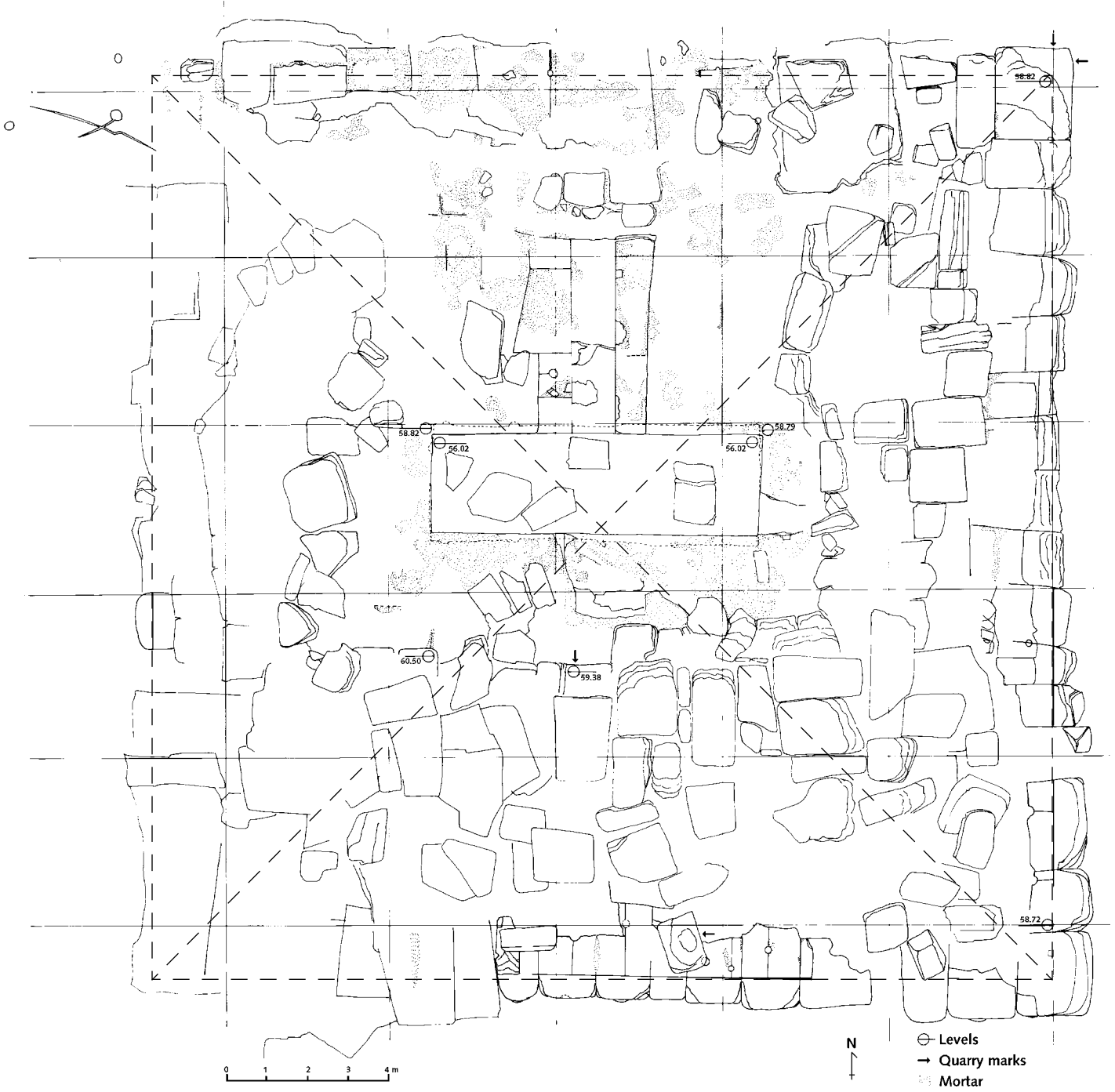


Fig. 4. Plan of the satellite pyramid of Khufu (GI-d).



Fig. 5. View of the satellite pyramid substructure, looking south.

this slab there are broad cuttings in the natural rock which served as emplacements for missing foundation slabs. We found a mass of limestone and mortar debris that composed part of the core along the west side and, closer to the burial chamber, there are large limestone pieces that are very irregular in shape and position.

North side

We found the northeast corner foundation slab in its original position, but any trace of builders' lines had been worn off its upper surface. None of the original foundation slabs remains along the rest of the north side, except for one slab toward the west end, just short of the original corner. This slab revealed a very rough indication of the baseline. Along the north side there are cuttings in the rock floor that were emplacements for missing foundation slabs.

