

GRAIN STORAGE
IN ANCIENT EGYPT
(2600-1650 BC)

TYPOLGY AND SOCIO-ECONOMIC IMPLICATIONS

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MARTINA BARDOŇOVÁ

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ABSTRACT

Ancient Egypt had, like the majority of pre-industrial societies, a pre-eminently agrarian economy. Amongst the agricultural products acquired from the Egyptian land, cereals stood out due to their economic significance. Grain and cereal-based products, such as bread and beer, were used as a medium of exchange and a basis for wages. The aforementioned importance of cereals must have made their management and storage a matter of priority.

Despite the significance of grain storage for the understanding of socio-economic and power relations in a given society, no comprehensive macro-study on grain storage in ancient Egypt has been undertaken. Thus, the main goal of this work is to obtain a new multi-faceted picture of grain storage in ancient Egypt. More precisely, the study focuses on an extensive historical span between the Third and the Thirteenth Dynasties (2600-1650 BC). Such a broad target should enable us to better observe long-term trends in the economy and, consequently, to evaluate more properly the changing practice of grain storage, which constituted a key element in the context of socio-economic and political transformations.

The new conception on grain storage is achieved in several steps. First, a typology of storage structures/institutions was created, mainly on the basis of accessible archaeological, iconographic, and written evidence. This typology of storage installations has been complemented with an overview of cereal species and products stored in them. Second, distribution patterns of storage facilities previously defined were examined in order to understand the socio-economic and political developments that took part in that millennium of changes. More specifically, the acquired distribution patterns are compared with prerequisites and assumptions of the Patrimonial Household Model.

KEYWORDS:

Old Kingdom, Middle Kingdom, First Intermediate Period, cereals, storage, magazines, silos, granaries, economy, administration, socio-economic structure, iconography, archaeology, Patrimonial Household Model.

I. INTRODUCTION

Ancient Egypt was, like the majority of pre-industrial societies, a pre-eminently agrarian economy. Amongst the agricultural products acquired from the Egyptian land cereals stood out due to their economic significance. Grain and cereal-based products, such as bread and beer, were employed as a medium of exchange and as a basis for wages. This above stated importance of cereals must have made their management and storage a matter of priority.

Storage is a key component of food distribution be it on the household or institutional level (Paulette, 2013: 106). Food distribution was an important tool to execute power and accomplish goals of specific actors in a system. Importantly, storage is also an analytical marker for studying cultural evolution because it is a necessity common to all sedentary and many nomadic societies all over the world (Rothman, 2016: 19). An important and logical prerequisite is the assumption that storage systems are connected to different adaptive strategies of societies and individuals (Rothman, 2016: 19). Different storage strategies (storage technology, storage capacity or system of control) are thus designed by each player in a system to meet his goals and are adapted to environmental as well as socio-economic and/or political circumstances (Rothman, 2016: 28). Concrete storage structures thus had their place not only in the techno-economic system, but were also related to particular socio-jurisdictional organization of the agricultural exploitation (Sigaut, 1978: 34). The shifts in the distribution patterns of particular storage facilities/technologies can thus inform us about

important changes in agrarian system, economy of domains, etc¹. In addition, different techniques of storage employed by populations/communities are to some extent linked to the climate (García, 1997: 88)².

As an object for deeper analyses, granaries and silos came to the attention of scholars in the second half of the 1980s. The most important work was B. Kemp's article *Large Middle Kingdom Granary Buildings (and the Archaeology of Administration)* (Kemp, 1986: 120–136). Kemp was the first to identify particular unearthed structures as large granaries with the help of the iconographic evidence. He also drew attention to the fact that the ancient Egyptian administration was studied almost exclusively through textual sources, while archaeological evidence tended to be omitted. However, this was not the only important outcome of his work. Kemp went further when he assumed that storage structures should reflect what the administration deemed important and how it was structured (Kemp, 1986: 120). Once he identified granaries in the archaeological evidence, he estimated their volumes and put it in relation to the number of people who could be sustained by each of these structures. Furthermore, he also considered the context of these structures, which allowed him to make more detailed statements about their administration and about the structure of provisioning in particular sites. This opened completely new ways to how to study and perceive ancient-Egyptian granaries.

