

Woven Patterns on Tutankhamun Textiles

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Abstract

Three thousand three hundred years ago a master weaver created the rare and remarkable patterned bands that adorn The Tunic of Tutankhamun now displayed in Cairo's Egyptian Museum. Howard Carter called this garment a "gala robe . . . with decorative bands . . . that still bear traces of their former beauty. In their pristine state they must have been gorgeous pieces of color." This paper presents Howard Carter's assessment of what type of textile he thought the decorative bands were, Grace Crowfoot's theory about how they were woven, and what other authors have published about their structure. My theory on the probable method of construction of these woven bands is based on recreating the ancient patterns and weaving methods as an 'experimental archaeology' project.

Introduction

Broad blue-green, brown, and natural linen woven panels with ornate geometric patterns are appliquéd on the right and left sides of the linen tunic of Tutankhamun.¹ A pastiche of four other woven bands in the same palette, but with different patterns frames a large embroidered panel of floral and animal motifs near the hem.² A similar scheme decorates the back of the tunic. An ankh-shaped neck-opening is formed by a curved woven collar and a yoke embroidered with the king's cartouche and trimmed with a narrow woven band. A double length of linen is folded in half for the body of the tunic and sewn at the sides. The added strength of two layers supports the heavier fabrics of the

¹ I wish to thank Dr. Zahi Hawass for granting me permission to publish photographs of the Tutankhamun textiles and for the special privilege of visiting the new Egyptian Textiles Museum prior to its public opening. The assistance of Iman R. Abdulfattah, Coordinator of the Renovation of the Museum of Islamic Art at the SCA, during my 2009 research trip to Egypt was invaluable. Dr. Wafaa Sadik and members of her staff, Dr. Hanane Gaber, Albert Ghaly, Amina El Baroudi, and Yasmin El Shazly, welcomed me to the Egyptian Museum and arranged for new photos of the Tutankhamun tunic and other textiles that were critical to my research. The help provided by Dr. Mohammed Saleh, the Director of the Egyptian Museum when I was there in 1983, has been very important to this project. I thank Robert Fletcher and Christine Pearson of Active Travel in Australia for inviting me to host the 2009 and 2010 *Textiles of Egypt Tour* that made returning trips to Egypt possible. The textile exhibits at museums we visited in Cairo, Luxor, Aswan, and Alexandria were outstanding. The important contribution to the history of Egyptian textiles by Grace Crowfoot, Elizabeth Riefstahl, Elizabeth W. J. Barber, and especially the more recent work of Gillian Vogelsang-Eastwood deserves acknowledgement.

² Howard Carter, *The Tomb of Tutankhamen* (New York, 1954), 206, described the tunic (Carter 367j, Egyptian Museum JE62626) as "a sleeved robe of fine plain linen, having auxiliary tapestry-woven fabric and open needlework . . . this garment . . . was badly crumpled up and cast into the box. Colors of the ornament (tapestry-woven) are difficult to discern exactly, but red, possibly green, blue, and possibly black, were present. Tunic Size: (width from shoulder seam to shoulder seam) 95 cm wide × 113.5 cm length . . . Sleeves Size: 36 cm . . . Back has similar side borders to the front (and better preserved). The lower border is not symmetrical as in front, though of similar devices and method of ornament." Howard Carter, *Handwritten Notes on the Textiles from Tutankhamun's Tomb, 367j, Tutankhamun: Anatomy of an Excavation: the Howard Carter Archives*. Courtesy of the Griffith Institute, Ashmolean Museum, Oxford, www.griffith.ox.ac.uk/gri/carter/o54p.html.



Fig. 1. Tunic of Tutankhamun in Egyptian Museum, Cairo. Carter 367j, JE 62626. Photograph courtesy of Z. Hawass.

woven bands and embroidery. The sleeves, of a finer linen fabric, are folded at the shoulder with sewn seams down their tapered length.³ A few fragments of fringed bands remain on the now detached sleeves (fig. 1).

