ARCHITECTURAL INNOVATIONS INFLUENCED BY CLIMATIC PHENOMENA (4.2 KA EVENT) IN THE LATE OLD KINGDOM (SAQQARA, EGYPT)

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Abstract
The work of the Polish-Egyptian Archaeological Mission at Saqqara revealed a cemetery of palace officials that was in use during the late Old Kingdom. The evidence found during the exploration of the tombs indicates that the tomb builders were aware of the problems resulting from torrential rains in last years of functioning of the cemetery and that architectural solutions have been invented against these problems. The discussed phenomena seem to be directly related to the 4.2 ka event.

Key words: Saqqara, architecture, 4.2 ka BP climate event, heavy rainfalls.

INTRODUCTION

Quite obviously, architecture is influenced by needs, capabilities and potential of builders/users and any changes in these factors can produce modifications in architectural forms and solutions. This is true not only for domestic, but also for funerary architecture, even though the needs of its users may be seen as less sophisticated and less prone to changes than those of living ones.

A cemetery investigated by the Polish archaeological mission in Saqqara yields evidence of significant architectural modifications, being a response to changing climatic conditions. The cemetery in question, being part of the extensive Memphite necropolis, is situated in Saqqara, west of the Step Pyramid complex (29°52'16.96 N, 31°12'51.20 E; cf. Fig. 1; for bibliography of the site, see: Myśliwiec et al., 2004: 31–36; Myśliwiec and Kuraszkiewicz, 2010: 23–24; Kuraszkiewicz, 2013: 6–7).

The area, extending between the funerary complex of Netjerykhet and the Dry Moat, is almost 10.00 m higher in the East than in the West and it comprises irregular terraces descending toward the West (cf. Fig. 2). The terraces were overlaid with deposits of dakka, formed as a result of stone processing, weathering and natural accumulation (Welc, 2011, Welc and Trzcinski, 2013). Thus, viewed from the west, the area in question was a slope with bedrock terraces exposed in places, topped with the distinct horizontal band of the temenos wall with the towering silhouette of the Step Pyramid in the centre. Towards the end of the 5th Dynasty (24th century BC), a cemetery of palace officials has been established there, as a result of expansion of the Wenis cemetery.

DATING OF THE CEMETERY

There are several factors that make dating of Old Kingdom non-royal tombs a difficult task (cf. e.g., Harpur, 1987; Strudwick, 1985: 2–52; Cherpin, 1989; Seidlmayer, 1997: 17–55; Swinton, 2014; Baud, 1998; Brovarski, 2006; Jánosi, 2005: 3–74). Old Kingdom tomb inscriptions usually do not contain any dates, and royal names – if mentioned – do not always give a certain base for dating. Moreover, the chronology of the Old Kingdom in general is far from being established, due to the peculiarities of the dating system used, and also to the incompleteness of historical record (cf., e.g., von Beckerath, 1962; Strudwick, 1985: 2–3; Spalinger, 1994; Kanawati and Abder-Raziq, 2006; Jánosi, 2005: 3–74).
Thus, absolute dates are generally avoided and it is only rarely that a more precise dating of a tomb than the attribution to particular reigns is possible (cf., e.g., Dee et al., 2008; Rowland, 2008; Bárta, 2013).

The relative chronology of the site is based on its layout and stratigraphy, as well as common features observed in the architecture of the tombs (Myśliwiec et al., 2004: 246–250; Rzeuska, 2006: 381, 383; Myśliwiec and Kuraszkiewicz, 2010: 97; Mycielska-Dowgiałło and Woronko, 1998; Mycielska-Dowgiałło et al., 1999; Szafranski, 1999; Cwiek, 2000; Kuraszkiewicz, 2007; Wele, 2011; Myśliwiec, 2011; Kuraszkiewicz, 2013: 22–23, 274–284). This, combined with the three fixed points described below, allow approximate dates to be proposed for the majority of the tombs. The chronological frame of the cemetery under discussion is based on three points, that is tombs belonging to Merefnebef, Ny-Pepy and Ikhi/Meri, which can be dated with a reasonable precision, as discussed below.