Since then granaries have become the subject of a number of studies. However, besides the rather narrow focus of these works, there has also been a certain imbalance regarding their time scope and use of sources. Most of them deal with the post Old Kingdom period. A substantial part of them concern either Middle Kingdom rectangular storage structures or storage facilities uncovered at Amarna (e.g. Adams, 2005; Adams, 2007: 1–23; Do. Arnold, 2005: 1–75; Shaw, 1992: 147–166; Tietze, 1985: 48–84, 1986: 55–78; Waki, 2002: 103–112). A number of studies are dedicated to particular architectural features (e.g. Adams, 2007; Do. Arnold, 2005: 1–75; F. Arnold, 2005: 77–104; Badawy, 1948, 1954, 1966; Siebels, 2001; Watt, 2013). Interestingly, some of the studies concerning the architecture of Old Kingdom granaries are mostly based on their “depictions”³ instead of the relevant archaeological evidence (e.g. Badawy, 1948, 1954; Siebels, 2001: 85–99). Besides focus on particular architectural features, studies on grain storage can deal with a particular archaeological site, like Adamski's and Kołodziejczyk's *Grain storing and bread making during formative period*

1. Of special importance is understanding of the socio-economic functions of long term reserves — they might have been aimed to consummation, or to agriculture (seeds) eventually to commerce (García, 1997: 88; Sigaut, 1978: 4).

2. The relation is not as straightforward as it might seem — we cannot clearly link the use of particular technology to particular climate (i.e. aerobic to wet conditions and anaerobic to dry conditions). But, importantly, the existence of a need to store for a long term might depend on climatic conditions. As shows Sigaut (1978: 38–39) on the case of storage in Nigeria the long term storage was important in zones with more risk of insufficient harvest, meanwhile in the zones with sufficient precipitation the long term storage practically did not play role.

3. Including models.

and in the Old Kingdom times: case of Tell el-Farkha (2014). A study which on the contrary deals with all types of evidence is the recent work of Adeline Bats (2017: 157-177).

Depictions of granaries formed an integral part of studies aiming seeking to reconstruct the management of estates and exploitation of resources (e.g. Swinton, 2012) or to reconstruct *everyday life* activities and technologies in use (e.g. Montet, 1925; Vandier, 1978). Nevertheless, most often granaries were simply treated as an integral part of the tomb decoration or aspects of funerary culture (e.g. Harpur, 1987; Hudáková, 2013b: 159–188; Kanawati, 2010; Siebel, 2001: 85–99; Stevenson Smith, 1946; Tooley, 1989; Willems, 1988).

To a lesser or greater extent, several studies touch on the topic of granaries from the perspective of their administrative uses (both central and provincial). Hrach Pappazian recently published an article dedicated to the central administration of the Old Kingdom granaries and treasuries, *The central administration of the resources in the Old Kingdom: departments, treasuries, granaries and work centres* (2013: 41–83). Institutional granaries appear in other works dedicated to the structure of an administration or to a particular town, region or excavated granary, but the complex work is still missing. As we have seen, most of the works concerning Middle Kingdom granaries focus on technical aspects.

The only substantial works concerning Old and Middle Kingdom granaries are Kimberley Watt's MA thesis, currently only accessible via a poster presented 2013 at the Current Research in Egyptology conference in Cambridge (see Watt, 2013); and the recently published doctoral thesis of Jeremie Flores, *Les céréales: analyse d'une gestion au protodynastique et sous l'Ancien Empire* (Flores, 2015). Watts apparently focused her work on the architecture of Middle Kingdom granaries, but little more can be stated from her poster. Flores, on the other hand, analysed all written and some iconographic evidence related to silos and granaries between the Early Dynastic Period and the Old Kingdom and focused his work on the questions related to the administration of granaries in those periods. However, he did not analyse the archaeological evidence. The core of his work rests on the analysis of administrative documents, inscriptions from the funerary sphere (offering lists, biographical inscriptions, etc.) titles of officials, seals and seal imprints and depictions (and labels) — all providing a very particular kind of information.

