EGYPTIAN CULTURE AND SOCIETY studies in honour of naguib kanawati



Preface by ZAHI HAWASS

Edited by

Alexandra Woods Ann McFarlane Susanne Binder



Egyptian Culture and Society

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EGYPTIAN CULTURE AND SOCIETY

STUDIES IN HONOUR OF NAGUIB KANAWATI

SUPPLÉMENT AUX ANNALES DU SERVICE DES ANTIQUITÉS DE L'ÉGYPTE CAHIER Nº 38

VOLUME I

Preface by ZAHI HAWASS

Edited by Alexandra Woods Ann McFarlane Susanne Binder



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Presented to

NAGUIB KANAWATI AM FAHA

Professor, Macquarie University, Sydney Member of the Order of Australia Fellow of the Australian Academy of the Humanities

> by his Colleagues, Friends, and Students

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SOME OBSERVATIONS ON THE DIMENSIONS OF TEXTILES IN THE OLD KINGDOM LINEN LISTS

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The textile-related terminology of the Old Kingdom linen lists that feature so prominently on the Fourth Dynasty slab stelae from Giza has been the subject of study since the early twentieth century. However, many flawed interpretations have been advanced and perpetuated, especially in relation to the calculation of dimensions of the textiles offered. Interpretations that are based on supporting textual and archaeological evidence are discussed, although many issues still remain largely unresolved and require further research.

It is a privilege to be included in this publication honouring Naguib Kanawati, to whom I owe my introduction to the world of Egyptology. I had a background in classical archaeology, with only a glancing interest in ancient Egypt, until I attended his introductory course to hieroglyphs. Naguib's enthusiasm brought those 'pictures' to life and made them speak, igniting a passion that will be life-long. In gratitude I offer this contribution to him.

Introduction

The fully developed compartmentalised Old Kingdom linen list, which is essentially an inventory of textile offerings, appears on the Fourth Dynasty Giza slab stelae dating to the reign of Khufu. Fifteen of these stelae survive, of which nine were found *in situ*.¹ The stelae form a unique corpus of decorated and inscribed representations of the funerary meal and associated offerings. They are independent elements that were not parts of false door panels or tomb chapels, and were mostly the only inscribed objects preserved in the tombs.² The stelae were set into a recess in the southern side of the eastern face of mastabas in nucleus Cemeteries 1200, 2100 and 4000 in the Western field. They were the focus of the offering cult and were surrounded by an external mud brick chapel until late in the reign of Khufu, when a program of extensive renovations was carried out.³

The textile terminology of the linen list has long attracted the attention of scholars, as the list features so prominently on the reliefs.⁴ It is located in an ordered, compartmentalised section on the right hand side of the stela, and in the majority of the extant examples comprises a third of the total area.⁵ The linen list specifies particular qualities, dimensions and quantities of textiles to be offered. The interpretation of these signs still remains largely problematical, despite attempts

by scholars to translate them, often mistakenly proposing hypotheses that disregard technical realities of production.

The study of the Old Kingdom linen list by W. S. Smith in 1935 has been the most comprehensive and most quoted interpretation of the elements of the linen list and the meaning of ancient Egyptian textile and clothing terms.⁶ Smith listed all occurrences of linen lists on the then known monuments, including Early Dynastic stelae, Old Kingdom false door panels and the walls of burial chambers and chapels. He also included comparative material with offerings of linen, and concluded that with only a few exceptions the linen list occurred very rarely after the Fourth Dynasty.⁷ Two of these 'exceptions' include the tombs of Seshemnefer I (G 4940) and Kaiemankh (G 4561) at Giza, which both contain linen lists incorporated with other offerings. That of Seshemnefer is on the east wall of the chapel,⁸ and the list of Kaiemankh is on the west wall of the burial chamber.⁹ The latter is a complete list, showing all the elements of the Fourth Dynasty Giza stelae. The linen list of Seshemnefer is damaged, and the squares representing textiles in the second register of each group, which would ordinarily contain designations of size, appear to be empty.¹⁰ However, close examination of the HU-MFA Expedition photographs¹¹ shows that there may be traces of relief inside the squares, and there is a high probability that a short fringe surmounted the squares, as seen on the linen list of Kanefer (Figure 5). The suggested date for Seshemnefer I is early Fifth Dynasty, Sahure-Niuserre¹² and for Kaiemankh, late Fifth Dynasty, probably in the reign of Djedkare/Isesi.¹³

A recent study of the Early Dynastic and early Old Kingdom funerary relief slabs from the Memphite necropolis at Helwan shows there is a clear progression from the textile inventories or 'lists' that made their first appearance in the late First Dynasty, to the fully developed Old Kingdom linen list.¹⁴ The textiles are always prominently positioned, often at the head of the lists of offerings. In the earlier examples the textile signs appear randomly, but there is a gradual increase in variety, quantity, and a trend towards more deliberate organisation. By the mid-Second Dynasty, the three main categories of quality characteristic of Fourth Dynasty stelae already occur together on one Helwan relief slab.¹⁵

This contribution will focus on one particular issue that still remains unresolved: the calculation of the dimensions of textiles as they appear in the Old Kingdom linen lists.