Other comments

On the south (back) side of the pyramid (see fig. 5), there is an inscription in red paint on the north side of a core block facing toward the burial chamber. The graffito reads: *imy rsy s*, "which is on the south (back) side" (see fig. 9).

We found several blocks of the outer casing that were not in their original position. One of these was a casing block of the southeast corner, probably from the second course above the foundation platform. We found many casing blocks toppled out of place along the south side.

Reconstruction of the pyramid base

The original baseline, or setting line, marking the foot of the lowest course of casing blocks, is preserved on five foundation slabs of the east side, and seven foundation blocks on the south side. We found no remains of the original baseline on the north side where most of the foundation slabs were missing. When the foundation slabs are missing, one can see sockets or emplacements cut into the rock floor to receive the individual slabs. However, these do not help determine the exact position of the original pyramid baseline. On the west side there is only one foundation block in situ that carried the baseline.

This single block on the west side allowed us to ascertain the original base length of the pyramid, 21.75 m, by measuring to it from the preserved baseline on the east (the values here are measured graphically off the 1:50 plan). This is a bit less than 41.5 cubits. This reconstruction of the base puts the center of the pyramid .20 m north of the south (upper) edge of the burial chamber. The north–south center axis of the pyramid falls about .15 m east of the best approximation of the north–south center axis of the passage and chamber.

Apex

On the south side of the pyramid we found a large piece of fine, Tura-quality limestone with three exterior sloping faces of the pyramid (fig. 13). An examination of this piece indicates that it formed a little more than the south half of the third course below the apex of the pyramid. It is 2.70 m long and .56 m thick. The exterior faces are coated with a light brown patina from their exposure when they formed part of the completed pyramid. The mean slope of the preserved faces is 52.40°. The underside of the block is flat, but the top surface was shaped as a concavity. When it completed the square of the top of this course of the pyramid, there were four triangular planes sloping toward one another to form the lines of the diagonals of the square. The four triangular planes also sloped 2.6° to the center of the original square of the top of this course. The diagonal lines must have helped the builders control the squareness of the pyramid, to make sure the sides of the pyramid met at a point. This concavity of the top surface was intended to receive the convex underside of the block(s) forming the second course down from the top. Here, obviously, the pyramid superstructure is all casing, with no fill or core material, as it narrows to the apex.

The block or blocks of the second course down from the top are missing, but later we found the actual apex stone of the satellite pyramid, a single piece of fine, Tura-quality limestone. It is the second oldest pyramidion ever found, the earliest belonging to the North Pyramid of

Sneferu discovered by Rainer Stadelmann at Dahshur.⁶ The underside of the pyramidion was convex, with four triangular faces sloping outward 7.3° to the center point of the base. This protruding convex base was meant to fit into the concavity of the second course from the top, just as the blocks of the second course had evidently fit into the convex top surface of third course down (of which the block of the southern half is described above). The edge along the base of the pyramidion was broken away, as was the top, but Joseph Dorner established the mean slope of the faces as $51^\circ 45'$.

This evidence allows us to conclude that the mean slope of the satellite pyramid was almost exactly that of Khufu's main pyramid ($51^\circ 51'$), a slope of 28:22, a *seked* of 5 palms two fingers, with a 7:11 proportion between height and base of the pyramid. The original height of the satellite pyramid was 13.80.⁷

1.2 Substructure

The passage is closely aligned north–south. The upper end of the passage begins 3.75 m from the reconstructed north base line. The width of the passage between the rock-cut walls is 1.05 m (2 cubits). It slopes downward at an angle between 25° and 28° (measured on the section drawings, fig. 6), for a length of 5.25 m (10 cubits) to its opening .55 m above floor level of the chamber. At the upper edges along both sides of the passage there are cuttings to receive the blocks that flanked and covered the passage. These emplacements are cut to depths ranging from 45 to 85 cm, and widths ranging from 75 cm to 1.40 m from the edges of the passage.

The passage and chamber together have the T-shape normal for satellite pyramids subsequent to this newly discovered one of Khufu. The chamber is cut to a depth of 2.85 m. The long walls of the burial chamber lean inward, so that the top of the chamber is narrower than the floor line. A similar situation exists in the eleven galleries under the east side of Djoser's Step Pyramid at Saqqara.⁸ The chamber is 7.92 m long (east–west). The east end of the chamber is 3.35 m wide at the floor and 2.35 m wide at the top, while the west end of the chamber is 3.40 m wide at the floor and 2.45 m wide at the top.

⁶ See Z. Hawass, "The Discovery of the Pyramidion of the Satellite Pyramid of Khufu," *Gs. Abdel Aziz Saleh*, (San Antonio, forthcoming).