While plain weave linens are plentiful from ancient Egypt, the embroidery and woven patterns on the garment are unusual. Scholars suggest that the tunic may have a Syrian origin, or perhaps was made in Egypt by a captive craftsman from the Near East.⁴ While Carter thought that the bands were *tapestry woven*, Grace Crowfoot theorized that the bands were *warp-faced weaves* woven in the *Beduin* technique.⁵ Since then, her theory, that they are warp-faced textiles, has been perpetuated in numerous publications.⁶ A more recent description of the bands suggests that they are an unidentified warp weave.⁷ Though the band outlining the yoke on the ankh and the small sleeve bands are warp-faced, I believe the ankh collar and five larger tunic bands, a Tutankhamun belt fragment, and two collars from his tomb on exhibit in the same gallery are multi-shed, weft-

faced, point twill pattern weaves.⁸ The weave structure, once analyzed and understood, is the basis for an ‘experimental archaeology’ project to recreate the ornate patterns as they were woven by the ancient artisans.

I first saw the tunic of Tutankhamun in its glass-covered vitrine in 1983 and was amazed that these ancient fabrics retained so much color, since only the black and white Harry Burton photo had appeared in publications. I never doubted that the larger tunic bands and collar were “*weft-faced*” after seeing them in 1983 and again in 2009 and 2010, though the literature on the tunic claimed that the woven tunic bands were “*warp-faced*.”⁹

³ G. Crowfoot, and N. deG. Davies, “The Tunic of Tutankhamun,” *JEA* 28 (1941), 115; G. Vogelsang-Eastwood, *Tutankhamun’s Wardrobe: Garments from the Tomb of Tutankhamun* (Rotterdam, 1999), 84; idem, *Tutankhamun Textiles and Clothing in the Egyptian Museum*, (Cairo, 1997), 8, 21. Interesting diagrams of the neck-opening and the fit of the tunic on the pharaoh are found in B. J. Kemp et al., *The Ancient Textile Industry at Amarna* (London, 2001), 204, 210.

⁴ Crowfoot and Davies, “The Tunic of Tutankhamun,” 112–30; E. W. J. Barber, “New Kingdom Egyptian Textiles: Embroidery vs Weaving,” *AJA* 86 (1982), 442–45; idem, *Prehistoric Textiles* (New Jersey, 1991), 160–61; B. Fowler, “Forgotten Riches of King Tut: His Wardrobe,” *The New York Times* (Tuesday, 25 July, 1995) B6; Vogelsang-Eastwood, *Tutankhamun’s Wardrobe*, 80–84; idem, *Tutankhamun Textiles*, 9; M. Feldman, “Interwoven Relations: Internationalism and an Embroidered Tunic from the Tomb of Tutankhamun.” Paper presented at the College Art Association Conference (February, 1999.)

⁵ Crowfoot and Davies, “Tunic of Tutankhamun,” 118.

⁶ See n. 2 and 3.

⁷ J. Allgrove, “Ancient Egypt,” in D. Jenkins, ed., *The Cambridge History of Western Textiles* (Cambridge, 2003), 39, acknowledged Vogelsang-Eastwood’s contribution on textiles. “It [the tunic] has . . . a warp-faced weave (unidentified) at the sides and hem.”

⁸ The Tutankhamun tunic bands and a Belt Fragment, as both warp and weft-faced textiles, are discussed with complete directions for weaving re-creations of the textile patterns. N. A. Hoskins, *Weft-faced Pattern Weaves: Tabby to Taqueté* (Seattle-London, 1992), 10–12, 311–36, and idem, “Linen Bands from Tutankhamun’s Tunic,” *Weaver’s* (Fall, 1998), 30–33. The Tutankhamun textiles discussed in this paper are as follows: Tunic of Tutankhamun, Carter 367j, JE 62626; Belt Fragment, Carter 54p, JE62679, Crowfoot 1045 (Crowfoot cites the Belt Fragment as Textile 1045); Collar, Carter 21o, JE 62644; Collar, Carter 21aa, JE 62643.