Despite the number of the works dedicated to ancient Egyptian silos and granaries, no comprehensive macro-study on grain storage practices has been undertaken. The main aim of this work is, therefore, to obtain, for the first time, a new multi-faceted picture of the grain storage during the era between the 3rd and 13th Dynasty (2600-1650 BC). This picture will be subsequently analysed in order to better understand the socio-economic and political developments which took part in this time span.

The first part of this work (*Chapters II-IV*) is descriptive and focuses on the attestations of cereals and on description of attested storage facilities as they appear in the archaeological (*Chapter II*), iconographic (*Chapter III*) and written (*Chapter IV*) evidence. The obvious aim of the first part is to provide the data for further analysis. In this case the data represents the typology of storage structures/institutions and cereal species as well as other agricultural products stored in them.

The second part of this work (*Chapter V*), focuses on the role of the previously defined storage facilities within the organizational scheme of cereal production, storage and distribution. The *Chapter V* deals with two main issues. First, the types of storage facilities that were used by various economic agents in selected sites are examined. Second, the particular distribution patterns of storage facilities in specific sites are studied and compared with prerequisites and assumptions of the Patrimonial Household Model.

1. WHAT IS THE GRAIN STORAGE AND HOW TO STUDY IT?

Grain storage is an intermediary stage between cereal production and processing and the distribution and consumption of the grain (Forbes and Foxhall, 1995: 70).

Storage is sometimes defined as the placing of a product while taking into account its characteristics; the storage mode is thus adapted so that the product is conserved in the state as close to the initial condition as possible (Huiroel, 2017: 2018)⁴. The main prerequisite of storage is that it should be adapted to the specific type of commodity. However, others recognise two aspects of storage: First, the simple placement of the grain and second, placement with the aim to conserve the grain. The latter again considers conservation as an action with the principal object to maintain the product in a state as close to its original conditions as possible (Sigaut, 1981). The storage for conservation is that one that exceeds the time point when the grain starts to deteriorate. For example, in Europe the moment when grain starts to decay is somewhere around 4-6 months after harvest; any storage longer than this period of time required the creation of specific environment in order to conserve the grain (Sigaut, 1981: 165-166). The question is for how long did the grain persist in good condition in ancient Egypt (2600-1650 BC) and in which part of Egypt⁵. Since which storage period was it necessary to employ a specific conservation method?

4. There are some storage techniques which seek on the other hand for the transformation of the product and the two — conservation for maintaining the product in the initial and transformation — should not be mistaken, even though both can have the same duration and both can lead to provision of edible product (Sigaut, 1981).

5. *I.e.*, there could be, in this sense the difference between generally more humid Delta and the Nile valley.

While the first step — placement of the grain — does not necessarily require specific conditions; the latter — conservation — mostly implies the use of particular techniques. Within these techniques two branches can be distinguished: First, the techniques for preservation (trying to fight against specific cause(s) of product decay, *i.e.* insects) and second, the techniques of conservation in *stricto sensu*. The latter concerns not only a control of a specific cause of decay but implies a global control of physical-chemical environment of stored goods — here cereals (Sigaut, 1981: 158). In addition, two techniques leading to the stabilisation of grain previously to the storage — drying and parboiling — may be added to the list of conservation methods (Sigaut, 1981: 158).

Placement/conservation are also related to other key terms — short-term, mid-term and long-term storage. These are employed in practically any publication concerning grain storage facilities, but their length of use is rarely consistent. I have decided that for the purpose of this study, short-term storage could be considered the placement of grain during the period before decay starts. For the mid-term storage could be considered the storage exceeding the period when the decay starts but before the next harvest. Long-term storage would then be that which exceeds a year period. In literature the division is then often drawn between facilities for mid and long-term storage (necessity of use of conservation technique) and between facilities for the short-term storage/placement (no such technology needed) (*cf.* Huirorel, 2017: 222). As we have seen, it is unclear where to draw the line between the placement of grain and the storage requiring some conservation method in Egypt. Importantly, if the grain was naturally preserved until the next harvest, then the term mid-term storage as defined above would be useless.