⁷ The estimation of the pyramid angles was based on the remaining stones found in situ on the east and south sides, and also on the remains of lines found in the three corners (east, west, and south). Still, the figures are approximate.

⁸ W.S. Smith, *The Art and Architecture of Ancient Egypt*, revised by William K. Simpson (Harmondsworth, 1981), pp. 53–62.

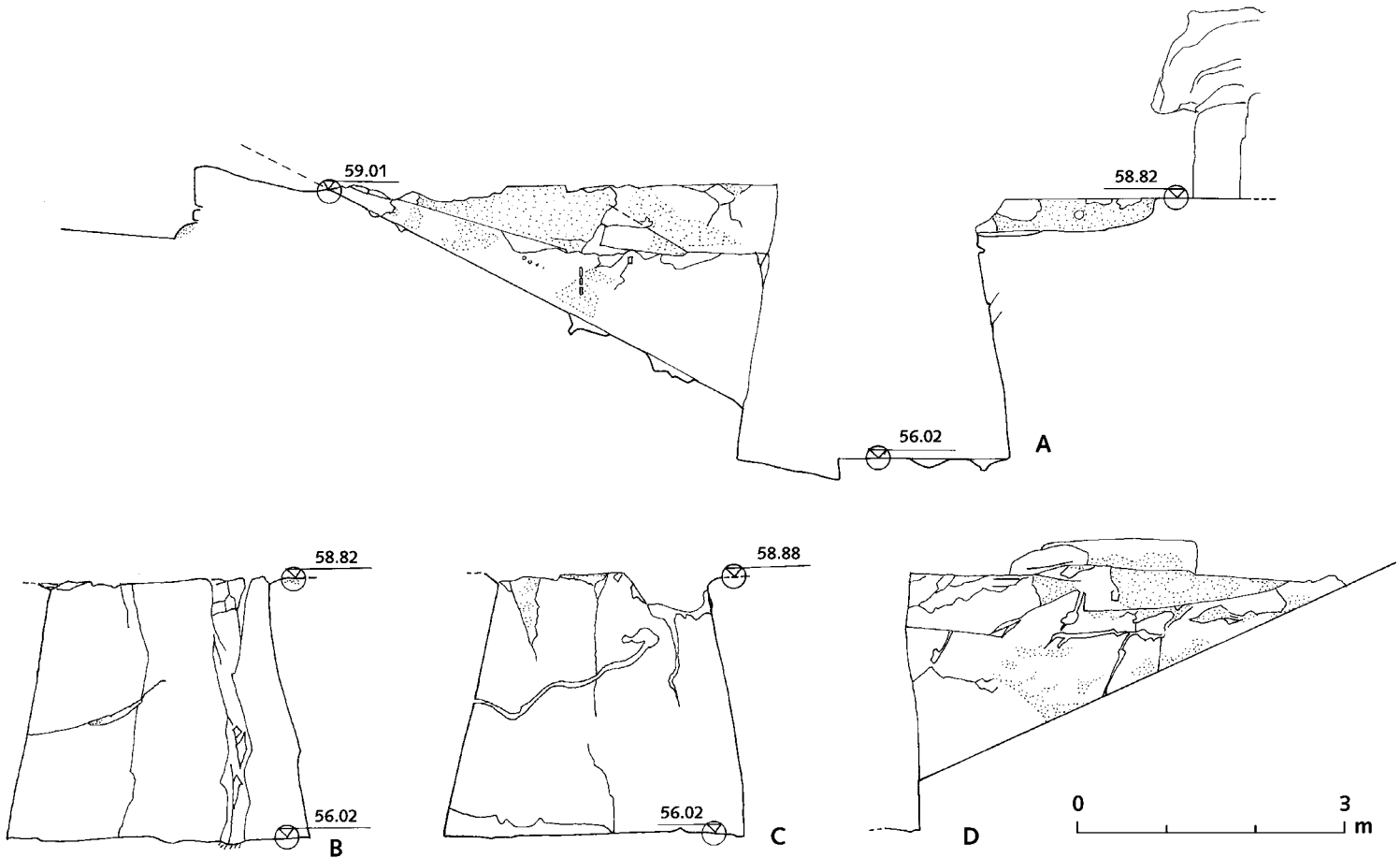


Fig. 6. Sections of the satellite pyramid substructure.

There is a cutting in the floor of the burial chamber, one meter wide, immediately in front of the opening into the chamber of the entrance passage. The bottom of the cutting slopes to a depth of .25 m and ends at a vertical face. The cutting probably received the end of the first block with which the passage was plugged.

At the west end of the chamber there are four small holes, a pair in the north and south walls respectively. The backs of the holes are round. They are about .10 m deep, and spaced, in each pair, about 1.45 m apart. Located a certain height above the floor, they appear to be sockets for wood cross-beams, perhaps for lowering or covering an object in the west end of the chamber.

