



■ Detail of the decoration inside the rock-cut tomb of Mersyankh III (M. Bárta)

Giza Plateau

Mark Lehner

Excavation of the Giza Necropolis has taken place over some four thousand years. Ancient Egyptians themselves began to mine the monuments on the Giza Plateau for vestiges of their own past. The Middle Kingdom ruler Amenemhet I scavenged pieces of temples and tomb chapels from Giza and incorporated into the core of his pyramid at Lisht (Goedicke 1971). New Kingdom pharaohs continued to quarry parts of the temples and pyramids of Giza and incorporate pieces other temples, even as they excavated and restored the Great Sphinx (Zivie-Coche 1976: 212-213; Sauneron 1953; Hölscher 1912: 66-67, 71-72).

The first systematic surveys of the Giza Necropolis, from the turn of the 16th to the 17th Centuries, focused mainly on the three main pyramids, their measurements and internal structures. True-to-scale maps of Giza started with the Napoleonic Expedition at the turn of beginning of the 19th Century. Most of the systematic, large-scale excavation of the necropolis surrounding the pyramids took place in the first half of the 20th Century, resulting in multiple-volume publications of George Reisner and his successors at the Museum of Fine Arts, Boston, Hermann Junker and Selim Hassan. In the 1990s, Zahi Hawass resumed excavation on an ambitious scale in the Giza cemeteries.

George Reisner's (1931) excavation of houses in the Menkaure Valley Temple in 1910 and Selim Hassan's (1943) excavation of the planned housing attached to the monument of Khentkawes I in 1932 began to reveal the Giza Plateau as a site of ancient settlement. Larger scale settlement archaeology with analysis of all classes of material culture started at Giza in 1988-1989 with the mission from the University Chicago and Ancient Egypt Research Associates, focused on the Heit el-Ghurab site, a return to the Khentkawes Town, and the Menkaure Valley Temple.

This chapter locates some of the major archaeological objects discovered at Giza. (An overview of the site's research can be found in Janosi 2005, Lehner and Hawass 2015).

Designating Archaeological Areas

Archaeological structures on the "Giza Plateau" span 2 km east west and north south. Across 1.69 sq. km (7/10 sq. mile) of this span, the Fourth Dynasty Egyptians started a carefully designed cluster of royal pyramids and associated cemeteries of mastaba and rock-cut tombs.

Because of this design, major cemeteries may be in closer proximity and more densely packed than at Abusir and Dahshur. The three principal pyramid complexes – each consisting of pyramid, upper temple, causeway, and valley temple – established zones for the development of the cemeteries. "Peribolos walls" of broken stone (secondary to the enclosure walls around the three main pyramids) actually define the three pyramid precincts (Petrie 1883, 100-101; Lehner 1985a: 157-158). Following Reisner, these are GI (Khufu), GII (Khafre) and GIII (Menkaure). Khufu started zoning cemeteries by flanking his pyramid (GI) with the Western Field (WF) and Eastern Field mastaba tombs on a gridded plan of streets and avenues (Janosi 2005; 2006). In the Eastern Field, no tomb was built north of the GI causeway. There, a set of very

different features, mostly rock-cut, call for a sub-zone, Eastern Field North (EFN). Another planned series of mastabas (GI-S) runs along the southern side of GI.

The area east of the Khafre Pyramid (GII) has come to be known as the Central Field (CF). The area south of the GII causeway divides itself as the Central Field West (CFW), a basin quarry some 230 m across exploited up to 30 deep, and Central Field East (CFE), not so deeply exploited by Fourth Dynasty quarry workers, where their bedrock blocks and channels came to be used for rock cut and mastaba tombs into the Fifth Dynasty. Again the Central Field, as with Khufu's Eastern Field, no Old Kingdom tomb was made north of the king's causeway. But here we find a number of Late Period tombs (Zivie-Coche 1991: 282-288) the Central Field, and Khafre's causeway itself makes the area along the north a separate zone, Central Field North.

Because the quarry southeast of the Menkaure Pyramid (GIII) retains features that are important for the archaeology of quarries, as well as inscribed rock-cut tombs, it has been designated as a separate zone, the Menkaure Quarry (MQ).

The Giza archaeological site spans outcrops of two separate geological formations (Aigner 1982). The Middle Eocene Moqqatam Formation rises on the north as the Giza Plateau proper. With hard limestone bedrock and thick layers, the Moqqatam Formation slopes from northwest to southeast at 6 degrees down into a natural wadi, widened by quarrying and filled with deep sand. As a distinct, major topographical feature, that has been little investigated, we can designate Central Wadi (CW) as its own area. Future excavation could reveal more archaeological features. The Upper Eocene Maadi Formation, with bedrock that is more thinly bedded, yellow, and clay-like (tafla) rises to the south along the wadi. This outcrops can be designated the South Field (SF), with a concentration of Old Kingdom and Late Period tombs (Porter and Moss 1974: 294-297) on the south-facing slope into another wadi, at which the Giza archaeological site ends. On the east facing slope of the Maadi Formation, we can designate the concentration of Old Kingdom tombs, and some Late Period tombs (Martin 1991; Petrie 1907; Lehner and Hawass 2017: 54-56, and chap. 14) by the local name, Gebel el-Qibli ("Southern Mount"), which can also refer to the knoll rising above the Central Wadi mouth (Lehner 2002). Finally, we give to the 13 ha of low desert, where about 7 ha of Fourth Dynasty settlement has been mapped and sampled, the name Heit el-Ghurab (HeG), Arabic for "Wall of the Crow," after the site's salient feature, a 200-meter long, 10 m high stone wall that bounds this zone on the northwest (Lehner and Tavares 2010: 176-180).

Large-scale Excavations of Giza

In 1901-02 Gaston Maspero (1846-1916), as head of the Antiquities service, asked the leaders of Italian, German, and American archaeological missions to divide up the Giza Necropolis for excavation. Ernesto Schiaparelli (1856-1928) represented the Egyptian Museum of Turin; George Steindorff (1861-1951) led the Sieglén expedition of the University of Leipzig; and George Reisner (1867-1942), directed the Hearst Egyptian expedition of the University of California. In 1905 the American concession at Giza was transferred to Harvard University and the Museum of Fine Arts, Boston. The story of how Giza was allotted to and transferred among the various missions has been published a number of times. See summaries by Reisner (1942: 21-26), Brovarski (1966: 28-30), and Manuelian (1999).

All three expedition leaders were particularly interested in the large burial ground west of the Great Pyramid. At the time, the tops of mastabas of the Eastern and Western Fields showed just above the sand. In the Western Field, the dividing line between the northern and middle strip was aligned on the north side of the Khufu pyramid, and the division between the middle and southern strip was aligned to its east–west centre axis. Reisner drew the lot for the northern of the three strips, the Germans took the middle and the Italians the southern one. The Italians later gave up their concession and so Reisner came to excavate the southern strip as well as the mastaba tombs and queens’ pyramids of the Eastern Field. Reisner worked at Giza between 1902 and 1941, but he was most active in excavating before the 1930s.

Reisner (1942) was keen to typologize all attributes of mastaba tombs – superstructures, casing, shafts, chapels, and more. However, he was not able to synthesize all his content and categories, and he did not come close to descriptive publication of all the mastaba tombs he excavated. Dows Dunham (1890-1984) and William Kelly Simpson (1929-2017), started publication of the individual mastabas of Reisner’s concession for the Egyptian Department of the Museum of Fine Arts in Boston (Dunham and Simpson 1974; Simpson 1976; 1978; 1980). The series has been carried on with monographs on tomb complexes by Kent Weeks (1994), Ann Roth (1995), Edward Brovarski (2000), and Peter Der Manuelian (2009a), who directed the digital formatting of the entire Reisner record for Giza and made the published and unpublished notes, photographs, maps and plans available on the internet (<http://giza.fas.harvard.edu>).