⁹ The woven samples of the patterns were first exhibited in 1990 and my material on the Tutankhamun woven patterns was first published in 1992. Hoskins, *Weft-Faced Pattern Weaves*, 311–36. Tutankhamun band #1 was published in L. Heinrich, *The Magic of*

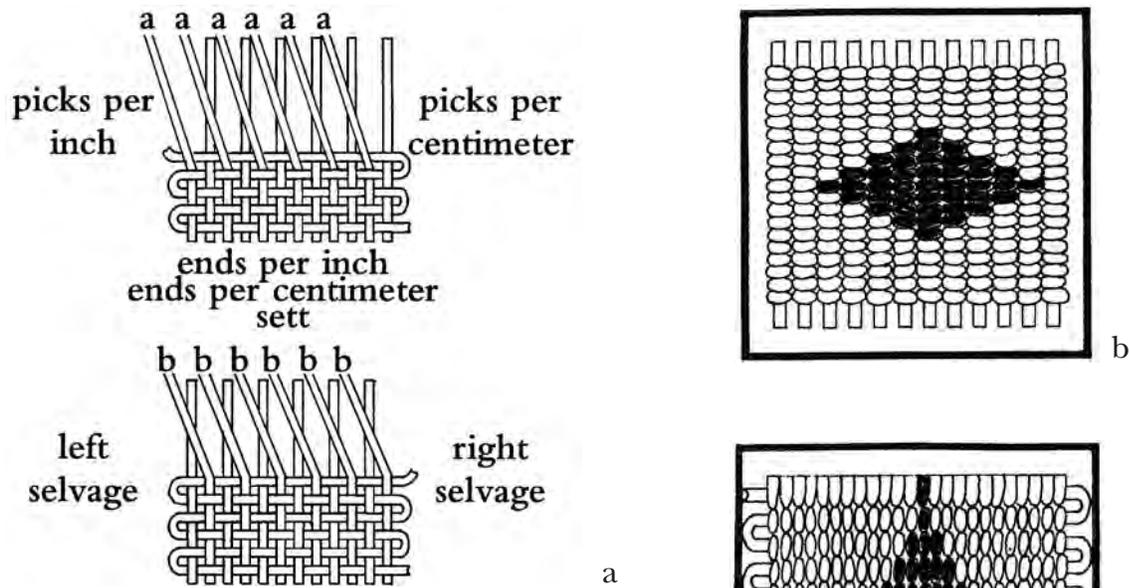


Fig. 2a. A diagram of a balanced or tabby weave in which both warp ends and weft picks show. The vertical yarns ('a' and 'b') are warp ends. The horizontal yarns are the interlaced weft picks. The open space between the warp yarns that are held up and those that are down is called the 'shed.' b. The pattern and color are from the weft yarns in a weft-faced textile. c. The pattern and color are from the warp yarns in a warp-faced textile. Both diamond motifs are five-shed patterns. (Drawings by the author.)

Weft-Faced and Warp-Faced Weaving

In a weft-faced textile all of the visible color and pattern are from the interlaced wefts. In a warp-faced textile all of the visible color and pattern are from the warp threads that were stretched on the loom (fig. 2). Theoretically, identical patterns can be woven as either weft-faced or warp-faced textiles. This is an easy task with two-shed plain weaves, but to weave a warp-faced example of any of the diamond-motif, point twill Tutankhamun patterns would require that thousands of fine linen threads must be organized on the loom according to a preconceived design—in perfect color and numerical order—and woven with a warp count of over one hundred ends per centimeter. There are technical

Linen: Flax Seed to Woven Cloth (Victoria, BC, 1992), 186, fig. 12.26. N. A. Hoskins, "Pharaoh's Gala Robe," *HALI* (issue 166), 31. Crowfoot wrote the analysis of the woven panels in her 1941 article, while Davies wrote the section on the embroidered panel. Crowfoot credits Winifred Brunton with the "drawings" (114, n. 3) and "paintings" of the tunic bands, ankh collar, and embroidery (pl. 15). The location of the paintings, which would be a valuable addition to the line drawings, are at present unknown. At the time that Crowfoot, Davies, and Brunton studied the tunic, both sides could be viewed in a glass-covered swing-case. Crowfoot and Davies, "The Tunic of Tutankhamun," 112–30. Barber, *Prehistoric Textiles*, 160, described it as "A linen tunic belonging to Tutankhamun . . . decorated with warp-faced bands. . . ." G. Vogelsang-Eastwood, *Pharaonic Egyptian Clothing* (Leiden, 1993), 140–41, described the tunic bands as "decorative compound weave bands," and she notes Crowfoot's description of the bands as "a decorative warp-woven form." "Another weave form used is a variation of a warp-patterning whereby the design is carried in the warp threads. When not in use the extra threads float on the back of the material," Vogelsang-Eastwood, *Tutankhamun Textiles*, 5; idem, *Tutankhamun's Wardrobe*, 24–25.