Since the upper part of the burial chamber is no longer extant, and no ceiling blocks remain, the original shape of the chamber remains a mystery. The inward slope of the north and south walls forms an unusual tent shape. No part of the walls is smoothed or polished. There are

traces of red mortar on the floor of the burial chamber, and traces of red on the south side. The mortar could indicate an original limestone pavement.

1.3 Restoration

In order to give visitors an idea of the original appearance of this small pyramid and its place in the architectural context of the site, as well as to preserve the loose and crumbling core material, we restored parts of the satellite pyramid with new masonry.

Our restoration began on the east side of the satellite pyramid where much of the first casing course was in situ (see fig. 14). The blocks that we recovered allowed us to establish the inclination angle of this side as well as that of the northeast and southeast corners. The restoration team began by making a new corner block for these corners. Displaced and in situ casing blocks, as well as the in situ core block on the east side, allowed us to reestablish the heights of the courses.

On the south side of the pyramid (see fig. 15), the architect first replaced a section of missing foundation slabs so as to complete the pyramid baseline which was partially preserved on this side. During the course of the excavation, large stone blocks which came from the first casing course on the south side were collected, studied and measured, and it was possible for the architect to place a few of them back into their original locations. As we re-established the southeastern corner, we based the angle of inclination of the restored upper course of casing on the blocks that we recovered, on those in situ on the eastern side, as well as on the angle of the limestone block of the third course below the pyramid apex (see above).

On the north side (see fig. 16), we had to replace most of the foundation platform between the only in situ foundation slabs, one at the northeast corner and another toward the west end. We established the north pyramid baseline by taking the pyramid width as given by the preserved baseline on the east side and the single slab with baseline on the west side, and then measuring this width from the preserved baseline on the south side.

On the west side (see fig. 17), we extrapolated from the baseline preserved on the single in situ foundation slab, and found the intersection with our reconstructed north baseline.

We also replaced missing limestone blocks in front of the entrance to the passage and along the sides. We added a lintel across the top of the

⁹ The restoration work on the pyramid was done by Abdel Hamied Koteb and Nivien Mohammed Mustafa, the architects of the Giza Inspectorate of Antiquities. Miss Nivien did the daily restoration and was responsible for all the work completed.



Fig. 7. Detail of the satellite pyramid substructure, looking south.



Fig. 8. Detail of the satellite pyramid substructure, looking east.

Fig. 9. Inscribed core block on the back (south) side of the satellite pyramid.



southern end of the trench of the passage, where it meets the pit of the burial chamber.

2. OTHER CONSTRUCTIONS ON THE EAST SIDE OF KHUFU'S PYRAMID

Scattered around Khufu's pyramid are several constructions whose functions are unknown. They include, in the order in which they are discussed below:

1. The "neben-pyramid"
2. GI-X (the unfinished pyramid)
3. The trial passage and the narrow trench

2.1 The "neben-pyramid"

This structure was found and named by Junker during his excavations in the GIS cemetery south of the Great Pyramid.¹⁰ It lies about 21.50 m south of the base of the pyramid, 42 m from the pyramid's southeastern corner and just outside the second enclosure wall. It is cut into the rock of the plateau and consists of a 4.30 m long descending passage that slopes to the north and ends in a small room measuring 1.5 m x 1.2 m x 0.8 m. The passage measures 0.9 m in height and 1 m in width. The top of the room is 1.3 m below the surface of the bedrock and lies under the second enclosure wall.¹¹

¹⁰ Junker, *Giza* 10, pp. 9–12, fig. 6.

¹¹ Maragioglio and Rinaldi, *L'Architettura* 4, pp. 74–75, pl. 2, fig. 4; M. Lehner, *The Pyramid Tomb of Hetep-heres and the Satellite Pyramid of Khufu* (Mainz am Rhein, 1985), p. 37.

Junker and Reisner believed that this structure was planned as a queen's pyramid. Possibly for topographical reasons, it was abandoned and rebuilt to the east.¹² Reisner noted that before and after Khufu's time, the location of the queens' pyramids was to the south of the main pyramid, for example: the South Pyramid complex of Sneferu at Dahshur and the pyramid complexes of Khafra and Menkaura at Giza. Both he and Junker believed that the "neben-pyramid" was abandoned because of the proximity of the quarry to the south of the Khufu Pyramid.¹³

Maragioglio and Rinaldi originally suggested that it was a tomb (Reisner, type 9) which predated the Great Pyramid and was abandoned when the pyramid was built. Later they rejected this theory and proposed that the "neben-pyramid" was a serdab similar to the one found south of the pyramid of Khafra.¹⁴ Brinks, however, felt that the "neben-pyramid" was built as the substructure for a satellite or ritual pyramid for Khufu.¹⁵

Recently, we found at Giza two sections of a supply ramp located on the south side, extending to the southwest corner of the Great Pyramid.¹⁶ Its presence suggests that the area to the south of Khufu's pyramid was free of structures during the building of the pyramid. The "neben-pyramid" had no apparent relationship to Khufu's pyramid. Most likely it was dug before or after Khufu's reign and has nothing to do with Khufu's burial as either a satellite or queen's pyramid.