Schiaparelli worked on behalf of the Turin Museum from 1903 to 1905 (Curto 1963). Steindorff led excavations in the western end of the German concession from 1903 to 1906–07 (Steindorff, Hölscher and Grimm 1991). In 1911, Steindorff offered the German concession to the Vienna Akademie der Wissenschaften (in exchange for part of the Austrian excavation concession in Aniba in Nubia). In 1911, Hermann Junker (1877–1962) took on the work in the middle strip of the Western Field, and eventually of the row of mastabas south of the Khufu pyramid, cemetery GI-S, representing the Vienna Academy of Science and the Roemer- und Pelizaeus-Museum, Hildesheim. Junker worked from 1912 to 1914 and 1926 to 1929. Between 1929 and 1955, Junker published 12 volumes on his Giza excavations (Junker 1929-1955). With many discussions of hieroglyphic titles, texts, and pictorial scenes, Junker’s work offers a virtual cultural history of the Old Kingdom.

Clarence Fisher (1876-1941) excavated on behalf of the Eckley B. Coxe Jr. Expedition for the University Museum of the University of Pennsylvania from January to March 1915 and published his results in *The Minor Cemetery at Giza* (1924). In the cemetery that Reisner re-numbered G 3071 to 3099 (from Fisher’s G 2071 to 2099) he excavated smaller mudbrick tombs with stone fittings that belonged to lower-status officials.

In 1928, on behalf of Cairo University, Selim Hassan (1886–1961) began to excavate mastabas and rock-cut tombs of the Central Field, south of the Khafre causeway, including the tomb of Khentkawes I and her mortuary town. He worked until 1938, finding the Amenhotep II Temple at the Sphinx. He cleared and the Khafre pyramid boat pits and Khufu’s upper temple. Like Junker, Hassan published a series of volumes on the tombs and areas he excavated (Hassan 1936–1960). Abd el-Moneim Abu Bakr (1907–76) excavated from 1949 to 1953 in a number of places in the Giza Necropolis, including a field of small tombs arrayed on the far west of the Western Field, thereafter called the Abu Baker Cemetery (Abu Bakr 1953; Handoussa and Brovarski 2021). In the early 1970s Abdel Aziz Saleh (1921-), on behalf of Cairo University, excavated walls, houses and workshops of an industrial settlement southeast of the Menkaure pyramid (Saleh 1974).

As for the three pyramid complexes, the Antiquities Service took on the Khufu pyramid and the Sphinx (Hassan 1960). The Germans were given Khafre’s pyramid. Uvo Hölscher (1878–1963), excavated the upper temple and valley temple between 1909 and 1010 (Hölscher 1912). For the Americans, Reisner was left with the smaller and seemingly much less promising Menkaure pyramid. But in the ruins of its temples, finished in simple plastered mud brick instead of fine granite and alabaster, he found some of the most exquisite pieces of sculpture from any period or culture worldwide, embedded in the effects of more than 300 years of occupation by people serving Menkaure’s cult (Reisner 1931).

By the terms of the Giza partitioning under Maspero, the Sphinx was first in the German concession and later transferred to the Austrians, but the Egyptian Antiquities Service usurped the Sphinx excavations during the First World War. Émile Baraize (1874– 1952) excavated the Sphinx and the area in front from 1925 to 1936 under the authority of Pierre Lacau (1873–1963), then Director General of the Antiquities Service (Lehner 1991). Selim Hassan carried on large- scale excavations north and east of the Sphinx in 1936–38, discovering the temple of the Eighteenth Dynasty pharaoh, Amenhotep II, dedicated to the Sphinx as Horemakhet (Hassan 1953).

Designating Archaeological Objects

The numbering and description of tombs at Giza started with Carl Richard Lepsius (1810–1884). When they surveyed Giza from 10 November 1842 to 10 February 1843, Lepsius, architect Georg Erbkam and the painter brothers Max and Ernst Weidenbach identified the names of 45 tomb owners and registered another 37 tombs. They copied scenes and inscriptions. In the order that they encountered them, they gave tombs numbers still used today, as LG+number (Lepsius 1897: 24-127; Freier, Grunert and Freitag 1984:13-43; references from Jánosi 1997: 38, n. 45-46).

More systemic excavation, recording and numbering of Giza tombs came with large-scale clearing of the cemeteries near the pyramids. Excavators designated tombs (“objects”) by the names of owner, giving tombs an alphanumeric identification where the name was missing.

The numbering system that Reisner devised is still used. As mentioned, he designated the three main pyramids GI, GII, GIII, and Khufu’s queen’s pyramids as GI-a, b and c; and Menkaure’s subsidiary pyramids as GIII-a, b and c. He seems to have conceived numbering “core cemeteries”, starting with G (for Giza) 1000, soon after he began to excavate the mastaba cemeteries west of the gigantic Mastaba G 2000 in the northern strip of the Western Field. He first sent Arthur Mace to excavate from March 18 until April 19, 1903. From this work, twenty mastabas “appear as the unnumbered structures at the far western edge of the Western Cemetery in Map 2 of Reisner’s *History of the Giza Necropolis*, Vol. I, but expedition photography labels them as G 1, G 2, etc, since they predate Reisner’s four-digit tomb-numbering system” (Manuelian 2009b: 107). Reisner (1942: 23) wrote that he had wanted Mace to determine the western extent of the cemetery. When he himself took charge, on site, he first excavated the “Wady Cemetery” that lay below mastaba G 2000. Here, he found small tombs of low-status people that lacked any strict order. Reisner designated these tombs by GW (Giza Wadi) plus a number (GW 1, GW 2, etc.; Manuelian 2009b: 108).

When he moved up onto the plateau and began to excavate larger, more orderly mastabas at the western edge the Western Field, Reisner started his expandable system of numbering. “These are the least-known, and the most poorly published of all of Reisner’s excavation seasons” (Manuelian 2009b: 107). It was when he had to deal with series of large mastabas in orderly rows that he conceived the idea of “nucleus cemeteries”, specifically, when he en-

countered the “first group of major mastabas east of G 2000, the largest mastaba at Giza:

It must have been at this time that Reisner began to develop his concept of the ‘nucleus’ or ‘core cemetery’, designating a cluster of Khufu-era major mastabas clearly laid out as a group, oriented towards a common design for the evolution of the necropolis (Manuelian 2006: 221).

Reisner applied his G+number designations, “to avoid documentary chaos” (Manuelian 2015: 2). In one of his earliest publications, Reisner (1905) still refers to Mastaba G 2000 (the largest at Giza) under its old Lepsius number, LG23, but he has already assigned his own numbers, such as G 1203, to other mastabas. He devised his numbering to reflect the logic of cemetery planning and development. To describe his system, we cannot do better than quote Peter Der Manuelian’s (2015: 317-318) description:

Streets progress from lower numbers (1000s) in the west to higher numbers in the east (7000s)...One exception is the G 6000 cemetery, occupying its own space southwest of the mastaba of Hemiunu...By this method one can discern instantly that G 1000-6000 numbers represent Western Cemetery tombs, while any tomb with a G 7000 number belongs in the Eastern Cemetery. Major mastabas bear round numbers, such as, moving from north to south, G 4410, G 4420, G 4430, G 4440, with the next row (farther east) increasing by a factor of one hundred: G 4510, G 4520, G 4530, G 4540. Subsidiary and/or intrusive mastabas from later periods received intercalary numbers such as G 4511, G 4518, G 4523, etc. Reisner numbered burial shafts belonging to original mastaba constructions from the front of the alphabet (A, B, C), while exterior or later, intrusive shafts received letters from the end of the alphabet (Z, Y, X).

When Junker published tombs of the middle concession in the Western Field, in the first ten of his twelve-volume publications he occasionally referred to, and sometimes used Reisner’s numbering, but not consistently. In his *Gesamtplan*, Junker (1955: vii) labels individual mastabas in the Austrian concession with the tomb owner’s name in transliteration. He retained the D+number assigned to those tombs that Steindorff excavated for Leipzig between 1903-1907 in the western end of the concession. The absence of Reisner-numbers for the “Junker Cemetery” and “Steindorff Cemetery” is followed in the long-standing Egyptologist’s reference for Giza, *Topographical Bibliography of Ancient Egyptian Texts, Reliefs, and Paintings III. Memphis, Part I, Abu Rawash to Abúsir* (Porter, Moss, and Málek 1974, 100-122, pls. xiii-xiv).