Description of the Giza Slab Stelae

The stelae are rectangular limestone slabs, carved in raised relief and were originally polychrome. Three stelae still retain their colour.¹⁶ The tomb owner is depicted seated on a stool before an offering table laden with loaves of bread, surrounded by inventories of offerings that include items of food such as bread and baked goods,

meat and fowl, fruit and agricultural produce, beverages, cosmetics, oils, fats and incense. The textiles are organised prominently in a separate section on the right hand side. Where the paint has remained, it is apparent that the tomb owner wears a spotted animal skin cloak.¹⁷ He grasps the shoulder knot with the fisted left hand, and reaches toward the bread with the right. The female tomb owners do not hold the knot; instead they place the open palm of the left hand on the chest. The owner's name and titles generally appear at the head of the stela (Figure 1).



FIGURE 1. The slab stela of Iunu (G 4150).¹⁸

The Arrangement of the Old Kingdom Linen List

The linen list is generally arranged into three groups of three horizontal registers, divided further into a number of vertical registers (or sometimes four groups, as on the slab stela of Ini, Figure 2).¹⁹ The uppermost register group consists of the Horus falcon on a standard²⁰ in the top register, signifying *idmy* 'royal linen',²¹ the finest quality of textile; the second register in the group usually consists of designative signs that indicate specific sizes of textiles, and the third contains numerals specifying quantities. This configuration is repeated, with different 'headings', most commonly $s\bar{s}r$ (represented by the arrow)²² and '3 (the tent pole or column)²³ in the first register of each new group. These terms denote other, probably lesser, qualities of linen; however, their exact meaning still remains unknown. Other less frequently occurring

headings in the Old Kingdom lists include $\breve{sm}^{c}.t$ $nfr.t^{24}$ (as in the third register group on the stelae of Ini, Figure 2) and *idmy*, written phonetically.²⁵ In some examples, granaries occur in the lower register (Figure 1).²⁶



FIGURE 2. Elements of the fully developed Old Kingdom linen list.²⁷

The following reading of the linen list is proposed, based on the criteria put forward by P. Posener-Kriéger.²⁸ In brief, she suggested that each of the horizontal signs in the second register of each group represents an area of 10 square cubits multiplied by the number of times the sign is written, and that the upright 'fringes' represent linear measurements of 1 cubit each (width) x 10 cubits (length).²⁹ The sign *š.t* represents 100 square cubits.³⁰ These formulae for calculation of dimensions, and the inherent problems, will be discussed in detail below.

Hence, the groups of signs would be interpreted as:

A *idmy quality linen ('royal linen')*

(Right to left) 1,000 pieces x 60 square cubits (each) in area; $1,000 \times 70$ square cubits; $1,000 \times 80$ square cubits; $1,000 \times 90$ square cubits; 1.000×100 square cubits.

B sšr quality linen

(Right to left) 1,000 pieces x 2 cubits wide x 10 cubits long;³¹ 1,000 x 30

square cubits; 1,000 x 40 square cubits; 1,000 x 60 square cubits; 1,000 x 100 square cubits.

C šm^c.t nfr.t quality linen

(Right to left) 1,000 pieces x 60 square cubits (each) in area; 1,000 x 70 square cubits; 1,000 x 80 square cubits; 1,000 x 90 square cubits; 1,000 x 100 square cubits.

D 3 quality linen

(Right to left) 1,000 pieces x 50 square cubits (each) in area; 1,000 x 60 square cubits; 1,000 x 70 square cubits; 1,000 x 80 square cubits; 1,000 x 100 square cubits.

Less frequently occurring signs include $\overset{\$}{h}$ h^{32} and $\overset{\flat}{h} = sf/ssf^{33}$, which appear to represent a known value, although the exact amount remains largely speculative. These signs will be discussed below.

The signs of quality in all four 'headings' are oriented left to right, i.e. facing the tomb owner, but the writer has chosen to read the second register with textile dimensions from right to left, contra Manuelian.³⁴ This reading is based on the orientation of *š.t* and the arrangement of the dimensions in ascending, rather than descending, order. The manner in which the signs h^3 denoting $1,000^{35}$ are written here would allow them to be read in either direction, except perhaps in one instance, in the extreme right hand compartment of the third register of the second group headed *sšr* where the leaf appears to be oriented to the right. However, in the linen list of Iunu (Figure 1) the leaf is 'correctly' oriented to the right throughout, hence the registers in each group could be read L-R, R-L, L-R, that is, in boustrophedon.³⁶

Yet, it should be conceded that the orientation of signs appears to be variable. Manuelian notes reversals of particular signs in the Old Kingdom linen lists, such as $\tilde{s}.t$ and $s\tilde{s}r.^{37}$ In the Giza slab stelae the offerings largely face toward the seated owner, whereas in the Helwan slabs the majority face right, i.e., away from the owner. The orientation of the early textile signs especially appears to be arbitrary, with reversals occurring in all Helwan reliefs.³⁸

Construction of the Fringes

Before proceeding to a detailed discussion of the calculation of dimensions and the associated problems, a brief discussion of the 'fringes' that denote linear measurements is warranted.

The method of construction of the long, twisted 'forked' vertical fringe was first interpreted by G. Jéquier³⁹ based on the representation of fringed cloths on the coffin of Djehutihetep in the Egyptian Museum, Cairo. He proposed that the number of

JANA JONES

fringes represents the width of the cloth, but did not specify a unit of measure. The long, twisted 'forked' (or 'inverted V') fringe is formed when an equal number of warp yarns are twisted together at regular intervals to form decorative fringes at the finished end of the textile (Figure 3). On the other hand, the 'raw' warp fringe is not worked in any way but simply cut from the warping beam when weaving is completed. The short weft fringe is inserted in bundles of yarn into the selvedge during the weaving process, and is generally worked into the full length of the left hand side of ancient Egyptian linens.⁴⁰ (See Figure 4 for reconstruction of the elements comprising a woven textile.)