2.2 The unfinished pyramid (GI-X)

Reisner found the substructure of an unfinished pyramid just east of Pyramid GIa. About 12.70 m north of this, almost on the east–west axis of Khufu's pyramid is the shaft of Hetep-heres I, G 7000x.

Maragioglio and Rinaldi offered another alternative explanation for GI-X, namely that it represents a trial cutting designed to test the process of laying masonry onto bedrock for the entrances of the small pyramids.¹⁷

¹² Junker, *Giza* 10, pp. 9–12, fig. 6; Reisner, *Giza Necropolis* 1, p. 72.

¹³ *Ibid.*

¹⁴ Maragioglio and Rinaldi, *L'Architettura* 4, pp. 174–76, obs. 56.

¹⁵ J. Brinks, *Die Entwicklung der königlichen Grabanlagen des Alten Reiches*, HÄB 10 (Hildesheim, 1979), pp. 113–22, pl. 5.

¹⁶ The publication of the newly discovered ramp will appear shortly. See the discussion on the ramp in Lehner, *Satellite Pyramid*, p. 81. See also the discussion of the serdab south of Khafra in A.H. Abdel-Al and A. Youssef, "An Enigmatic wooden object discovered beside the Southern Side of the Giza Second Pyramid," *ASAE* 62 (1977), pp. 103–20, and *ASAE* 62 (1979), pls. 1–2. Cf. P. Lacovara and M. Lehner, "Brief Communication: An Enigmatic Object Explained," *JEA* 71 (1985), pp. 169–74.

¹⁷ Maragioglio and Rinaldi, *L'Architettura* 4, p. 182, obs. 76.



Fig. 10. The satellite pyramid area, looking west.



Fig. 11. The satellite pyramid area, looking east.



Fig. 12. The satellite pyramid area, looking south.



Fig. 13. Block forming the south half of the third course below the apex of the satellite pyramid.

GI-X is a T-shaped cutting in the rock, consisting of an open trench sloping from north to south measuring 6.35 m wide, and a 3.75 m long corridor descending from north to south which measures 0.54 m high and 0.85 m wide. Reisner believed that this cutting was abandoned when the nearby tomb of Hetep-heres I was dug.¹⁸ Lehner offers a different explanation for the existence of GI-X. On the basis of the relationship he sees between GI-X and G 7000x, he suggests that the two were features of the same subsidiary complex. According to his theory, G 7000x was dug first and GI-X was started later, only to be abandoned when the plan of the eastern field was changed.¹⁹

2.3 The trial passages and the narrow trench

North of the causeway of Khufu, beside the secret tomb of Hetep-heres I are corridors cut out of the rock. These passages, called the “trial passages,” lie 87.50 m from the eastern base of Khufu’s pyramid and 43.50 m north of the east–west axis. They are oriented north–south, with carefully cut and well-squared blocks, some of which were cased with mortar.

The passages have a total length of 22 m and a total vertical depth of 10 m. At the north end, an opening in the bedrock is cut in steps. It becomes a sloping passage 1.05 m wide and 1.20 m high, which continues at an angle of $260^{\circ} 32'$ for a distance of about 21 m. At a point about 11 m from the north entrance to this passage, a second passage of almost identical cross-sectional dimensions begins. This second passage ascends southward at approximately the same angle as that by which the first passage descends. At 5.80 m from its beginning, this second passage reaches the surface of the bedrock and widens into a corridor which is open to the sky. A square shaft, about 0.72 m in width was cut vertically from the surface of the bedrock to the point where the two passages meet.²⁰

About 6 m west of the trial passages is another long corridor called the “narrow trench.” This runs parallel to the other passages and is almost exactly equal in width to the vertical shaft in the trial passages. It measures 0.15 m deep at the north end and 0.43 m deep at the south end. It is 0.71 m wide and 7.35 m long.²¹

The function of these trial passages has been debated by scholars since their discovery by Perring and Vyse, who believed that they were

¹⁸ Reisner, *Giza Necropolis* 1, p. 70.

¹⁹ Lehner, *Satellite Pyramid*, pp. 71–74; 35–40.