Starting in his first volume, when Junker (1929) presented mastaba tombs he gave them Roman numerals and he supplied either the tomb owner’s name (Mastaba I, s [south] = Iwnw) or the “Reisnerschen Zählung”, for example Mastaba I, n [north] = G 4160, and sometimes both, e.g., Mastaba III, n = Mrj-htp-f (G 4360). In volumes 2 and 3, Junker designates mastabas by tomb owner names. In Giza 4 Junker (1940: 3, Abb. 1) offered a plan with both his Roman numeral + “n” (north) or “s” (south), and Reisner’s numbers for cemetery G 4000. In the “Mittelfeld” Junker (1943 = Giza 6) assigned S (Straßen)+number for small mastabas and shaft graves in the streets (Junker 1943: 27, Abb. 3, 79, Abb. 19). Junker numbered individual shaft tombs in the hundreds, 2000s and 4000s (Giza 9) and sometimes lower-case letters.

When Junker (1944, Giza 7) published tombs on the east end of his strip, which took in a section of the Cemetery en Echelon, he used Reisner 4000- (e.g. 4950, 4960) and 5000-numbers (e.g. 5050, 5060, 5070, etc.), as well tomb owner names, and S+number for mastabas and shafts. Unfortunately, at some later point Reisner switched some of these numbers; he changed certain tombs numbered in the 2100s and 2300s to numbers in the 5000s, and he changed G 2180 to G 4990. He also changed numbers for tombs east of giant mastaba G 2000. He changed numbers for tombs that Fisher excavated from 2000s to 3000s (see Manuelian 2015: 316, n. 3; and Roth 2001: 3). In Giza 7 Junker uses

some of Reisner’s older set of numbers, so that, for example, the mastaba of Sheshemfefer II changed from 2200, which Junker uses, to G 5080. In Cemetery GI- S Junker numbered shafts, apparently from 1 into the 300s (Giza 10-11) for ten mastabas (or lots) with designated by Roman numerals I through X.

All this variability in designating “objects” – with correspondence between excavators here, but not there – contributes to the possibility of, if not documentary chaos, certainly documentary complexity, not least because, all around the larger mastaba tombs, “in both the western and eastern fields the tombs of lesser officials and descendants or funerary priests of the original owners filled the streets and any available spaces” (Brovarski 1996: n. 28). How, then, to make tractable a cemetery site designed to pack as many large, elite mastaba tombs as possible into regimented order, but whose spaces filled with numerous miniature mastabas and shaft tombs? Consider that in his Mittelfeld Junker found numerous “dwarf mastabas” and some 700 total graves (Junker 1950: 6-13).

The division of the Giza Necropolis into excavation concession strips and patches could retard understanding of its layout and development. As Junker (1955: 3) expressed it, “es doch im größten Interesse der Wissenschaft lag, das ganze Gebiet zusammenhängend zu beschreiben”. (and see Jánosi 2005: 31-32 for Junker’s aspirations to understand the necropolis as a whole in its historical sequence). It was precisely to describe the necropolis coherently that Reisner sought a unified numbering system that included the tombs excavated and published by his colleagues. Reisner’s consistent numbering proves most useful, for example in Janosi’s (2005) study of Giza in the Fourth Dynasty.

At the end of his work, Reisner’s (1942) overall maps of the Western Cemetery as published in *A History of the Giza Necropolis, Vol. I*, retained only some tomb designations outside his system. Certain unexamined mastabas and tombs retained their Lepsius Giza (LG), numbers. Tombs that Steindorff excavated between 1903 and 1907 in the western part of the middle concession strip retained their D-numbers. A cluster of mastabas at the far west end of the Western Field remained blank. In his General Map of the Giza Necropolis, Reisner keeps to Junker’s Roman numerals for the (GI-S) row of mastabas south of the Khufu Pyramid.

In recent years, Peter Der Manuelian has “tried to extend the logic of Reisner’s tomb-number system to areas outside the original HU-MFA Expedition concession” (Manuelian 2015: 320). For the most part, Manuelian numbered the tombs excavated by Selim Hassan in the Central Field. In his comprehensive 2005 study, for rock-cut tombs in the Central Field, Jánosi used LG numbers or tomb owners’ names. Manuelian and his team have now designated the entire Central Field as Cemetery G 8000. They designate tombs with round numbers in the hundreds, starting on the west (e.g. G 8080) and progressing to the east. For example, the Galarza Tomb of Khamerernebty II (Callender and Jánosi 1997), at the far north-eastern edge of the Central Field East behind the Khafre Valley Temple, becomes G 8978. Manuelian designates as Cemetery 9000 the area north of the Khafre causeway, which takes in Old Kingdom rock-cut tombs in the north cliff of the “Sphinx Amphitheater”, Late Period rock-cut tombs in the west- northwest cliff of the Sphinx Amphitheater and Late Period shaft tombs west of the Sphinx, most prominently Campbell’s Tomb (Porter and Moss 1974: 290-291), now G 9500.

Remaining to be designated with Reisner numbers are many of the numerous rock cut tombs on the escarpment of the Eastern Field, some excavated in recent years by the Russian Archaeological Mission, directed by Eleonora Kormysheva (Kormysheva, at al. 2010 2012; 2015; 2018; Lebedev 2017). The Russian mission numbered otherwise unidentified tiombs with GE+ number. Also lacking Reisner numbers are mall mastabas in the Central Field West, northwest of the Khentkawes I Monument, excavated by Wahiba Saleh; tombs



■ The pyramids of Giza

of the Abu Bakr Cemetery (Abu Bakr 1953; Manuelian 2009: 320), re-examined and re-published by Edward Brovanski and Tohfa Handoussa (2021); Old Kingdom tombs of the “Workmen’s Cemetery” in the eastern Maadi Formation escarpment south of the Gebel el-Qibli (Hawass 1997; Lehner and Hawass 2017: chap. 14); and all other tombs of the South Field, dating to the Early Dynastic (e.g. Covington’ Tomb, Martin 1997), Old Kingdom (Kromer 1991), and Late Period (Porter, Moss and Málek 1974: 294-297) .

Mapping The Giza Necropolis

There exists no single, best, unified map of the Giza Plateau that brings together all the maps of the various cemeteries produced by the various expeditions. The ever more common production of continuous raster data from laser scans (point clouds) and photogrammetric modelling comes with limitations for archaeological and architectural analysis. Vector-line maps are needed because, by design, linear features and paths constitute the Giza Necropolis, while non-linear terrain is most usefully rendered by contour lines. It behooves map makers to interpret and abstract, that is, to draw the lines of traditional maps. Drawn lines are decisions on the most accurate locations of “objects” and interpretations of ancient builders’ lines.

In fact, because of the complexity, density, and differences in the sizes of tombs and their features, there is no one, ideal such map. Any map can only be an extraction. To display detail at various scales, vector maps are ideally zoomable, and based in a Geographic Information System (GIS) that can store layers of information of various classes and from which researchers can derive information most relevant to the scale of their interest.

Topographic Maps of Giza Were Lacking

Any vector map is an abstraction. General maps of the whole Giza Necropolis published by the early 20th Century expeditions were too abstract and too schematic to understand the necropolis in the context of the local topography and geomorphology. It is surprising how sketchy is Reisner’s published overall General Map of the Giza Plateau. Reisner, Junker, Hassan and other excavators published middle-scale maps that show individual stones of mastabas and shaft linings, but they are also schematic, not the kind of plans and maps, closer to facsimile, produced in the best practice of modern field archaeology.

What is most consequential for understanding the cemeteries and pyramids as archaeological sites is that the maps and plans produced by the early 20th Century expeditions lack any vertical information, in the way of contours or spot heights. Junker demonstrated the importance of topographical information when he published Holey’s (1929: 3-7, Abb. 1-2) report on the contours of the terrain underlying the Western Cemetery in order to illustrate how the different terraces influenced cemetery development. But, in general, topographical maps have been lacking.