FIGURE 4. Reconstruction of a fringed cloth.⁴²

Both the long, twisted upright and short weft fringe types are illustrated in the linen list of Kanefer (Figure 5). In the second register of the first group, the upright 'inverted V' fringe indicates linear measurements, whilst the measurements of surface area in the second group are enclosed in short-fringed cloths. The diagonal line below the short fringes in the latter appears to indicate the line formed by the insertion of the bundles of yarn that form the weft fringe.



FIGURE 5. Upper section of linen list of Kanefer (G 1203) showing two types of fringe.43

Calculation of Dimensions in the Old Kingdom Linen List

Smith considered a number of possibilities to interpret the meaning of the signs expressed by different numbers of fringes: that they could represent the number of yarns in a specific length of cloth or the quality of the yarn, estimated by the number of fibres per thread; that the number of vertical fringes depicted on the textile suggest a measurement of width, based on the number of 'hand-breadths'; that 'special terms' such as *ssf* and *tm3* may also indicate unusual widths, either extra wide or narrow, or plaited bands for girdles. Smith quite correctly dismissed most of these as being technically impossible, apart from the calculation of width in 'hand-breadths' and the 'special terms'.⁴⁴ His observations have been further refined, expanded and corrected.

Posener-Kriéger attempted more exact calculations of dimensions on the Old Kingdom stelae based on her analysis of a Fourth or Fifth Dynasty papyrus from the Gebelein archives, which was devoted to the accounting of cloth deliveries.⁴⁵ She applied the principles therein to the calculation of size of the textiles on the Giza slab stelae. As noted briefly above, she proposed that each of the vertical signs (i.e. 'fringes'⁴⁶) \downarrow is equivalent to one cubit, so that the width of a textile can be calculated by the number of vertical fringes, up to a total of four or five in the Old Kingdom linen lists. When placed over the horizontal sign⁴⁷ —, which she postulated to be equivalent to 10 units, the length of the textile would be 10 cubits. For example, \coprod = 2 cubits wide x 10 cubits long.⁴⁸ Manuelian, however, interpreted this as 20 cubits wide x 10 cubits long.⁴⁹ although Posener-Kriéger quite definitely stated *'une étoffe de 10 coudées de long sur 2 de large'*.⁵⁰ Manuelian also noted the occurrence of the fringes without the horizontal sign on some of the Giza slab stelae.⁵¹ However, the

writer suggests that there is possibly no difference in the calculation, and that the base line of the register on which the upright fringe sits acts as a *de facto* horizontal sign.

When the number of vertical signs was greater than four or five, Posener-Kriéger noted that generally the size was written as a series of -, each of which is equivalent to 10 cubits.⁵² Further, she proposed that the horizontal sign without the fringes probably represented area, i.e., 10 square cubits.⁵³ The use of horizontal signs as well as the vertical fringes to represent smaller dimensions e.g. 30 square cubits,⁵⁴ suggests that there is a clear distinction between the two signs. III would designate a textile with a specific width of 3 cubits x 10 cubits in length, but \equiv (30 square cubits) would provide a number of possibilities: 1 cubit x 30 cubits, 2 cubits x 15 cubits, 3 cubits x 10 cubits, 5 cubits x 6 cubits. The first measurement is unlikely, although technically possible, nor is the last probable. This leaves the second as the most likely option as distinct from the third (3 cubits x = 10 cubits) that could have been written with the upright fringes if a width of 3 cubits had been intended. Similar observations can be made regarding the larger sizes: 60 square cubits has six possible combinations of linear dimensions of width and length, 70 square cubits has four possibilities, 80 square cubits has five possibilities, and 90 square cubits has six possibilities.55

Posener-Kriéger observed that it would seem that the finest textiles were measured in surface area.⁵⁶ However, all the Giza linen lists contain the horizontal sign, where it appears under any of the standard headings denoting different qualities. Consequently this does not seem to be a convincing observation.⁵⁷ Posener-Kriéger applied both formulae to the Heb-Sed cloak on the reliefs at Abu Gurob, made of *idmy* quality linen, 30 or 40 square cubits in size.⁵⁸ The calculation based on 1 cubit as the base unit yields linear measurements of 1.60 m. x 5.25 m., or 2.10 m. x 5.35 m. This result appears to be unrealistic for the construction of a cloak that in representations finishes above the knees, except perhaps if the material were doubled. By calculating the surface area on the basis of 1 cubit x 1 palm, a relatively reasonable measurement of 0.75 m. x 2.1 m. was reached.⁵⁹

Certain designations such as h and sf appear in the linen lists but not in the Gebelein calculations. Posener-Kriéger supposed that these were narrow cloths of a known, predetermined size.⁶⁰ She suggested that h, sometimes written in a fringed square or rectangle, as in the linen list of Kanefer (Figure 5), probably represents a value greater than 100 or 200, but less than 1,000 cubits. She tentatively favoured a linear measurement of 300 cubits.⁶¹ However, the frequent occurrence of h in the same register as signs specifically denoting area suggests that the interpretation of h as a linear measurement may require further investigation.⁶² Where the sign h appears in the Giza group, it is always together with $\breve{s}.t$, ⁶³ which represents 100 square cubits.⁶⁴