problems in the warp-face twill weaving process and obvious structural and visual distinctions between the two types of cloth.¹⁰

The narrow bands on the tunic yoke, sleeves, and collar trims are two-shed warp-faced plain weave structures, but the Beduin weave, suggested by Crowfoot to weave the more complex patterns, forms another type of interlacement. That weave is basically a warp-face plain weave textile with supplementary warps for the pattern colors. The motifs are woven with a pick-up method.¹¹ A band warped with the Beduin method would have pairs or sets of the colors that appear on the surface of each pattern row floating on the back when they are not used. Furthermore, a Beduin band would vary in thickness in accordance with the location and number of colors in the pattern. The Tutankhamun bands appear to be of uniform thickness. Crowfoot stated that she had examined the back of a Tutankhamun belt fragment and included a photo of the back of it in her article. Photographs show the weft yarns on the belt fragment and on the small scrap flow all across the back of the pattern—not just in certain sections.¹² Crowfoot wove a sample piece in the Beduin technique and said she, “found it possible to manage this and obtain a result that seems to resemble the original.” Regrettably, she did not publish a photograph of her sample.¹³ Elizabeth Crowfoot, her daughter and a textile scholar in her own right, wrote that she could not find either the sample by her mother or a photograph of that piece.¹⁴ Crowfoot’s article does not mention any ancient examples of the Beduin weave structure. There is no clear evidence that the Tutankhamun bands were woven with the Beduin method.

Using contemporary textile terms, the band, belt, and collar patterns are based on three, four, five, six, seven, and ten-shed point twill structures woven with sets of complementary wefts. This weft-faced pattern weave, is traditionally called *boundweave*.¹⁵ The dense surface of warp-wise ribs resembles tapestry, but has long weft floats on the reverse that are characteristic of the weft-faced pattern weaves based on point twill threading orders. All the larger tunic band patterns, the belt fragment pattern, and collar patterns can be woven with a taut warp stretched on a simple horizontal or vertical loom just by counting and picking through the warp to place the weft. Both types of looms were in use by the New Kingdom period.¹⁶ A shed sword, such as those used by ancient Egyptian weavers, can be put through the counted repeats and then turned on edge for the weft to pass through. Another method to consider is the use of a needle or heddle bars with string heddles. There is no evidence for a heddle bar method in ancient Egypt, but this system is a logical development of simple weaving, not difficult to set up, and would leave no evidence in the cloth (fig. 3).

The above diagrams show how the shed sword or pick-up stick would go through the warp to make the sheds for a five-shed point twill pattern. Each weft is passed through the shed and then beaten with the shed sword. The weft color will show over each warp end that is held down. The five picks com-

¹⁰ See n. 8.

¹¹ While Crowfoot spells the technique as Beduin, J. M. Hilden, “The Colorful Oasis,” *Threads*, no. 21 (1989), 48–53; idem, “In Search of Beduin Weavers,” *Aramco World* (May–June, 1988), 38–40; www.beduinweaving.com; idem, *Bedouin Weaving of Saudi Arabia and its Neighbors* (London, Publishers, 2010), prefers Bedouin.

¹² The reverse side of the Belt Fragment (Carter 54p, JE62679, Crowfoot 1045) is illustrated in Crowfoot and Davies, “The Tunic of Tutankhamun,” 122, pl. 19. Dr. Mohammed Saleh, the former Director of The Egyptian Museum, graciously gave me permission to take photos of the tunic and other textiles in 1983 and provided copies of the Harry Burton black and white photographs of the tunic and ankh (Carter 367j, JE 62626).

¹³ Crowfoot chose the pattern of the Tutankhamun Belt Fragment (Carter 54p, JE62679, Crowfoot 1045) to weave as an example of a warp-faced Beduin weave, Crowfoot and Davies, “The Tunic of Tutankhamun,” 122–24, pl. 16.

¹⁴ Elizabeth Crowfoot, 31 May 1991 (pers. comm.).