In fact, until the photogrammetric survey of 1977 that produced the MHR 1:5,000 map sheets (see below), the maps that best rendered the overall *Gestalt* of the site were produced in the early 19th Century by Pierre Jacotin (1765-1827) of the 1798 Napoleonic Expedition (Description de l’Égypte 1809, vol. v, pl. 6; Gillispe and Dewachter 1987), John Perring (1813- 69; Perring 1839: 5, pl. xii), Carl Richard Lepsius (1810-84) with architect Georg Erbkam (1811-1876; Lepsius 1849, pl. 14); the 1878 map by Émile Prisse d’Avennes (1807-1879; see Taschen 2014: 114, pl. 50), and, with somewhat lesser verisimilitude, Salt’s 1817 map of Giza (Usick and Manley 2007: 15, pl. 1). These early maps show, with impressionist rendering, the condition of the site before two centuries of excavation and modern building. We see archaeological landscape evidence that has since been covered over or removed, such as dumps and tip lines of the pyramid builders, the stone-built embankment that carried Khufu’s cause-

way out over the low desert and even Late Period mudbrick walls and a professional way leading to the Sphinx.

Over the following 150 years, professional survey focused on the pyramids, with a special fixation on the Great Pyramid of Khufu (GI). When Sir Flinders Petrie surveyed on the plateau during 1880-1882, great mounds of debris still obscured the sides of GI. Petrie measured its exterior through an elaborate set of triangulations that encompassed all three Giza pyramids, resolving the positions of the corners and the lengths of the sides trigonometrically. Petrie’s triangulated map, plotted at 1:10,000, was never published at a scale large enough to be useful for further measurement and analysis (Petrie 1883: pl. 1). In 1925, Ludwig Borchardt (1863- 1938) and the German Institute cleared the base of the GI sufficiently for J.H. Cole to survey for a determination of its exact size and orientation (Cole 1925; Borchardt 1926). Surveys by Dorner (1981; 2005), Lehner and Goodman (Dash 2012), and Dash and Paulson (Dash 2015a, 2015b) would follow.

MHR 1:5,000 1977 Map Sheets

As for topographic maps of the overall site, the Survey of Egypt provided maps at scales 1:25,000 and 1:100,000 but these are far too small for archaeological study. In the late 1970s and 1980s, a 1:5,000 (MHR) map series was available for purchase in the Egyptian government Survey Office in Giza. While they are no longer available for purchase, these are still the best maps for the topography of the Memphite pyramids.

Each of MHR map sheets cover 350 x 250 m at scale 1:5,000. They were produced by the Consortium SFS/IGN, France from aerial photogrammetry flown in April 1977 for the Egyptian Ministry of Housing and Reconstruction. They cover the Cairo area and adjacent desert, east and west, from northwest of the Rosetta-Damietta split to south of Dahshur. The valley floor and high desert are contoured at one-meter intervals, with intermittent spot heights in meters above sea level. Those who plotted the maps included any architecture, ancient or modern, that that they could see in the aerial photographs, including, for the Giza Plateau, most of the larger mastabas of the Eastern and Western Fields. These maps are a real boon for archaeologists who wish to study the pyramids of Abu Roash, Giza, Zawiyet el-Aryan, Saqqara, or topics like ancient Memphis and movement of the Nile. MHR map sheets F17-18 cover the Giza Plateau from north of the Khufu Pyramid to south of the South Field.

The Giza Plateau Mapping Project (GPMP)

While the MHR 1:5,000 map series is a real boon for the topography underlying the Giza Necropolis, the scale is too small for middle range focus on pyramids, tombs, and temples. Only those features are drawn which could be seen in the aerial photography from which the map sheets were compiled, and the plotting was not done with an eye to the archaeology of the site.

In 1984 Mark Lehner and David Goodman, Surveyor and Civil Engineer with the California Department of Transportation, Office of Geometrics launched the Giza Plateau Mapping Project (GPMP). The aim was to establish a control network from which a topographic map at a scale as large as 1:500 could be plotted from aerial photogrammetry (Lehner 1985b; Goodman 1985; Lehner 1986; Goodman 2007; Goodman and Lehner 2007; Lehner 2007).

Basic horizontal survey control was established in an 11-course, 6,000-meter long, closed-loop traverse around the necropolis, from the Gebel el-Qibli (GP1), south to the South Field ridge above the southern wadi (GP2-3), west along the Maadi Formation knolls rising south of the Central Wadi (GP4-7), northwest to the high point of the Moqqatam Formation (GP8), northeast to Mastaba G 2000 (GP9), thence to the bedrock surface north of GI (GP10),

then southeast to the top of queen's pyramid GI-c (GP11), and finally south, to close back at the Gebel el-Qibli point of origin (GP1). This traverse skirted the major ancient features of the plateau. Auxiliary stations were established within the loop of the basic control traverse, including stations at, or near, every major architectural features and around the Central Field quarry and the Menkaure Pyramid Quarry. Azimuth control for the GPMP was established by observing the circumpolar star "Polaris." Eight sets of direct-and-reverse sightings were observed on Polaris on the evening of December 31, 1984.

The GPMP vertical datum is based on sea level at Alexandria, with values taken from a single bench mark located in the north face of the Khufu Pyramid, about 17 m westerly of the northeast corner and 2 m ± above the plateau's bedrock surface. This established, vertical datum of the Survey Department of Egypt is a hexagonal cast iron disk with "Survey Dept." embossed on its surface in Arabic and English. The disk is cemented into one of the second course of pyramid stones, a decimeter or so below the top of that stone. It protrudes about 1 cm from the face of the pyramid stone and has an integrally cast nipple, 16 mm in diameter and 7 mm high in the top.

The top of this nipple is the actual elevation point of the benchmark. This datum was published in 1936 as Part Five of Descriptions and Elevations of Survey Bench Marks in the Provinces of Al Jizah (Giza) and Bani Suwayf (Suef), First Edition, by Al Amiriyah Press in Bulaq, Egypt as number 472P with an elevation of 61.724 m asl at Alexandria.

The established horizontal control matrix, the "GPMP Grid," is astronomically oriented. Coordinate values of the GPMP Grid are based on a calculated horizontal center of the base of the Great Pyramid, which was assigned coordinates of North 100,000 meters and East 500,000 meters. The center of the pyramid was calculated from a closed-loop traverse through the brass survey plugs that (Sir) David Gill set in the "sockets" at the pyramid's corners during the (astronomical) Transit Expedition of 1874 (Forbes 1916, 5-76; Petrie 1883, 205-207).

Two survey monuments are documented as existing atop the Great Pyramid. One monument bears first-order and the other second-order geographic positions (expressed in latitude and longitude). The first-order monument is a copper or brass plug (E1) fixed with mortar in the SW corner of the square top of the pyramid. The second-order monument, 2.3 meters NE of the copper marker, is the prominent wooden pole at the center of the top. (This has been removed in recent years). Goodman and Lehner "tied" these two monuments into the basic control traverse and calculated their coordinates in the GPMP grid (Goodman 2007). But latitude and longitude were based on the obsolete Helmert reference ellipsoid. If entered into Google Earth, they place the top of the Great Pyramid more than 180 meters west (in the Western Field).

In 2018 Surveyor Joel Paulson and Glen Dash used GPS (Global Positioning Systems) to determine that the first order Survey of Egypt monument (the brass plug), E1, at the top of GI is located at Latitude 29° 58' 45.00041" North and Longitude 31° 08' 03.05680" East, according to the World Geodetic System Earth ellipsoid proposed in 1984 (WGS 1984). They calculated the center of GI as Latitude 29° 58' 45.05570" North and Longitude 31° 08' 03.11209" East (Dash 2018).