Posener-Kriéger interpreted *sf* as a narrow cloth of a specific size, a translation followed by other scholars.⁶⁵ An erroneous interpretation of *sf* as a 'sleeved garment', based on the misreading of the sign group on an Early Dynastic relief slab from Helwan, was proposed by Kaplony,⁶⁶ and has led to some confusion in the literature. The ideogram representing a sleeved garment or dress⁶⁷ appears to be limited to Early Dynastic examples of the linen lists. It does not occur at all on the Old Kingdom Giza slab stelae, contra R. Hall, who stated that the sleeved garment occurs as a determinative to *ssf* in the Old Kingdom linen lists.⁶⁸ H. G. Fischer argued for the interpretation of *sf* as a bolt of linen tied in the centre.⁶⁹ This premise was based on a comparison of the determinatives of *sf* occurring in offering lists beginning in the Early Dynastic period and representations in Old Kingdom burial chambers.⁷⁰ He conceded that the sign might well represent an unknown, specified dimension, but not a narrow cloth. This interpretation of *sf* is further supported by evidence from Helwan.⁷¹

Calculations Based on Extant Archaeological Textiles

Measurements of five intact Middle Kingdom textiles from excavations at the temple of Mentuhotep at Deir el-Bahari by the German Archaeological Institute were provided to Posener-Kriéger.⁷² However, when these measurements are converted into both linear and square cubits, they involve fractions of a cubit and not whole numbers. For example, one of the textiles measures 1.20 m. x 18.40 m. = 2.29 x 35.18 cubits = 80.56 square cubits. ⁷³ Complete textiles inscribed with one of the signs designating size would be needed to provide irrefutable evidence for the units of measure in the Old Kingdom linen lists. Posener-Kriéger cited the only inscribed example known to her, but stated that she was unaware of the dimensions.⁷⁴

The writer examined the textile in the Egyptian Museum, Cairo (Figure 6).⁷⁵ The linen, found by Maspero in 1880 in the burial chamber of the Sixth Dynasty pyramid of Pepi I,⁷⁶ was inscribed in ink with the textile sign denoting size \coprod at the top, followed by the inscription $\exists f = 1 \\ f$

The textile is not complete. The inscribed portion had been cut out and folded to display the inscription. Doubled over, it measured approximately 29 cm.; the total width was stated as 45 cm. in the *Journal d'Entrée*. The textile was too fragile to unroll to measure the length, but that would have proved to be pointless, as the fragment is clearly not relevant to any calculation of dimensions. Based on Posener-Kriéger's hypothesis, in its original form the textile should have measured the same



FIGURE 6. Pepi I inscribed textile.78

as the larger sized Heb-Sed cloak mentioned above, i.e., $4 \ge 10$ cubits or 2.10 m. x 5.23 m., if the cubit were used as the unit of measure. The inscription was located at the finished end of the textile, near the raw warp fringe that originally would have measured approximately 8 cm. Three additional signs not noted in publications of the inscription were observed using a stereo-microscope at 10x magnification. They were located 2 cm. above and 2.5 cm. to the left of the beginning of the inscription. They comprised two horizontal signs denoting area, arranged one above the other, approximately 1 cm. in length, with one sign to the right of these, approximately half that length. Unfortunately, a most important diagnostic specimen has been lost.

This paper has focused on the conundrum posed by the determination of size in the linen lists, but the meaning of the signs designating quality and the use of the 'ideal' quantity of 1,000 for the most part still remain unexplored and unresolved, and a brief discussion follows.

The signs of quality provide unmistakable evidence that linen was graded and assessed by specific criteria, which would have included at least the density of the weave and the fineness of the yarn. Administrative titles relating to textile production and distribution in the Old Kingdom attest to the complexity of production associated with royal estates.⁷⁹ However, there is a notable absence of evidence to determine the standard for grading of quality. The archaeological evidence shows that specialist workshops already existed in the Predynastic period, producing textiles of uniform quality for funerary purposes. At Hierakonpolis in the 'working class' cemetery HK43 (c. 3500 BC), only two qualities of textile were used as shrouds and wrappings throughout the cemetery – a fine and a medium.⁸⁰ At the contemporary Cemetery 7000 at Naga ed-Dêr three qualities – fine, medium, coarse – are reported.⁸¹

In order to obtain meaningful data, textiles inscribed with designations of quality would require technical analysis of the structure of the textile based on thread count, yarn diameter, density of the weave etc.⁸² The results would then be compared with other examples bearing similar signs to determine whether there is any consistency in quality. Reports of inscribed linen occasionally occur in the literature, such as the wrappings from the female burial in Giza mastaba G 2220 (Shaft B)⁸³ bearing the designation δm^{c} .t nfr:t, which occurs as a heading in contemporary Old Kingdom linen lists. However, this and similar reports do not include a textile analysis and in many cases the textiles are no longer extant.

The earliest occurrence of the quantity of 1,000 is in the linen list of the Second Dynasty stela of Sehefner from Saqqara, where the quantities are shown in multiples of 100s and 1000s.⁸⁴ This is very rare in an Early Dynastic context; the quantities offered on the reliefs of the Helwan corpus begin with small numbers of one and two, gradually increasing to ten and multiples of ten during the Second Dynasty. In some early examples, especially those that are purely pictographic, there are no quantities indicated. The first appearance of the quantity 1,000 is in the Third Dynasty.⁸⁵ Is it possible that the quantities in the early lists at Helwan signify a 'real' quantity to be offered, as opposed to the later 'ideal' of 1,000?⁸⁶

Conclusion

The 'deciphering' of the terminology of the linen lists has long been based on conjecture and speculation. Hypotheses that ignored technical realities of production have been advanced and perpetuated, especially in relation to the estimation of the dimensions of the textiles.