¹⁵ Hoskins, *Weft-faced Pattern Weaves*, 12.

¹⁶ Barber, *Prehistoric Textiles*, 83–91, 113–16; Kemp and Vogelsang-Eastwood, “Reconstruction of a New Kingdom Loom,” *The Ancient Textile Industry in Amarna*, 405–11.

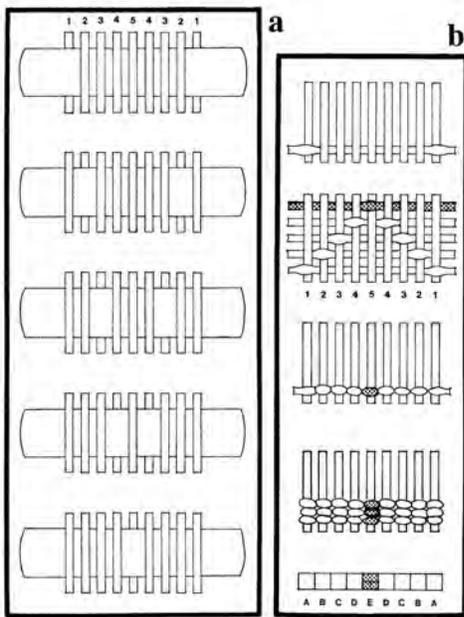


Fig. 3a. How warp ends can be counted and held with a shed sword or pick-up stick so that each of five separate wefts can be inserted. b. How the five picks compress to make one pass and how three passes build up a pattern row. (Drawings by the author.)

press into one pass, which is one visual weft row of the pattern.¹⁷ The patterns are produced by controlling the color of the picks, and the pattern blocks are built up by repeating the color order for a set of passes. The different pattern sheds can be counted quite easily once the first set of picks is in the warp. Each new shed is made by moving over one end in repeating and symmetrical sets; therefore, it is quite easy to weave the patterns. The same warp and system of picking across the warp ends could be used for *any* of the patterns produced on the tunic bands, belt fragment, and collars no matter how many sheds there are in the pattern repeat—three, four, five, six, seven, or ten. Patterns can be devised during the weaving process. They require no pre-set design. Any mistake in the placement of a color is immediately evident and easily corrected. This method of weaving produces a thick, sturdy, and attractive fabric that is now used primarily for rugs and decorative art fabrics.

Woven Samples of Tutankhamun Patterns

I wove patterned samples on a simple frame loom by counting threads and set-up heddle bars on another sample, but, I confess, I used my timesaving, multi-shaft loom to weave my re-creations of the band, belt, and collar patterns. *The weave structure is the same with any method.* The patterns were drafted based on my examination of the Tutankhamun textiles under glass in 1983, 2009, and 2010, my color photos taken in 1983, Carter's notes, the diagrams in Crowfoot's article, and color photos in Vogelsang-Eastwood's 1999 book.¹⁸ I wove two previous sets of the tunic bands and belt fragment that were larger than the original textiles.¹⁹ To weave the new samples of the band, belt, and collar patterns close to their original size and color, I used Egyptian cotton sewing thread in a palette, though brighter, that resembles the original. I wove weft-faced examples of the patterns from five Tutankhamun tunic bands, the ankh collar, a belt fragment, and two other collars. Warp-faced patterns of the diamond motif from the belt fragment, the ankh yoke band, the sleeve bands, and those trimming the two other collars were also woven.²⁰

¹⁷ Pass: a pass equals one set of complementary picks or completes the binding of one weave unit, and forms one visual row of weaving. Complementary Picks: two or more picks that are co-equal in the structure and necessary to complete the weave unit are called complementary picks, Hoskins, *Weft-faced Pattern Weaves*, 14.

¹⁸ See n. 12 concerning the 1983 color photos. Carter, *Handwritten Notes on the Textiles from Tutankhamun's Tomb*, 367j; Crowfoot and Davies, "The Tunic of Tutankhamun," pls. 15–16, 18, 22; Vogelsang-Eastwood, *Tutankhamun's Wardrobe*, 26, 31, 61, 80–84.