Before LiDAR (Light Detection and Ranging, laser scanning) and widespread use of GPS, the protocol that David Goodman brought to the GPMP was the professional way to set control for surveying a map of an area the size of the Giza Plateau. Goodman plotted the flight lines on the MHR map series for overlapping photo pairs taken from the air. But GPMP never achieved coordination with authorities who could do the aerial photography nor obtain government

clearance to obtain certain photographs that were flown. But the GPMP control network and grid served as an underpinning for all subsequent excavations the University of Chicago / Ancient Egypt Research Associates (AERA) survey and excavations in the Heit el- Ghurab and Khentkawes Town, sites of Fourth Dynasty settlement, as well as tying together maps at 1:50 and 1:100 scales measured by hand (offset planning) and by Total Station survey. These maps include the Khufu (GI) Upper Temple, Sphinx, Sphinx Temple, Khafre (GII) Valley Temple, and Menkaure (GIII) Valley Temple. In addition we have mapped parts of the Giza Plateau for the Supreme Council of Antiquities, for Zahi Hawass, and for the Giza Inspectorate: the AMBRIC trenches that hit the foundation of the Khufu causeway (in 1991, see Jones 2020); the Khufu satellite pyramid and queens' pyramids GI-a, b and c (1995), the area east of the Khafre Valley Temple (in 2002); the Menkaure causeway ramp (in 2004), and the construction ramp along the southern wall of the Wester Field (2005).

In 1992 Mark Lehner enlarged twenty-five of the 500 x 500-meter grid squares of the MHR 1:5,000 map sheets (F17-18) for Giza and clarified and color coded the 1-m contour lines to help Peggy Sanders, of the Oriental Institute, University of Chicago Computer Lab, digitize the contours together with the ancient architecture shown for the Giza Plateau (Sanders 1992). "Once all twenty-five squares were completed these files were processed to extract the X, Y, Z coordinates for every line segment of each contour, producing a data file of just over 100,000 point proveniences for a 3.5 x 4 km area of the Giza Plateau. This file of point proveniences was then used to generate a three-dimensional surface terrain model of the Giza Plateau using the ARRIS graphics program and an add-on module called Topographer, from Aritek Systems, Inc., on a Sun SPARCstation 1+ computer" (Sanders and Sanders 1993: 123).

This surface terrain model, augmented by on-site survey, became a basis for a Geographic Information System (GIS) that AERA launched in 2005 funded by a generous grant from the Charles and Lisa Simonyi Fund for Arts and Sciences. Developed by Farrah Brown, Camilla Mazzucato and carried on by Rebekah Miracle, AERA's GIS incorporates all its excavation and survey data. In 2011, funded by the Glen Dash Foundation, AERA team members began a concerted effort to bring all previous maps and plans of the GPMP and AERA projects, including the temple maps listed above, into the AERA GIS System (Miracle 2011).

In our 2012 field season an AERA survey team launched the Ground Truth Survey Project, as we called it then, as part of the Glen Dash Foundation Survey. Using total stations, team members measured points on the pyramids, causeways, temples and major tombs to further geo-reference their location on an overall map of the Giza Necropolis (Lehner 2012).

As part of this work, starting in 2011, AERA collaborated with Peter Manuelian to geo-reference 66 historical maps produced by the early 20th Century expeditions as part of his Giza Archives Project, which was in transition from the Museum of Fine Arts, Boston, to Digital Giza: The Giza Project at Harvard University. The effort added 1500 more mastaba tombs to AERA's GIS as well as to model of the Giza Plateau (Miracle 2011). As part of that collaboration, Rebekah Miracle provided the Harvard Digital Giza project with a copy of the digitized plateau contour data to assist in their "Giza 3D" modeling for the whole plateau (Manuelian 2013).

More and more, topographical, archaeological and architectural data can be captured with GPS, photogrammetry, both terrestrial and aerial flown at close range with drones, laser scanning, and satellite imagery. Resulting 3D models can be such close facsimiles, almost photographic, that we are reminded of Jorge Luis Borges story where cartography becomes so exact, the map of the empire is the same size as the empire, leaving it of no value whatsoever, except that we can turn and zoom to the 3D models to any scale, and take measurements from them.



The Great pyramid of Giza with the cult pyramid of Khufu in the foreground (M. Barta)

For analysis and understanding, continuous flow-data from such passive, “non- interpretive”, means of capture must still be made meaningful by drawn vector lines. And, one problem with these methods applied to the Giza Plateau is that the Giza Plateau has changed, and continues to change year by year. To keep up with tourist traffic, transport vehicles and parking, the escarpment north of the Great Pyramid has been extended by modern dumping. In order to create new entrance facilities near Mena House in the early 2000s, the ancient dumps of the pyramid builders themselves, captured in the 19th Century impressionist maps, have been covered or removed. More recently, in preparation for transport vehicles bringing visitors from a new entrance on the northwest, massive deposits of red tafla and cobblestones have been brought from outside Giza, and laid down as a new road embankment running from the southwest Panorama to a turn-around between the Khafre and Khufu Pyramids. The ancient structures, too, have changed over the last four decades, most prominently the Sphinx, but also the temples and tombs, where consolidating paste has been used liberally, and stone shoring has been put up to preserve the structures, while necessarily changing them. It is not the same Giza Plateau as captured by the 1977 photogrammetry. The “objects” in these satellite images are not static, they are as much processes.

We are now motivated not so much the desire to generate one, single comprehensive map that shows all architectural and archaeological features of the Giza Necropolis and its topographical setting. That is possible, with zoom capability, but the motivation is to continue to capture data, to add to the map of Giza in the Old Kingdom and later periods (as we have added the entire HeG settlement site, for example). The motivation now is more to generate maps on demand, maps that reflect various interests and scales. This is possible with the layers of information in GIS.

Designating Giza Plateau Areas and Objects on the Satellite Images

In the figures that accompany this essay, areas mostly correspond to those in Porter, Moss, and Málek 1974 for Giza, with the addition of areas EFN (Eastern Field North), GQ (Gebel el-Qibli), HG (Heit el-Ghurab), and MQ (Menkaur Quarry), which features its own cemetery of rock cut and partial mastaba tombs (figs. 1-2). The presentation starts with the three pyramid complexes (GI, GII, GIII), followed by the area around the Sphinx (S). The Central Field, as designated in Porter, Moss, and Málek 1974, is broken down into CFN (Central Field North), CFW (Central Field West) and CFE (Central Field East).

Labeling tombs and smaller features on satellite images taken in recent years is far less optimal than on the detailed form-line (vector) maps compiled from the large-scale excavations of early 20th Century missions. After a century or more, sand has filled around many of the tombs and other structures, and the original builders’ lines are no longer traceable from aerial photographs or raster graphic images. Nonetheless, major tombs are still visible, and most of those listed and mapped in Porter, Moss, and Málek 1974 can be located on the satellite images.

For labelling “objects” on the satellite atlas, it would be burdensome to assign additional alpha-numeric identifications to those already assigned. So, with the exception of the Abu Bakr Cemetery (see below), new I.D. tags have been given only to features that heretofore lacked alphanumeric designations.

Within areas GI, GII, GIII and S, features not previously designated with alphanumeric code are given GI+number, GII+number, GIII+number, and S+number. Features and structures previously given an identification tag keep that tag, so, for example, the subsidiary pyramids are labelled GI-a, GIII-b, etc. Tombs keep numbers previously assigned by Reisner, or by those who carried out his numbering system, mostly recently Peter der Manuelian (2015:

320), who assigned 8000 numbers for Central Field tombs and 9000 numbers for tombs in Area S (fig. 6) and CFN (north of the Khafre causeway). Here, if tombs carry no numbers in the Reisner sequence, they will keep whatever alphanumeric designation have so far been given, for example, Lepsius numbers (LG+number) or D+number for tombs excavated by Steindorff in the western end of the middle strip of the Western Field, or S+number for tombs Junker excavated in his Mittelfeld between cemetery G 4000 and G 2000.

The exception, here, is the Abu Bakr Cemetery, where AB+number have been given to some of the principal tombs previously identified by Lepsius number (LG19-20) or by a owner’s name, before the publication of this cemetery by Handoussa and Brovarski (2021) became available. They give ABC+number to some, but not all of the tombs (e.g. ABC 263, ABC 886). So, the designations given in fig. 8 can be amended.