The calculations proposed by Posener-Kriéger still remain problematical. The Gebelein papyrus was incomplete, and the exact value of the units of measure remains to be confirmed. Often some quite fantastic measurements of size are obtained if the cubit is used as the basic unit in the linen lists. Posener-Kriéger's study is a valuable point of departure for further research. Manuelian noted: '... there is still a need to reconcile more of the textual evidence with the material remains. Our understanding of the linen lists of the Old Kingdom would greatly benefit from such an interdisciplinary approach'.⁸⁷ The success of such an approach is dependent largely on re-examination of the texts and access to new finds of archaeological material, especially that elusive body of evidence – complete, inscribed textiles.

- P. Der Manuelian, *Slab Stelae of the Giza Necropolis* (New Haven and Philadelphia, 2003), xxxi. For the archaeological background and excavation history of the stelae in the early twentieth century, see pages 113-132. Manuelian has collated and re-examined the surviving examples, provided new translations and detailed commentary and drawings, and included all the known Early Dynastic stelae in an appendix.
- ² Manuelian, *Slab Stelae*, xxxiii; 43.
- ³ Manuelian, *Slab Stelae*, xxxi.
- 4 For example, F. Ll. Griffith, in M. A. Murray, Saggara Mastabas, I, Egypt Research Account 10 (London, 1905), 33; R. Weill, Des monuments et de l'histoire des II^e et III^e Dynasties Egyptiennes (Paris, 1908), 228-229; G. Jéquier, Les Frises d'Objets (Cairo, 1921), 34; K. Sethe, Dramatische Texte zur Altaegyptischen Mysterienspielen, I (Leipzig, 1923), 216; A. M. Blackman, The Rock Tombs of Meir, IV (London, 1924), 47-48; H. Junker, Giza. Grabungen auf dem Friedhof des Alten Reiches bei den Pyramiden von Giza, I (Wien and Leipzig, 1929), 177-178; W. S. Smith, 'The Old Kingdom Linen List', ZAS 71 (1935), 134-149; E. Edel, 'Beiträge zum ägyptischen Lexikon VI', ZÄS 102 (1975), 13-30; P. Barguet Les textes des sarcophages égyptiens du Moyen Empire (Paris, 1986), 85-86. W. Barta, Die Altägyptische Opferliste von der Frühzeit bis zur griechisch-römischen Epoche MÅS 3 (Berlin, 1963) was one of the earliest scholars to publish a range of offering lists from various periods, and in the same year P. Kaplony published all the known sources of Early Dynastic offering scenes in Die Inschriften der ägyptischen Frühzeit, 3 vols. (Wiesbaden, 1963). More recently, J. Kahl, in Das System der ägyptischen Hieroglyphenschrift in der 0.-3 Dynastie (Wiesbaden, 1994) has assembled all known inscriptions from Dynasty 0 to the Third Dynasty and proposed translations, although he relies heavily on previous scholars' research. See also J. Kahl, N. Kloth and U. Zimmerman, Die Inschriften der 3. Dynastie. Eine Bestandsaufnahme, Äg. Abh. 56 (Wiesbaden, 1995).
- ⁵ Exceptions are Manuelian, *Slab Stelae*, 32, pls. 1- 2 Wepemnefret (G 1201); 58, pls 11, 12 Nefret-iabet (G 1225).
- ⁶ Smith, ZÄS 71 (1935), 134-149.
- ⁷ Smith, ZÄS 71 (1935), 134-136. In addition to offering lists in the tombs of Seshemnefer and Kaiemankh, he cites the 'late Old Kingdom' slab stela of Setju from G 2352. See Manuelian, *Slab Stelae*, 236, fig. 314.
- ⁸ N. Kanawati, *Tombs at Giza*, I. *Kaiemankh (G4561) and Seshemnefer I (G4940)*, ACE Reports 16 (Warminster, 2001), 61; pl. 43.
- ⁹ Kanawati, *Tombs at Giza* I, 40; pl. 36.
- ¹⁰ Kanawati, *Tombs at Giza* I, pl. 43; Manuelian, *Slab Stelae*, 236, fig. 312.
- ¹¹ Manuelian, *Slab Stelae*, 236, fig. 310. Photographed in 1931.
- ¹² Kanawati, *Tombs at Giza* I, 55.
- ¹³ Kanawati, *Tombs at Giza* I, 18. A. Woods, 'Contribution to a Controversy: A Date for the Tomb of K3(=i)-m-'nh at Giza', *JEA* 95 (in press), also argues for a late Fifth Dynasty date instead of late Sixth Dynasty based on artistic and architectural features.
- E. C. Köhler and J. Jones, *Helwan*, II. *The Early Dynastic and Old Kingdom Relief Slabs* (Rahden, in press). The publication examines 41 known relief slabs from Helwan, the largest group of early, securely provenanced, inscribed material of its kind. New examples continue to be found during each excavation season by the Australian mission, under the direction of E. Christiana Köhler.
- Köhler and Jones, *Helwan* II, relief slab EM99-4. Previously published in Z. Y. Saad, *Ceiling Stelae in Second Dynasty Tombs from the Excavations at Helwan*, SASAE 21 (Cairo, 1957), pls. 10, 17-19.
- ¹⁶ Manuelian, *Slab Stelae*, xxxiii, n. 6; pl. 1 Wepemnefret (G 1201); pl. 11 Nefret-iabet (G

1225); pl. 25 Iunu (G 4150).