This work focuses on grain storage via the study of its storage places. The subject of this work is grain storage in its broader sense comprising of the temporary placement of grain as well as its conservation with the main focus on the storage of living grain (not toasted or parboiled *etc.*).

In my work I decided to study grain storage practices from the long-term perspective. The studied era is a thousand years long — it starts at the beginning of the 3rd Dynasty and ends with the disintegration of the 13th Dynasty (*ca.* 2650–1650 BC). This might at first sight seem excessive, but the work is designed to include the historical era from the Old to Middle Kingdom, which enables us to study and compare two subsequent phases during which the Egyptian state was considered strong and centralised as well as the era in between them — the period of decentralisation separating the two phases. It is not necessary to stress that, necessarily, huge socio-economic, political and religious changes occurred during the studied era. Considering the utmost importance of grain (staple diet, means of value) in the economy as well as in creating and reproducing social networks as well as studying the technical aspects and the role/place of grain storage and grain management over this long period of

time full of transformations enables us to better assess the meaning of grain storage and its relations with the socio-economic structures and politics.

In order to obtain the fullest picture possible of the grain storage, the present work employs all types of the available evidence — archaeological, iconographic and textual. This evidence was gathered between the years 2014–2018 in the Source-Database produced in Filemaker. The facilities published after the latter date are therefore not discussed here.

While the archaeological evidence is essential for the knowledge of the material aspects of the grain storage, texts and images represent important tools to ascertain the meaning of storage facilities. They can provide us with details on how silos and granaries were used (*e.g.* mode of filling, size, quantities of grain which were stored or extracted *etc.*), which are sometimes not easily visible in the archaeological record due to bad preservation or documentation. Furthermore, the latter sources also shed light on grain storage in the ancient Egyptian “mental world” (*cf. e.g.* mentions of storage facilities in religious spells⁶, or depiction of granaries in tombs).

The specific problems related to each of the employed evidence are dealt with in the respective chapters (*Chapters II, III and IV*).

The Source-Database served for the creation of typology of storage structures/institutions and on overview of cereal products stored in them. Which are dealt with in the first part of the book (*Chapters I-IV*).

The character of the data analysed necessarily influences the output of any analysis (the questions we might and we want to ask in the end). This work aims to identify existing types of grain storage facilities and their relation to particular contexts⁷. Regarding the contexts, special focus is laid on the assessment of the employed storage technology, its purpose of storage⁸, related storage period and capacity. In addition, it specifically focuses on the identification of storage facilities for conservation

6. Pyramid Texts spells PT 515, and 1071.

7. Of the utmost importance is the assessment whether we can associate specific storage facilities with specific functions such as: 1) exclusive use for grain storage versus multifunctionality; 2) form in which was the grain stored (loose grain versus containers); 3) storage period (facilities from long-term versus short-term storage); 4) use of particular facilities exclusively by specific subjects, and, 5) use only in a specific historical period (diachronic trends).

8. The identification of storage technologies in relation to particular find contexts is crucial for our understanding of grain storage practices in general as well as for the possible (re)assessment of the purposes of each facility. Importantly, the mode of grain storage is, beside others, driven by the specific needs of the owner of the grain/grain storage facility. Among the specific needs mentioned pertain *e.g.* the quality of grain needed (the grain for seeds or for bread *etc.*) or *e.g.* whether the grain is needed for its regular distribution (*i.e.* some technologies does not allow the grain be extracted more than once). Some facilities might be thus related to specific segments of the provision chain (from the producer to the consumer) (Sigaut, 1978: 35).

and long-term storage (eventually also mid-term) in contrast to short term storage/temporary placement and the relationship between the two.