²⁰ Maragioglio and Rinaldi, *L'Architettura* 4, pp. 160–62; 58, 68–70; Lehner, *Satellite Pyramid*, pp. 45ff., fig. 10.

²¹ Maragioglio and Rinaldi, *L'Architettura* 4, p. 70; Lehner, *Satellite Pyramid*, pp. 45–46.



Fig. 14. East side of the satellite pyramid, looking southwest.

part of the substructure of a fourth queen's pyramid that was left without a superstructure.²²

Petrie, who examined and mapped these passages, noted the similarity between them and the passages inside the Great Pyramid. He suggested that the trial passages functioned as a model for the interior of the Great Pyramid and noted that the trial passages had the same height and width (although shorter in length) as that of the passages in the Great Pyramid.²³

The trial passages reproduce in form the following features of the pyramid passages: the descending corridor, the ascending corridor, the northern end of the grand gallery with the lateral branches and the middle horizontal corridor.²⁴

²² H. Vyse, *Operation carried on at the Pyramids of Giza 2* (London, 1841), pp. 63ff.

²³ W.M.F. Petrie, *The Pyramids and Temples of Giza*, with an update by Z. Hawass (London, 1990), pp. 15–16.

²⁴ Maragioglio and Rinaldi, *L'Architettura* 4, p. 68.

Fig. 15. South side of the satellite pyramid, looking northeast.



Lehner lists several objections to the theory that these are model passages: flaws in the sides of the passages would not have been covered with plaster if they were not meant to be used; the lower part of the ascending passage narrows as if to provide a resting place for plugging blocks, a situation that implies a superstructure and a burial; the north opening of the descending passage is cut in steps as if to provide a place for the masonry of a superstructure; and the narrow trench appears to mark the north–south axis of a pyramid. On the basis of these points, he reconstructs a pyramid over the area.²⁵ This pyramid would have been comparable in size to GI–a, b or c, and would have lain on their north–south axis. The upper temple, the causeway, and the fifth boat pit were cut into the hypothetical area of this pyramid, indicating that it was never built.²⁶ Lehner suggested that this pyramid might have been planned as a satellite or ritual pyramid for Khufu. He thinks that it might have

²⁵ Lehner, *Satellite Pyramid*, pp. 50–51.

²⁶ *Ibid.*, pp. 63ff., figs. 9 and 15.

been planned to be twice as large as the eventual queen's pyramids and assumes that it was abandoned for topographical reasons.²⁷ Lehner also suggested that the three queen's pyramids were planned at the same time as the building of this pyramid. According to his hypothesis, this pyramid was never completed, probably due to the expansion of the upper temple and the change in route of the causeway. At this point, Lehner thinks that the queen's pyramid GI-a was taken over as the ritual pyramid. He chooses this pyramid because of its proximity to Khufu's upper temple and the absence of any traces of a mortuary temple associated with it.²⁸

Lehner's theory that the trial passage was originally in the substructure of a satellite pyramid is based on the fact that many of the satellite pyramids have interiors which echo the interior of the main pyramids with which they are associated.²⁹ Lehner later assigned GI-a to the burial of Khufu's mother, Hetep-heres I and GI-b as a satellite pyramid.

The most likely scenario for the subsidiary pyramids of the eastern side of the Great Pyramid seems to be the following: Khufu planned the four subsidiary pyramids on the east side, the trial passages as the substructure of the satellite pyramid and the other three pyramids as queen's pyramids.

In year 5, Khufu changed his cult and appointed himself as Re, then he enlarged the upper temple to accommodate the new subjects of the wall reliefs as well as the new cult.³⁰ The satellite pyramid was abandoned. At this time, GI-a was the pyramid for the original burial of Queen Hetep-heres.³¹

We assumed that GI-c was a satellite pyramid because this pyramid did not have a boat pit on the south side, as did GI-a and b. We excavated the south side of GI-c and found no evidence of boat pits. Queen Henut-sen died and was buried inside GI-c, but apparently the pyramid was not finished, a fact we determined based on the cross lines we found through clearance on the west side of the pyramid. The satellite pyramid was planned in the southeast corner. Its location suggests that it was built at the end of Khufu's reign in year 23, and the method of construction

²⁷ Ibid., pp. 78–85.

²⁸ Ibid., p. 39.

²⁹ Ibid., p. 81; see also Jéquier, *Les pyramides des reines Neit et Apouit* (Cairo, 1933), pp. 10–11.

³⁰ Z. Hawass, "The Great Sphinx at Giza: Date and Function," *International Congress of Egyptology 2* (Turin, 1993), pp. 177–95.

³¹ See Lehner, *Satellite Pyramid*, pp. 30–31; Z. Hawass, *The Funerary Establishments of Khufu, Khafra and Menkaura during the Old Kingdom*, Ph.D. Thesis, University of Pennsylvania (1987), pp. 101–111.