The remainder of the Western Field is designated more broadly than in Porter, Moss and Málek (fig. 7). Area AB (Abu Bakr Cemetery includes all tombs spread to the northwest on a projecting point of high desert. Area 1K takes in all the tombs assigned Reisner numbers in the 1000s, from G 1008 to G 1673 (as in Porter, Moss, and Málek 1974: 52-65). In fact, the hundreds of thousand numbers assigned to tombs in area 1K do not consistently designate different clusters or “nucleus cemeteries”. They do trend toward higher numbers, from 1000s to the 1400s, from east to west. But, tombs numbered in the 1400s do not comprise a separate cluster. They interlace with tombs on the western edge of tombs numbered in the 1200s. Tombs with numbers in the 1600s extend from rock cut tombs (G 1607-1608) at the eastern end of the Abu Baker Cemetery (see fig. 8) to individual tombs (G 1673) on the north edge of the concentration within area 1K. The jump from 1200s to the 3000s comes from Reisner renumbering of Clarence Fisher’s 2000-numbers for the small tombs he published as “The Minor Cemetery at Giza” (Fisher 1924).

The other subdivisions of the Western Field broadly follow the cemeteries designated in the 2000s (2K), Cemetery 4000 (4K), and the Cemetery en Echelon (CE), except that here the northern part with the Snedjemib complex (Brovarski 2000) and a distinct cluster of smaller tombs around it, is designated (CEN). Area 6K, named for Cemetery G 6000, is extended to take in any tombs (e.g., LG14) west of the G 6020-30-40 group (Weeks 1994). Area WC (Wady Cemetery) is where Reisner excavated small tombs of low status people before he personally started excavating mastabas in the Western Field (Manuelian 2009b).

BIBLIOGRAPHY

Abu Bakr, Abdel-Moniem

1953 *Excavations at Giza 1949–1950*, Cairo: Government Press.

Aigner, Thomas

1982 “Zur Geologie und Geoarchäologie des Pyramidenplateaus von Giza, Ägypten”, *Natur und Museum* 112/12, pp. 377–388.

Borchardt, Ludwig

1926 *Längen und Richtungen der vier Grundkanten der Großen Pyramide bei Gise*, Berlin: Julius Springer.

Brovarski, Edward

1996 “Epigraphic and archaeological documentation of Old Kingdom tombs and monuments at Giza and Saqqara”, in: Thomas, Nancy (ed.). *The American Discovery of Ancient Egypt*, Los Angeles: Los Angeles County Museum of Art, pp. 24–43.

2000 *The Senedjemib Complex, Part I*, Boston: Museum of Fine Arts [Giza Mastabas 7].

Callender, Vivienne – Jánosi, Peter

1997 “The tomb of Queen Khamerernebty II at Giza: A reassessment”, *Mitteilungen des deutschen archäologischen Instituts Abteilung Kairo* 53, pp. 1–22.

Cole, J., H.

1925 *Determination of the Exact Size and Orientation of the Great Pyramid of Giza*, Cairo: Government Press [Survey of Egypt Paper 39].

Curto, Silvio

1963 *Gli scavi italiani a el-Ghiza 1903*, Roma: Aziende Tipografiche eredi Dotti G. Bardi [Centro per le antichità e la storia dell’arte del Vicino Oriente, Monografie di archeologia e d’arte 1].

Dash, Glen

2012 “New Angles on the Great Pyramid,” *Aeragram* 13/2, pp. 10–19.

2015a “What was the original size of the Great Pyramid’s footprint?”, *Aeragram* 16/1, pp. 8–11.

2015b “The Great Pyramid’s footprint: results from our 2015 survey”, *Aeragram* 16/2, pp. 8–14.

2018 “Where in the world is the Great Pyramid?”, *Aeragram* 19/1, pp. 16–20. Descriptions and Elevations

1936 *Descriptions and Elevations of Survey Bench Marks in the Provinces of Al Jizah (Giza) and Bani Suwayf (Suef)*, pt. 5, 1st ed. Bulaq: Al Amiriyyah Press (In Arabic).

Descriptions and Elevations

1936 *Descriptions and Elevations of Survey Bench Marks in the Provinces of Al Jizah (Giza) and Bani Suwayf (Suef)*, pt. 5, 1st ed. Bulaq: Al Amiriyyah Press (In Arabic).

Dorner, Josef

1981 *Die Absteckung und astronomische Orientierung ägyptischer Pyramiden*, Unpublished Doctoral Dissertation: Universität Innsbruck.

2005 “Das Basisviereck der Cheops Pyramide”, in: Jánosi, Peter (ed.). *Structure and Significance: Thoughts on ancient Egyptian Architecture*, Vienna: Österreichische Akademie der Wissenschaften [Österreichische Akademie der Wissenschaften Denkschriften der Gesamtkademie, Band 33], pp. 275–281.

Dunham, Dows – Kelly Simpson, William

1974 *The Mastaba of Queen Mersyankh III, G 7530–7540*, Boston: Museum of Fine Arts [Giza Mastabas 1].

Fisher, Clarence S.

1924 *The Minor Cemetery at Giza*, Philadelphia: University Museum.

Forbes, George

1916 *David Gill, Man and Astronomer*, London: John Murray.

Freier, Stefan – Grunert, Elke – Freitag, Michael

1984 *Eine Reise durch Ägypten. Nach den Zeichnungen der Lepsius-Expedition in den Jahren 1842–1845*, Berlin: Henschelverlag.

Gillispie, Charles C. – Dewachter, Michel (eds.)

1987 *Monuments of Egypt, the Napoleonic Edition: The Complete Archaeological Plates from La Description de l’Égypte*, Princeton: Princeton Architectural Press.

Goedicke, Hans

1971 *Re-used Blocks from the Pyramid of Amenemhet I at Lisht*, New York: Metropolitan Museum of Art.

Goodman, David

1985 “1984/85 survey controls”, *Newsletter of the American Research Center in Egypt* 13, pp. 29–31.

2007 “The GPMP surveying and mapping control-datums”, in: Lehner, Mark – Wetterstrom, Wilma (eds.). *Giza Reports, Volume 1*, Boston: Ancient Egypt Research Associates, pp. 95–100.

Goodman, David – Lehner, Mark

2007 “The survey: the beginning”, in: Lehner, Mark – Wetterstrom, Wilma (eds.). *Giza Reports, Volume 1*, Boston: Ancient Egypt Research Associates, pp. 53–57.

Handoussa, Tohfa – Brovarski, Edward

2021 *The Abu Bakr Cemetery at Giza*, Atlanta: Lockwood [Wilbour Studies in Egyptology and Assyriology 5].

Hassan, Selim

1936–1969 *Excavations at Giza, 10 vols.*, Oxford: Faculty of Arts of the Egyptian University (Vol. 1) – Cairo: Government Press.

1943 *Excavations at Giza IV: 1932–1933*, Cairo: Government Press.

1953 *The Great Sphinx and its Secrets: Historical Studies in the Light of Recent Excavations*, Cairo: Government Press [Excavations at Giza 8].

1960 *The Great Pyramid of Khufu and its Mortuary Chapel*, Cairo: Government Press [Excavations at Giza 10].

Hawass, Zahi

1997 “Tombs of the Pyramid Builders”, *Archaeology* (January/February), pp. 39–43.

Holey, Karl

1929 “Das Gelände des Friedhofs von Giza”, in: Junker Hermann. *Giza I*, Vienna – Leipzig: Hölder-Pichler-Tempsky A.-G., pp. 95–100.

Hölscher, Uvo

1912 *Das Grabdenkmal des Königs Chephren*, Leipzig: J.C. Hinrichs’sche.

Jánosi, Peter

1997 *Österreich vor den Pyramiden, Die Grabungen Hermann Junkers in Auftrag der Österreichischen Akademie der Wissenschaften in Wien bei der grossen Pyramide in Giza*, Vienna: Österreichischen Akademie der Wissenschaften.