The goal of this investigation, the search for the basic characteristic of attested storage facilities, is achieved by using both qualitative and quantitative methods with the preponderance of the former. The studied sample is very problematic regarding the specificity of the sites from which it was recovered and its incompleteness. Quantitative methods are used only in the case of archaeological and iconographic evidence and only in particular cases, mostly to study the frequency of occurrences of a specific type of facility/attribute/technology in specific contexts during a particular era and to compare samples from various sites and eras. It is necessary to always be aware of what exactly is quantified. For example, studying the frequency of attestations of particular storage facilities does not necessarily provide us with the sufficient information allowing us to generalize which technology was the most frequently used or which distribution pattern of technologies was the most typical in each given era. Rather, it should be evaluated within the limited area of the particular studied context (archaeological site).

The important issue to be dealt with is also how to combine the particular and disparately studied datasets in order to provide one coherent picture. I first decided to deal with each type of evidence separately drawing on their specificity. Only after this is done, I proceed to the identification of common points shared by all three types of evidence (*Chapter IV*). These are mostly found among the use contexts of particular storage facilities/institutions/terms.

The second part of the book (*Chapter V*) is then dedicated to the interpretation of the findings presented in the first part (*Chapters II-IV*) with regard to particular socio-economic and historical conditions.

It has been stated that storage is a key component of food distribution be it on the household or institutional level (Paulette, 2013: 106). Food distribution was then an important tool to execute power and accomplish goals of specific actors in a system. Different storage strategies (storage technology, storage capacity or system of control) are usually designed by each player in a system to meet very specific goals and are adapted to environmental as well as socio-economic and/or political circumstances (Rothman, 2016: 28). Consequently, the shifts in the distribution patterns of particular storage facilities/technologies can thus inform us about important changes in agrarian system, economy of domains, *etc.*⁹. In addition, different techniques

9. Of special importance is understanding of the socio-economic functions of long term reserves — they might have been aimed to consummation, or to agriculture (seeds) eventually to commerce (García, 1997: 88; Sigaut 1978: 4).

of storage employed by populations/communities are to some extent linked to the climate (García, 1997: 88)¹⁰.

In conformity to the above-postulated relationship between storage strategies of various agents and their goals as well as their adaptation to environmental, socio-economic and/or political circumstances (Rothman, 2016: 28) *Chapter V* seeks to relate specific economic partakers with specific storage facilities and potentially specific strategies to pursue their goals. The first part of *Chapter V* is therefore dedicated to an overview of a variety of agents who produced and stored/managed grain resources.

The second part of *Chapter V* concerns two main issues. First, the types of storage facilities that were used by various economic agents in selected sites are examined. Specific attention is given here to questions of capacities in relation to extension of fields that could yield similar quantities. In addition, this issue is also closely related to the question of whether any relationship between the purpose of storage and the employed storage facility can be observed. Second, the particular distribution patterns of storage facilities in specific sites are studied and compared with prerequisites and assumptions of the PHM.

However, to draw any picture from the fragmentary information at our disposal is a problematic and complex task. As has been already stated, not all the data collected in the corpus are equally suitable for more complex analyses. Therefore a selection of sites was made. This selection was based on two main concerns: First, the state of preservation and publication was considered. Second, the sites were chosen to reflect (demonstrate) the diversity of the existing evidence. Both concerns represent important problems with the very limited and biased evidence from the Old Kingdom (more in *Chapter V.2*). Eventually, it was decided to reflect the bias of this era in the choice of sites where “pyramid towns” prevail. In addition, to compensate for the often fragmentary archaeological evidence it was decided to complement the archaeological sources with the testimony of written evidence whenever possible.

Each of the selected sites is briefly described in order to understand its possible place in grain production, collection/storage, or distribution. Subsequently, attention is paid to the agents storing grain. Lastly, the distribution pattern of storage facilities and their implications are considered.

10. The relation is not as straightforward as it might seem — we cannot clearly link the use of particular technology to particular climate (i.e. aerobic to wet conditions and anaerobic to dry conditions). But, importantly, the existence of very a need to store for a long term might depend on climatic conditions. As shows Sigaut (1978: 38–39) on the case of storage in Nigeria the long term storage was important in zones with more risk of insufficient harvest, meanwhile in the zones with sufficient precipitation the long term storage practically did not play role.

The key findings from both parts of the book are then summarised in the concluding chapter of this work (*Chapter VI*).