The construction of the tomb of Merefnebef started late in the reign of Teti (c. 2345–2323 BC), was continued through the short reign of Weserkare (c. 2323–2321 BC), and abandoned early in the reign of Pepy I (c. 2321–2287 BC) (Myśliwiec, 2011; Myśliwiec et al., 2004: 246–250). The latest dated tomb is that of Ny-Pepy, was built in the late part of the reign of Pepy II (c. 2278–2184 BC) (Myśliwiec, 2008: 174; Kuraszkiewicz, 2013: 100–107); postdating it there was at least one phase of the cemetery’s development.

The tomb of Ikhi/Meri hewn in the western bank of the Dry Moat dates from the final years of Pepy I to Merenre (c. 2287–2278 BC) (Kuraszkiewicz, 2014; cf. Myśliwiec, 2003: 121–126; Kuraszkiewicz, 2003: 137–140; Rzeuska, 2003b: 144–150; Kuraszkiewicz, 2006: 193–195). The main owner of this tomb, god’s sealer Ikhi/Meri, together with his
son (and namesake), participated in the royal expedition to Wadi Hammamat, which is well dated to the year after the 18th census of Pepy I (cf. Kuraszkiewicz, 2014 for bibliography). Because the titles attested for the younger Ikhi are higher in the tomb than in the Wadi Hammamat graffiti, the tomb in Saqqara must have been decorated after that date (although precise correlation of the regnal years of Pepy I with absolute dates does not seem to be possible, due to the problems discussed, e.g., by Verner, 2008).

ARCHITECTURE OF THE TOMBS

The cemetery comprised mainly mastabas, but also a few rock-cut tombs. The mastabas were built of sun-dried bricks, made of Nile silt or local marly limestone – *tafl*, occasionally with addition of stone (*tafl* or higher quality limestone, usually in the form of irregular chips or – rather rarely – dressed blocks), with silt or *tafl* mixture used both as mortar and plaster. This type of material is relatively resilient, but prone to weathering and dissolving in water (Kuraszkiewicz, 2013: 242–243; cf. Kemp, 2000; Spencer, 1979; Spencer, 1994).

An Egyptian tomb consisted of two essential elements: a cult place and a burial place (Fig. 4). The cult place had to be accessible for the living and thus situated at the ground level, and its form depended on the owner’s wealth: both a decorated chapel with elaborate false door and offering table, and a simple arrangement of a niche with a place marked for offerings served basically the same function. A burial place was intended to preserve the body buried inside and to guarantee its safety, and therefore it should be placed as deep as possible, in order to prevent – or hinder at least – any unauthorised entry. Almost all burial places in the cemetery un-
discussion have the form of a rock-cut chamber accessible through a vertical shaft (cf., e.g., Reisner, 1936: 57–74; Dodson and Ikram, 2008: 13–22, 136; Bolshakov, 1997: 24–25, 28–30, 121–122). After the funeral, the access to the burial chamber was blocked, usually by filling the shaft with by-products of the tomb construction, i.e. taff and limestone chips, broken bricks, gravel etc. (cf. Kuraszkiewicz 2013: 267–269, with references).

EVIDENCE OF THE CLIMATIC CHANGES AT THE END OF THE OLD KINGDOM

Towards the end of the Old Kingdom (from the second half of the reign of Pepy II), torrential rains had become significantly more frequent and violent (Trzciński et al., 2010; Welc and Trzciński, 2013; Welc and Marks, 2014). Huge streams of water mixed with mud and debris were flowing down the slope destroying or damaging mastabras’ superstructures, transporting their remains westward and getting into underground rooms (Fig. 5). There is evidence of walls having been repeatedly destroyed by water and then rebuilt, in some cases with revetments added. The floods deposited also a layer of debris on chapel’s floors and offering places. Water stagnating in many of the burial chambers led to the damage and probably desecration of human remains (the preservation of which being prerequisite for the afterlife, according to Egyptian beliefs) and funerary equipment (Fig. 6; Myśliwiec, 2004: 121; cf. Kowalska and Kuraszkiewicz, 2011: 95–97; Kuraszkiewicz, 2011: 532–533). The dating of the tombs, as discussed above, suggests that the rainy period evidenced at the West Saqqara cemetery is to be identified with the 4.2 ka event (cf. Walker et al. 2012: 653–656).
THE SOLUTION AGAINST WATER DESTRUCTION: ABOVE GROUND