2005 *Giza in der 4. Dynastie*, Vienna: Österreichischen Akademie der Wissenschaften.

2006 “Old Kingdom tombs and dating – problems and priorities. The Cemetery en Echelon at Giza”, in: Bárta, Miroslav (ed.). *Old Kingdom Art and Archaeology: Proceedings of the Conference, Prague, May 31 – June 4, 2004*, Prague: Czech Institute of Egyptology, pp. 175–183.

Jones, Michael

2020 “The remains of the causeway and pyramid temple of Khufu: rescue archaeology and preservation through documentation”, in: Kamrin, Janice – Bárta, Miroslav – Ikram, Salima – Lehner, Mark – Megahed, Mohamed (eds.). *Guardian of Ancient Egypt: Studies in Honor of Zahi Hawass, Vol. II*, Charles University, Faculty of Arts, pp. 771–792.

Junker, Hermann

1929–1955 *Bericht über die von der Akademie der Wissenschaften in Wien auf gemeinsame Kosten mit Dr. Wilhelm Pelizaeus unternommenen Grabungen auf Friedhof des Alten Reich bei den Pyramiden von Giza*, 12 vols., Vienna: Hölder–Pichler–Tempsky – Rudolf M. Rohrer [Giza I–XII].

Kormysheva, Eleonora – Malykh, Svetlana – Vetokhov, Sergey

2010 *The Tomb of Khafraankh G 7948*, Moscow: Institute of Oriental Studies, Russian Academy of Science [Giza Eastern Necropolis I].

2012 *The Minor Cemetery to the East from the Tomb G 7948*, Moscow: Institute of Oriental Studies, Russian Academy of Science [Giza Eastern Necropolis II].

Kormysheva, Eleonora – Malykh, Svetlana – Lebedev, Maksim – Vetokhov, Sergey

2015 *Tombs of Tjenty II, Khufuhotep, and Anonymous Tombs GE 17, GE 18, GE 47, GE 48, AND GE 49*, Moscow: Institute of Oriental Studies, Russian Academy of Science [Giza Eastern Necropolis III].

Kormysheva, Eleonora – Malykh, Svetlana – Lebedev, Maksim – Vetokhov, Sergey

2018 *Tombs of Perseneb, Ipy, and Anonymous Tombs GE 23, GE 40, GE 56, GE 57, and GE 58*, Moscow: Institute of Oriental Studies, Russian Academy of Science [Giza Eastern Necropolis IV].

Kromer, Karl

1991 *Nezlet Batran: Eine Mastaba aus dem Alten Reich bei Giseh (Ägypten)*, Vienna: Österreichischen Akademie der Wissenschaften.

Lebedev, Maksim

2017 “Some observations on Old Kingdom burials at the eastern edge of Giza excavated in 2007–2014”, in: Piacentini, Patrizia – Delli Castelli, Alesio (eds.). *Old Kingdom art and archaeology 7: Proceedings of the international Conference; Università degli studi di Milano 3–7 July 2017*, Milano: Pontremoli [EDAL VI], pp. 92–101.

Lehner, Mark

1985a “Giza: A contextual approach to the pyramids”, *Archiv für Orientforschung* 32, pp. 137–158.

1985b “The Giza Plateau Mapping Project: Season 1984–85”, *Newsletter of the American Research Center in Egypt* 131, pp. 23–56.

1986 “The Giza Plateau Mapping Project: Season 1986”, *Newsletter of the American Research Center in Egypt* 135, pp. 29–54.

1991 *ARCE Sphinx Project 1979–1983 Archive*, in: Lehner, Mark – Flowers, Megan – Miracle, Rebekah. Released: 2017-12-23. Open Context. <<http://open-context.org/media/5ffb91c9-18b2-4e61-8cea-470f1049037b>> ARK (Archive): <https://n2t.net/ark:/28722/k2rx9gz3z>.

2002 “The Pyramid-Age settlement of the Southern Mount at Giza”, *Journal of the American Research Center in Egypt* 39, pp. 27–73.

2007 “Appendix to Chapter 2: Giza Survey Notebook”, in: Lehner, Mark – Wetterstrom, Wilma (eds.). *Giza Reports, Volume 1*, Boston: Ancient Egypt Research Associates, pp. 59–93.

2012 “GPMP full circle”, *Aeragram* 13/1, pp.16–19.

Lehner, Mark – Goodman, David

1986 “Unraveling the mystery of pyramid construction”, *P.O.B.* 11/4, pp. 12–19.

Lehner, Mark – Hawass, Zahi

2017 *Giza and the Pyramids*, London: Thames and Hudson.

Lehner, Mark – Tavares, Ana

2010 “Walls, ways, and stratigraphy: signs of social control in an urban footprint at Giza”, in: Bietak, Manfred – Czerny, Ernst and – Forstner-Müller, Irene (eds.). *Cities and Urbanism in Ancient Egypt, Papers from a Workshop in November 3006 at the Austrian Academy of Sciences*, Vienna: Österreichischen Akademie der Wissenschaften, pp. 171–216.

Lepsius, Carl R.

1849–1913 *Denkmäler aus Ägypten und Äthiopien*. 12 vols. Berlin (1849-1859) – Leipzig (1897–1913).

1897 *Denkmäler aus Ägypten und Äthiopien: Text I. Bd. Unterägypten und Memphis*, Leipzig: J. C. Hinrichs.

Manuelian, Peter Der

1999 “Excavating the Old Kingdom: The Giza Necropolis and other mastaba fields”, in: *Egyptian Art in the Age of the Pyramids*, New York: Metropolitan Museum of Art, pp. 139–153.

2006 “A re-examination of Reisner’s nucleus cemetery concept at Giza”, in: Bárta, Miroslav (ed.). *The Old Kingdom Art and Archaeology: Proceedings of the Conference Held in Prague May 34 – June 2004*, Prague: Czech Institute of Egyptology, pp. 221–230.

2009a *Mastabas of Cemetery G 2100*, Boston: Museum of Fine Arts [Giza Mastabas 8].

2009b “On the early history of Giza: The ‘lost’ Wady Cemetery (Giza Archives Gleanings III)”, *Journal of Egyptian Archaeology* 95, pp. 105–141.

2013 “Giza 3D: Digital Archaeology and Scholarly Access to the Giza Pyramids: The Giza Project at Harvard University”, in: *Proceedings of Digital Heritage 2013 (Digital Heritage International Congress)*, Marseille, France, October 28 – November 1, 2013, vol. 2, Marseille: Institute of Electrical and Electronics Engineers, pp. 727–734.

2015 “Harvard University–Boston Museum of Fine Arts Expedition contributions to Old Kingdom history at Giza: some rights and wrongs”, in: Manuelian, Peter Der – Schneider, Thomas (eds.). *Towards a New History for the Egyptian Old Kingdom*, Leiden: Brill, pp. 315–336.

Martin, Geoffrey

1997 “Covington’s Tomb’ and related early monuments at Giza”, in: Berger, Catherine – Mathieu, Bernard (eds.). *Études sur l’Ancien Empire et la nécropole de Saqqâra dédiées à Jean-Philippe Lauer*. Montpellier: Université Paul Valéry [Monspeliensia IX], pp. 279–288.

Miracle, Rebekah

2011 “Something old, something new, something borrowed in map view: GIS brings it all together”, *Aeragram* 12/2, pp. 10–12.

Perring, John E.

1839 *The Pyramids of Gizeh, from Actual Survey and Measurement, Part I, the Great Pyramid*, London: James Fraser.

Petrie, W.M. Flinders

1883 *The Pyramids and Temples of Gizeh*, London: Field & Tuer.

1907 *Gizeh and Rifeh*, London: School of Archaeology in Egypt and Egyptian Research Account.

Porter, Bertha – Moss, Rosalind – Málek, Jaromír

1974 *Topographical Bibliography of Ancient Egyptian Hieroglyphic Texts, Reliefs, and Paintings III. Memphis, Part I. Abū Rawāsh to Abūsir*, Oxford: Clarendon Press.