- ¹⁷ Manuelian, *Slab Stelae*, pl. 1 Wepemnefret (G 1201); pl. 11 Nefret-iabet (G 1225).
- ¹⁸ Drawn by Mary Hartley, Macquarie University, after Manuelian, *Slab Stelae*, pl. 26.
- ¹⁹ No two examples follow exactly the same arrangement. Cf. Smith, ZÄS 71 (1935), 147.
- A. H. Gardiner, Egyptian Grammar (3rd ed., Oxford, 1988). Sign list no. G7, a combination of G5 on R12, with the addition of a folded (or pleated) cloth projecting from the 'perch' of the standard. G7 lacks the 'folded cloth' of the sign associated with the linen lists. A. Erman and H. Grapow, Wörterbuch der ägyptischen Sprache, I (Berlin, 1955-1963), 153, 14, 'Leinenstoff' von roter Farbe'. The Wörterbuch lists the ideographic writing as an abbreviation of the phonetic writing of *idmy*. R. Hannig, Ägyptisches Wörterbuch, I. Altes Reich und Erste Zwischenzeit (Mainz, 2003), 244 (4411) 'Leinenstoff (*dunkelrot)'; 245 (4412) 'wertvoller Leinenstoff. The traditional translation of *idmy* as 'red linen' has been refuted on philological grounds by E. Edel, 'Beiträge zum ägyptischen Lexikon VI', ZÄS 102 (1975), 24 and independently by the writer in an unpublished M.A. thesis at Macquarie University, 1998, which proposed that the textile has royal and divine connotations, but is not one specific colour. Smith, ZÄS 71 (1935), 130, 131 cites Jéquier as noting that *idmy* does not imply a red coloured material until the New Kingdom.
- The transliteration *idmy* is used here rather than *iti.wy*. The latter appears to be an earlier nisbe form for 'royal linen', perhaps replaced by *idmy*, cf, Edel, ZÄS 102 (1975), 24-27. The form *iti.wy* has been adopted for the Early Dynastic corpus by Kahl, *System*; Kahl, Kloth and Zimmerman, *Inschriften der 3 Dynastie*; Köhler and Jones, *Helwan* II. For a discussion of *idmy* v. *iti.wy* see also Manuelian, *Slab Stelae*, 153. Manuelian suggests that *idmy* has connotations of 'red linen', but see comment in n. 20 above.
- ²² Gardiner, Egyptian Grammar, sign list no. T11. Wb. IV, 547, 11 šsr: 'Art Leinen'; Hannig, Ägyptisches Wörterbuch, 1241 (30705) sšr (written phonetically): 'Leinenstoff'. Justification for the use of sšr in a Fourth Dynasty context instead of the earlier šsr, and the possible usage of this type of linen in a medical context is discussed by Manuelian, Slab Stelae, 157. See also A. H. Gardiner, 'Two Hieroglyphic Signs and the Egyptian Words for "Alabaster" and "Linen," ' BIFAO 30 (1930), 175.
- ²³ Gardiner, Egyptian Grammar, sign list no. O29. Wb. 1, 166, 6 3.t: 'Art Leinen'; Hannig, Ägyptisches Wörterbuch, 259 (4808) 3t: 'Leinengewand, Leinenstoff, Leinengewebe (e. Stoffqualität)'. For reading as 3, see Kahl, System, 637-638; Edel ZÄS 102 (1975), 13-17.
- ²⁴ Gardiner, *Egyptian Grammar*, sign list nos. M26 + F35. *Wb*. IV, 477, I.14 '*feines š. Leinen*'; Hannig, *Ägyptisches Wörterbuch*, 1303 (32862) '*feines Schemot-Leinen*'.
- ²⁵ For example, on an unprovenanced fragment JE 46436 (SR 15351) in the Egyptian Museum, Cairo. Photograph reproduced in Manuelian, *Slab Stelae*, 153 where other occurrences of the phonetic writing of *idmy* are discussed.
- ²⁶ Manuelian, *Slab Stelae*, 158 reproduces all five granaries that occur in the linen lists on the Giza slab stelae.
- After Manuelian, *Slab Stelae*, pl. 16; 154, slab stela of Ini (G 1235). Drawn by Mary Hartley, Macquarie University. Where Manuelian has used 'width' to describe the function of the signs in the second register of each group, the writer has employed 'dimensions'. Completely unrealistic, fantastic dimensions of width are obtained when the horizontal signs that in all probability denote area are used as a basis for linear measurements. The latter formula is used for all of Manuelian's translations of the lists, although in each case he questions whether the measurements should be expressed as surface area. See n. 53.
- P. Posener-Kriéger, 'Les mésures des étoffes à l'Ancien Empire', *RdE* 29 (1977), 86-96.
- ²⁷ Posener-Kriéger, *RdE* 29 (1977), 92.
- ¹⁰ Posener-Kriéger, *RdE* 29 (1977), 93.