In numerous offering places in the cemetery under discussion an interesting phenomenon can be observed: the false doors and offering tables covered with fine reliefs and polychromy have been subsequently painted white (Fig. 7; cf. Kuraszkiewicz, 2013: 205–206). In some cases the white coating (consisting of numerous layers of paint) was so thick that it obscured the name and image of the deceased and offering formula, being of crucial importance for the posthumous cult. This means that at some point the practice of painting cult places white was even more important than their original design. The appearance of this practice can be dated to the second part of the reign of Pepy II (phase Ff of the cemetery development, cf. Kuraszkiewicz, 2013: 274–275). White being the colour of purity in Egyptian beliefs (cf., e.g. Kees, 1943), it may be supposed that the practice was aimed at restoring the ritual purity to offering places desecrated as a result of the above-mentioned frequent flooding of the cemetery, and the multiple layers of white paint evidently correspond to repeated rainfalls. Thus, after heavy rains that caused damage to the tombs, the superstructures had to be repaired and ritually purified, and the evidence of such activity may be seen as a dating criterion (Kuraszkiewicz, 2002: 366–368; Kowalska and Kuraszkiewicz, 2011; cf. Rzeuska, 2003a).

THE PROTECTIVE SOLUTION: UNDERGROUND

In a number of tombs dated securely to the 5th and early 6th Dynasty the floor of the burial chamber was situated lower than the bottom of the shaft or on the level with it. Such arrangement seems to reflect the desire to protect the dead body from being damaged by robbers. However, towards the end of the dynasty in a number of tomb superstructures “raised” burial chamber are found, i.e. hewn above the shaft’s bottom (the difference of levels reaching one meter).
It should be emphasised that, although burial shafts were blocked after the funeral (as mentioned above), the blockage was intended as a security measure against robbery, and thus there was no need of the shaft’s fill to be watertight. During the floods, water penetrated into burial chambers and stagnated therein, causing decomposition of the funerary equipment and of burials themselves and leaving deposits of mud; there is an ample evidence of such occurrences in Saqqara (Kuraszkiewicz 2007; Id. 2009; Id. 2011; Kowalska and Kuraszkiewicz 2011; Id. 2013; Myśliwiec et al., 2012; Sowada, 2013). The introduction of the “raised” burial chambers coincided with the increase of rainfalls at the end of the Old Kingdom and the ‘surplus’ section of the shaft below the burial chamber was evidently intended as a rainwater-drainage device, collecting water away from the burial chamber. This way, the burial chamber and its contents was protected from being flooded (Fig. 8; cf. Kuraszkiewicz, 2013: 152). Thus, the location of the burial chamber above the shaft bottom was evidently an intentional security measure that can by itself suggest a possible date of a shaft in the second half of the reign of Pepy II (Kuraszkiewicz, 2009; Kuraszkiewicz, 2013: 258–259).

**SUMMARY**

As discussed above, two distinct (but having no obvious purpose) architectural solutions introduced in final years of the Old Kingdom (early 22nd century BC) seem to be the tomb builders’ response to the intensive rainfalls, being one of the aspects of the climatic changes that marked the Middle-Late Holocene Boundary (4.2 ka event, cf., e.g., Walker et al., 2012; Welc and Trzciński, 2013; Welc and Marks, 2014). The evidence of similar processes is found also in other parts of the Saqqara necropolis (cf. Sowada, 2013), it remains, however, largely unpublished (cf. Kuraszkiewicz 2013: 224–225, 246–247). Importantly, the architectural analysis provides not only a corroboration of paleoclimatic data obtained from other sources, but also a dating criterion that may be applied to other funerary structures.

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