Prisse d’Avennes, Émile

1878 *History of Egyptian art According to Monuments: from the Earliest Times to Roman Rule*, Paris: Arthus Bertrand.

Reisner, George

1905 “The work of the Hearst Egyptian Expedition of the University of California in 1903– 04”, *Records of the Past* IV/V, pp. 131–141.

1931 *Mycerinus, The Temples of the Third Pyramid at Giza*, Cambridge, MA: Harvard University Press.

1942 *A History of the Giza Necropolis, Vol. I*, Cambridge, MA: Harvard University Press.

Roth, Ann Macy

1995 *A Cemetery of Palace Attendants*, Boston: Museum of Fine Arts [Giza Mastabas 8].

Saleh, Abdel-Aziz

1974 “Excavations around Mycerinus pyramid complex”, *Mitteilungen des Deutschen Archäologischen Instituts Abteilung Kairo* 30, pp. 131–154.

Sanders, John

1992 “Computer Laboratory”, in: Sumner, William M. (ed.). *The Oriental Institute 1990–1991 Annual Report*, Chicago: The Oriental Institute, pp. 76–82.

Sanders, John, – Sanders, Peggy

1993 “Computer Laboratory”, in: Sumner, William M. (ed.). *The Oriental Institute 1990–1991 Annual Report*, Chicago: The Oriental Institute, pp. 120–126.

Sauneron, S.

1953 “Le chef de travaux May”, *Le Bulletin de l’Institut français d’archéologie orientale* 52, pp. 57–63.

Simpson, William Kelly

1976 *The Mastaba of Qar and Idu, G 7101 and 7102*, Boston: Museum of Fine Arts, [Giza Mastabas 2].

1978 *The Mastabas of Kawab, Khafkhufu I and II, G 7110–20, 7130–40, and 7150 and Subsidiary Mastabas of Street G 7100*, Boston: Museum of Fine Arts [Giza Mastabas 3].

1980 *Western Cemetery: Part I*, Boston: Museum of Fine Arts [Giza Mastabas 4].

Steindorff, Georg – Hölscher, Uvo – Grimm, Alfred (eds.)

1991 *Die Mastabas westlich der Cheopspyramide*, Frankfurt am Main: Peter Lang [Münchener Ägyptologische Untersuchungen 2].

Taschen, Benedikt (ed.)

2014 *Egyptian Art, The Complete Plates from Monuments égyptiens & Histoire de l’art égyptien*, Cologne: Horst Neuzner.

Usick, Patricia – Manley, Deborah

2007 *The Sphinx Revealed: A Forgotten Record of Pioneering Excavations*, London: The British Museum [British Museum Research Publications 164].

Weeks, Kent R.

1994 *Mastabas of Cemetery g 6000*, Boston: Museum of Fine Arts [Giza Mastabas 5].

Zivie-Coche, Christiane

1976 *Giza au deuxième millénaire*, Cairo: Institute française d’archéologie orientale du Caire.

1991 *Giza au premier millénaire*, Boston: Museum of Fine Arts.



Western Field
subdivision into
cemetery zones

Area GI
(Khufu Pyramid complex)

Area GII
(Khafre Pyramid complex)

Area S
(Sphinx)

Area GIII
(Menkaure Pyramid complex)





Area G1

Khufu Pyramid complex

- G11:** Khufu pyramid
- G1-a:** queen's pyramid
- G1-b:** queen's pyramid
- G1-c:** queen's pyramid
- G12:** Khufu upper temple
- G13:** causeway
- G14:** satellite pyramid
- G15:** eastern north boat pit
- G16:** eastern south boat pit
- G17:** causeway boat pit
- G18:** western south boat pit
- G19:** eastern south boat pit
- G10:** satellite pyramid boat pit



Area G11

Khafre Pyramid complex

- G111:** Khafre Pyramid
- G112:** Khafre upper temple
- G113:** satellite pyramid
- G114:** causeway
- G115:** valley temple
- G116:** peribolus walls
- G117:** "Quarry Cemetery"
- G118:** quarry grid
- G119:** "workers' barracks"



Area GIII

Menkaure Pyramid complex

- GIII1:** Menkaure Pyramid
- GIII2:** Menkaure upper temple
- GIII-a:** Menkaure satellite / queen's pyramid
- GIII-b:** queen's pyramid
- GIII-c:** queen's pyramid
- GIII3:** causeway
- GIII4:** valley temple
- GIII5:** north mastaba
- GIII6:** peribolos wall
- GIII7:** western enclosure
- MQ:** Menkaure quarry



Area S

Sphinx

- S1:** Great Sphinx
- S2:** Sphinx Temple
- S3:** Amenhotep II Temple
- G114:** Khafre Pyramid causeway
- G115:** Khafre Valley Temple
- 9060:** Tomb No. 11 of Hassan
- 9090:** InkaF rock cut tomb
- 9120:** Akhre rock cut tomb
- 9200:** rock cut tomb
- 9210:** Kawehem
- 9400:** Ptahhardis rock cut tomb
- 9410:** Pedubaste rock cut tomb
- 9430:** rock cut tomb
- 9500:** Campbell's Tomb



Western Field

Subdivision into cemetery zones

- AB:** Abu Bakr Cemetery
- WC:** Wady Cemetery
- 1K:** Cemeteries G 1000 – 1900 and 3000 (Fisher Cemetery)
- 2K:** Cemeteries – G2500
- 6K:** Cemetery G 6000; Cemetery G 4000
- CEN:** Cemetery en Echelon North
- CE:** Cemetery en Echelon



Abu Bakr Cemetery

Mastabas of:

- AB1** Persen and Irukakhufu (LG 20–21)
- AB2** Ipi
- AB3** Nyhotepkhnum
- AB4** Katep
- AB5** Seperi
- AB6** Henutsen and Khufuseneb
- AB7** Neferihy
- AB8** Neferi
- AB9** Abdu
- AB10** Akhethotep
- AB11** Ankh
- AB12** Nywedjaptah
- AB13** Neferherentah

Western Field (WF), Zone 1K

Distinguishing and numbering separate nucleus cemeteries breaks down. Reisner renumbered tombs in the 3000s from Clarence Fisher's numbers 2071 to 2099 for "The Minor Cemetery at Giza". Tombs numbered in the 1400s do not comprise a separate cluster, nor do tombs numbers in the 1600s which extend from rock cut tombs at the eastern end of the Abu Baker Cemetery (see fig. 8) to individual tombs (e.g. 1673) on the north edge of the concentration shown here. Numbers are largely those listed in Porter and Moss 1974, 52-65.

IDO	Tombs of	IDO	Tombs of
3004	Khufumernetjeru	1152	boy statue
3008	Sneferuhotep	1157	anonymous
3015	anonymous	1171	Kaemtjenenet
3020	Semerka	1201	Wepemnefret
3033	Sabef	1203	Kanefer
3035	Tjenti	1204	Akhethotep
3050	Ankh	1205	Khufunakht
3082	Senka	1206	Ikhetneb
3086	Rudj	1207	Nefer
3093	Mededi	1208	Akhethotep
3094	Khetu	1213	anonymous
3096	Nedjsu	1214	Katjesu and Itjetka (?)
3097	Neferhi	1221	Shad
3098	lymery and Neferhetepes	1223	Kaemah
1008	Shepseskafankh	1225	Nefertiabt
1012	Sedaug	1226	anonymous
1020	Messa	1227	Setjiheknet
1021	anonymous	1234	Ankhhaf
1026	Ma	1235	Ini
1029	Sekhemka	1301	Mernesut
1032	Hetepib	1309	Werka (?)
1039	Mertash (?)	1313	lydjefa
1040	Teti (?)	1314	Khakara
1047	Nyankhmin	1351	Shenu (?)
1061	anonymous	1402	Sabu (?)
1062	anonymous	1452+	
1104	Messa	1453	Djedua
1105	Petpennesut (?)	1457	Nefertnesut
1109	anonymous	1607	Ian
1111	Nyanknemty	1608	Senenu
1151	Neferked	1673	Kednes





■ The Great Sphinx with the so-called sun temple of Khafra (M. Barta)