Fig. 16. North side of the satellite pyramid, looking southwest.



indicates that it was built in a hurry and further suggests that it was built a few days after the death of Khufu.

The style of T-shaped burial chamber of the recently discovered satellite pyramid is typical of that of most of the satellite pyramids. Stadelmann determined that GIII-a of Menkaura's subsidiary pyramid was a satellite pyramid because of its T-shaped burial chamber.³² Khafra followed his father in building his subsidiary pyramid with a T-shaped structure,³³ but he built it to the south on the north-south axis of his pyramid. He did not follow his father Khufu in the location of the pyramid. Khafra chose the southeast corner, a location that became the standard location of the satellite pyramids of Dynasties 5 and 6.

³² R. Stadelmann, *Die ägyptischen Pyramiden. Vom Ziegelbau zum Weltwunder* (Mainz am Rhein, 1985), pp. 146–47.

³³ U. Hölscher, *Das Grabdenkmal des Königs Chephren* (Leipzig, 1912), pp. 34–35 and pl. 13.



Fig. 17. West side of the satellite pyramid, looking northeast.

3. LOCATION OF THE OLD KINGDOM SUBSIDIARY PYRAMID

Subsidiary pyramids have been discovered in the complexes of most of the pyramids of the Old Kingdom. A debate exists over whether these represent queen's pyramids or satellite pyramids; i.e., pyramids built for the owner of the main tomb. While several of the subsidiary pyramids at Giza definitely belonged to queens, the newly discovered satellite pyramid which is the subject of this paper did not. It has been suggested that these subsidiary pyramids developed from the southern tomb of King Djoser of Dynasty 3.³⁴

The southern tomb of Djoser, which lies below the southern wall surrounding his complex, west of the north–south axis of the Step Pyramid, is in the form of a mastaba. The burial chamber, which is not

³⁴ H. Ricke, *Beiträge zur ägyptischen Bauforschung und Altertumskunde 4: Bemerkungen zur ägyptischen Baukunst des alten Reiches 1* (Zurich, 1944), pp. 106–107; Lehner, *Satellite Pyramid*, p. 75; J.P. Lauer, *Histoire monumentale des pyramides d'Égypte 2: Les pyramides à degrés (IIIe dynastie)* (Cairo, 1962), pp. 132–33; Jéquier, *Pepi II 1* (Cairo, 1936), p. 9, note 2.

thought to be large enough for an actual interment, was empty. Other internal chambers contained the remains of a wooden box and quantities of pottery and stone vessels thought to have held milk and beer.³⁵ The most significant finds, those in a long north–south gallery, were three paneled niches decorated with reliefs portraying Djoser himself, clearly identified by the inscriptions.³⁶ These stelae, along with the small burial chamber, strongly suggest that this tomb was built for the use of Djoser, and not for a member of his family.

The southern tomb of Sekhemkhet also lies on the north–south axis of the main pyramid, but inside the enclosure wall. It was never finished, but was also in the form of a mastaba. Within the tomb were found the remains of a gilded wooden coffin, dated stylistically to the Old Kingdom, associated with the skeleton of a child.³⁷

The subsidiary pyramid at Meidum is also located south of the main pyramid. There were no finds in this pyramid, except for a fragment of a stele that bears part of a falcon. Interpreted as part of a royal stele, this discovery would suggest assigning the small pyramid to the owner of the main pyramid.³⁸

In the Bent Pyramid complex at Dahshur, a subsidiary pyramid was built south of the main pyramid, on its north–south axis. The interior of this pyramid was empty, but a stele bearing the names and titles of Sneferu next to a representation of the king seated on a throne was found outside the northern entrance.³⁹ No trace of a subsidiary pyramid has yet been found in the northern complex at Dahshur.⁴⁰

In the complex of Djedefra at Abu-Rawwash, a subsidiary pyramid was started in the southwest corner of the complex.⁴¹ Khafra has one subsidiary pyramid, south of the main pyramid and on its central north–south axis. Inside this pyramid several items were found: ox bones, fragments of wood, and a jar-sealing bearing the name of Khafra.⁴² It has

³⁵ J.P. Lauer, *La pyramide à degrés 1* (Cairo, 1935), p. 20; C.M. Firth, J.E. Quibell and J.P. Lauer, *La pyramide à degrés 2* (Cairo, 1936), pp. 62–63; Lehner, *Satellite Pyramid*, pp. 76–77.

³⁶ Lauer, *Pyramide à degrés 1*, pp. 18–20; *ibid.* 2, pp. 105–109, pls. 31–36.