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- Expressed in linear measurements, indicated by the two vertical fringes. Discussed in detail below.
- ³² Gardiner, Egyptian Grammar, sign list no V 28; Wb. III, 1, 2 'in alten Kleiderstofflisten als Qualitätsbezeichnung von Geweben'; Hannig, Ägyptisches Wörterbuch, 754 (19248) 'als Stoffmass, viell 300 Quadratellen'.
- ³³ Wb. IV, 274, 2 ssf: 'Art dünnes Gewebe (am Schluss der Kleiderlisten nach den Einfadenstoffen); Hannig, Ägyptisches Wörterbuch, 1233 (30363) Gewebe (*schmal, *dunn). For discussion of the redundant 's' in ssf see J. Kahl, Das System der ägyptischen Hieroglyphenschrift in der 0.-3 Dynastie (Wiesbaden, 1994), 66-70
- ³⁴ Manuelian, *Slab Stelae*, 70. He reads the second register of each group from left to right, in descending order.
- ³⁵ Gardiner, *Egyptian Grammar*, sign list no. M 12.
- ³⁶ Concise Oxford English Dictionary, (eds) C. Soanes and A. Stevenson, (11th revised edn., Oxford, 2006). 'Written from right to left and from left to right in alternate lines. From Greek, lit. 'as an ox turns in ploughing'. I am grateful to Boyo Ockinga who alerted me to the use of this bi-directional text in an early Fourth Dynasty linen list from Helwan.
- ³⁷ Manuelian, *Slab Stelae*, 109; 156.
- ³⁸ Köhler and Jones, *Helwan* II, Ch. 4.
- ³⁹ Jéquier, Frises d'Objets, 31.
- ⁴⁰ See B. J. Kemp and G. Vogelsang-Eastwood, *The Ancient Textile Industry at Amarna*. Egypt Exploration Society 68 (London, 2001), 123-144 for fringe construction.
- ⁴¹ Drawn by Mary Hartley, Macquarie University.
- ⁴² Drawn by Mary Hartley, Macquarie University, after Kemp and Vogelsang-Eastwood, *Ancient Textile Industry*, 90, fig. 4.1 (b). The orientation of the textile in this drawing has been changed to conform to known ancient Egyptian weaving techniques, i.e. that the weft fringe is on the left hand edge and the starting border at the bottom end. This would have been from the perspective of the weaver, who worked from the starting border.
- ⁴³ After Manuelian, *Slab Stelae*, pl. 4. Drawn by Mary Hartley, Macquarie University.
- ⁴⁴ Smith, *ZÄS* 71 (1935), 142; 148-149.
- ⁴⁵ Posener-Kriéger, *RdE* 29 (1977), 86-96.
- ⁴⁶ Gardiner, *Egyptian Grammar*, sign list no. S 27.
- ⁴⁷ Gardiner, *Egyptian Grammar*, sign list no. Aa 12.
- ⁴⁸ Posener-Kriéger, *RdE* 29 (1977), 92. One cubit (52.3 cm) is equivalent to 7 palms and 28 digits.
- ⁴⁹ Manuelian, *Slab Stelae*, 159.
- ⁵⁰ Posener-Kriéger, *RdE* 29 (1977), 92.
- ⁵¹ Manuelian, *Slab Stelae*, 159.
- ⁵² Posener-Kriéger, *RdE* 29 (1977), 92.
- ⁵³ This interpretation has been followed by Kahl, Kloth and Zimmerman, *Inschriften der 3. Dynastie*, 175-179 and Köhler and Jones, *Helwan* II. Manuelian in his translation of the linen lists used the formula to calculate width, which gives unrealistic measurements of e.g. 90 cubits (wide), 80 cubits (wide) etc. Posener-Kriéger, *RdE* 29 (1977), 91 discussed the nuances inherent in the vertical and horizontal signs and concluded that the horizontal sign indicates area.
- ⁵⁴ As in the second register of the second group in the linen list of Ini, fig. 2 above.
- ⁵⁵ I wish to thank John Croucher, Professor of Management, Macquarie Graduate School of Management, Sydney, Australia, for calculations and many insightful comments.
- ⁵⁶ Posener-Kriéger, *RdE* 29 (1977), 91.
- ⁵⁷ Manuelian, *Slab Stelae*, for example pl. 12 (G 1225); pl. 16 (G 1235); pl. 24 (G 4140).

- ⁵⁸ Posener-Kriéger, *RdE* 29 (1977), 94. However, the reason that Posener-Kriéger states "*le manteau de fête Sed du roi est une étoffe idmj de 30 ou 40 coudées de surface*" is unclear, because the inscription very clearly shows four upright fringes i.e. 4 cubits x 10 cubits = 40 square cubits. See F. W. von Bissing and H. Kees, *Das Re-Heiligtum des Königs Ne-Woser-Re (Rathures)*, II (Leipzig, 1923), 6-7, pls 16, 22.
- ⁵⁹ Posener-Kriéger, *RdE* 29 (1977), 94-95.
- ⁶⁰ Posener-Kriéger, *RdE* 29 (1977), 94.
- ⁶¹ Posener-Kriéger, *RdE* 29 (1977), 93-94, n. 27.
- ⁶² Exceptions are Manuelian, *Slab Stelae*, pl. 6 (G 1205); pl. 8 (G 1207); pl. 14 (G 1227) and pl. 30 (G 4860), each of which contains a sign denoting linear measurements of 2 x 10 cubits in a register devoted to measurements of area.
- ⁶³ Gardiner, *Egyptian Grammar*, sign list no. V 1. Manuelian, *Slab Stelae*, pl. 4 (G 1203); pl. 8 (G 1207); pl. 14 (G 1227); pl. 20 (G 2135); pl. 26 (G 4150).
- ⁶⁴ Posener-Kriéger, *RdE* 29 (1977), 93.
- ⁶⁵ Posener-Kriéger, *RdE* 29 (1977), 94; Kahl, Kloth and Zimmerman *Inschriften der 3*. *Dynastie*, 175 n. 5. See Kahl, *System*, 65-70 for an analysis of the various forms. Smith, *ZÅS* 71 (1935), 149 had also proposed that *sf* represents a narrow width of cloth.
- ⁶⁶ Kaplony, Inschriften der ägyptischen Frühzeit I, 324, 331; P. Kaplony, Kleine Beiträge zu den Inschriften der ägyptischen Frühzeit (Wiesbaden, 1966), pl. 146, fig. 850. Köhler and Jones, Helwan II, relief slab No. EM99-1. The interpretation was followed by Kahl, System, 67, n. 78; 714 and others, cf. n. 68 below.
- ⁶⁷ Written phonetically as *m*³t on the Second Dynasty Helwan slab EM99-4.
- ⁶⁸ R. M. Hall, 'Two linen dresses from the Fifth Dynasty site of Deshasheh now in the Petrie Museum of Egyptian Archaeology, University College London', *JEA* 67 (1981), 169. Followed by J. R. Ogdon, 'Studies in Archaic epigraphy VII. On the long-sleeved dress logogram and its phonetic values', *GM* 68 (1983), 81-83.
- ⁶⁹ H. G. Fischer, 'An Elusive Shape within the Fisted Hands of Egyptian Statues', in C. Aldred (ed.), *Ancient Egypt in the Metropolitan Museum Journal*, 2 vols. (1968-1976), (New York, 1977), 148-155; 148 n. 41. The sign follows S26 (*šndw.t*, a kilt) in Gardiner's sign list.
- ⁷⁰ Fischer in Aldred (ed.), Ancient Egypt in the Metropolitan Museum Journal, 150-154.
- ⁷¹ Köhler and Jones, *Helwan* II, EM99-24 (early Second Dynasty) and an unpublished, newly discovered relief slab. The 'ties' are graphically illustrated on the determinative in both examples.
- ⁷² Posener-Kriéger, *RdE* 29 (1977), 92 n. 22.
- ⁷³ Calculations based on 1 metre = 1.912046 cubits. The measurement of textiles in the linen lists is currently under investigation by the writer with John Croucher.
- ⁷⁴ Posener-Kriéger, *RdE* 29 (1977), 94 n. 29.
- ⁷⁵ Temporary No. 21/3/33/1. Located in Upper Corridor 44. Permission to examine and publish was granted by the former director of the Egyptian Museum, Mohammed Saleh, in 1997. Yarn is single, s-spun; the weave is a medium quality, one to one plain tabby, with a thread count of 24 x 16 yarns per cm. Inscription published by A. Wiedemann, *Ägyptische Geschichte* (Gotha, 1884), 211; H. K. Brugsch, *Thesaurus Inscriptionum Aegyptiacarum. Altaegyptische Inschrifen*, Vols. V-VI (Graz, 1968. First published Leipzig, 1891), 1212; G. Maspero, *Guide to Cairo Museum* (1st edition, Cairo, 1903), 472, n. 57; Sethe, *Urkunden* I, 97.16; PM III²/1, 424.
- ⁷⁶ A. Labrousse, L'architecture des pyramides à textes, I. Saqqara Nord. BIFAO 114/1 (Le Caire, 1996), 160, 161 n. 33. I am very grateful to Audran Labrousse for generously providing references and information on the precise provenance of the textile, which was not noted in the Journal d'Entrée.

- ⁷⁷ My thanks to Boyo Ockinga, Macquarie University, for very helpful advice on the grammatical structure of the two possible translations.
- ⁷⁸ Photograph Jana Jones[®].
- ⁷⁹ D. Jones, An Index of Ancient Egyptian Titles, Epithets and Phrases of the Old Kingdom, I, BAR 866 (I) (Oxford, 2000). For example, 170 no. 649 'overseer of every royal bundle of flax'; 512 no. 129 'overseer of the houses of weaving women of ... of the *itiwy*-cloth of the king (?).
- ⁸⁰ J. Jones, 'Pre- and Early Dynastic Textiles. Technology, Specialisation and Administration during the Process of State Formation', in B. Midant-Reynes, Y. Tristant, J. Rowland, S. Hendrickx (eds), Egypt at its Origins 2. Proceedings of the International Conference 'Origin of the State. Predynastic and Early Dynastic Egypt', Toulouse (France), 5th-8th September 2005 (Leuven, 2008), 116-119.
- ⁸¹ A. M. Lythgoe and D. Dunham, *The Predynastic cemetery N7000. Naqa-ed-Dêr* (Berkeley/ Los Angeles, 1965), IV, 33.
- ⁸² Although complete textiles are essential to ascertain dimensions, accurate technical analysis of quality can be undertaken on small samples using the stereo-microscope.
- ⁸³ Manuelian, *Slab Stelae*, 155; 156, figs. 231-233.
- ⁸⁴ Saq. 2146; E. J. E. Quibell, Archaic Mastabas, Excav. Saqq. 1912-14 (Cairo, 1923), pl. 26.
- ⁸⁵ Helwan slabs EM99-19; EM99-32. Köhler and Jones, *Helwan* II.
- ⁸⁶ Smith, ZÄS 71 (1935), 138 notes that in the tomb of Pepy-Ankh at Meir the individual amounts of textiles above boxes do not add up to the total. Blackman, *Meir* IV, 49.
- ⁸⁷ Manuelian, *Slab Stelae*, 155.