³⁷ Lehner, *Satellite Pyramid*, p. 77; Lehner, “*Récherche et découverte*,” pp. 101–102.

³⁸ Maragioglio and Rinaldi, *L'Architettura 3* (Rapallo, 1964), pp. 26–28, 44ff.; Lehner, *Satellite Pyramid*, p. 75; Cf. Petrie, MacKay and Wainwright, *Meidum and Memphis 3* (London, 1910), pp. 10–12.

³⁹ A. Fahkry, *Sneferu 1*, pp. 89–96; Maragioglio and Rinaldi, *L'Architettura 3*, pp. 74ff., 116, pl. 15, and figs. 1–2.

⁴⁰ Stadelmann, “*Snofru*,” pp. 437–49; *idem*, “*Die Pyramiden des Snofru in Dahschur: Erster Bericht über die Grabungen an den nördlichen Steinpyramide*,” *MDAIK 38* (1982), pp. 379–93.

⁴¹ Lepsius, *Denkmaeler 1*, p. 23; Lehner, *Satellite Pyramid*, p. 76.

⁴² U. Hölscher, *Das Grabdenkmal des Königs Chephren* (Leipzig, 1912), pp. 34–35, 57, 64.

been referred to as both a queen's pyramid and a satellite pyramid.⁴³ There are subsidiary pyramids south of Menkaura's pyramid.⁴⁴ These are, again, usually referred to as queen's pyramids, but it has been suggested that either GIII-a or GIII-c were satellite pyramids.⁴⁵ Userkhaf's complex contains one subsidiary pyramid, which is located to the south of the west side of the main pyramid.⁴⁶ Almost all of the remaining Fifth and Sixth Dynasty pyramid complexes contain one subsidiary pyramid, and these are always, except in the case of Niussera, whose subsidiary pyramid is on the east end of the south side,⁴⁷ east of the main pyramid and south of the upper temple.⁴⁸ The only evidence of attribution in any of these later subsidiary pyramids is from the small pyramid in the complex of Neit. A group of model vessels bearing the name of the queen herself was found in the pyramid,⁴⁹ suggesting that it as well as these later subsidiary pyramids were satellite pyramids dedicated for the use of the owner of the main pyramid.⁵⁰ The fact that many of the Sixth Dynasty queens had their own pyramids and complexes (including as in the case of Neit, subsidiary pyramids) renders the identification of any of these later subsidiary pyramids as queens' pyramids highly unlikely. Thus it seems that the satellite pyramid existed as a part of the pyramid complex of the Old Kingdom since Dynasty 3.



⁴³ Hawass, *Funerary Establishments*, pp. 163–68.

⁴⁴ G.A. Reisner, *Mycerinus. The Temples of the Third Pyramid at Giza* (Cambridge, MA, 1931), pp. 55–68.

⁴⁵ Ricke, *Bemerkungen 2*, p. 126; Stadelmann, "Pyramiden," pp. 137–38; J.P. Lauer, "Sur le dualisme de la monarchie égyptienne et son expression architecturale sous les premières dynasties," *BIFAO* 55 (1955), p. 168. However, I believe that GIII-c is a satellite pyramid; see Hawass, *Funerary Establishments*, pp. 283–85.

⁴⁶ Firth, "Excavations," p. 66; J.P. Lauer, "Le temple haute de la pyramide du roi Ouserkaf à Saqqarah," *ASAE* 53 (1956), pp. 119–33.

⁴⁷ Borchartd, *Ne-user-re*, pp. 108–109, pl. 18.

⁴⁸ Lehner, *Satellite Pyramid*, p. 76; J.P. Lauer, *Le mystère des pyramides* (Paris, 1974), pp. 133–71; Cf. Stadelmann, *Pyramiden*, figs. 51–52, 55, 59, 61, 63, and 67.

⁴⁹ Jéquier, *Neit et Apouit*, pp. 10–11.

⁵⁰ Jéquier, *Pepi II 1*, p. 2; Lauer, "Temple-haut," pp. 167–69; Lauer, *Les pyramides à degrés (IIIe dynastie)*, pp. 132–33; Ricke, *Bemerkungen 1*, pp. 106–107; idem, *Bemerkungen 2*, p. 125.

SCHOLARS FROM AROUND THE WORLD HAVE GATHERED HERE to contribute sixty-eight articles in honor of their friend and colleague, William Kelly Simpson, one of the most distinguished Egyptologists of his generation. The topics include archaeological expedition reports, art-historical essays, philological treatises, and historical analyses. The focus is on Egypt during 3,000 years of ancient pharaonic history, but Nubian and Aegean studies are also well represented. The volume contains 232 photographs, numerous line drawings, and a comprehensive bibliography of W. K. Simpson's Egyptological writings through 1996.