¹⁹ Re-creations of the Tutankhamun tunic bands and belt fragment patterns were exhibited as follows: *Etudes*, Convergence 1990 (San Jose, California, 1990); *Etudes*, Michigan Handweaver's Conference (Alma, Michigan, 1997); *Fabricated from Flax*, Contemporary Crafts Gallery, (Portland, Oregon, 1998). Elizabeth Barber requested that I send my re-creation of a Tutankhamun pattern and also a Coptic taqueté to the following exhibit: *Tutankhamun and Coptic Replicas*, Museum of Textiles (Toronto, Ontario, 2000); *Egyptian Memories*, Convergence 2000, (Cincinnati, Ohio, 2000); *Ancient Odyssey*, Springfield Museum (Springfield, Oregon, 2001); *Memory of Egypt*, Sarratt Art Gallery, Vanderbilt University (Nashville, Tennessee 2011). See nancyhoskins.com/gallery for art fabrics inspired by my Egyptian research.

²⁰ Color images of the recreated bands can be viewed on my website nancyhoskins.com/work. The following materials and method were used for the woven samples. *The Weft-Faced Samples*: Structure: Weft-Faced Pattern Weave with 3, 4, 5, 6, 7, 10-sheds.

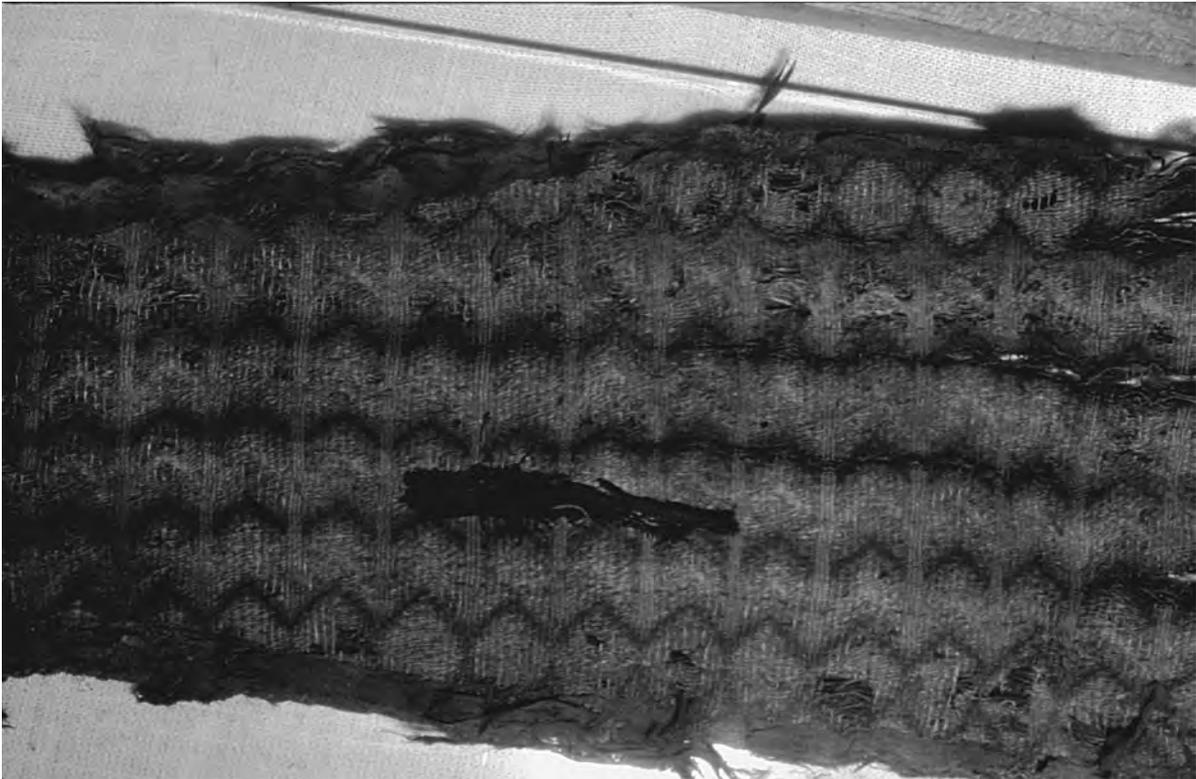


Fig. 4. A 1983 photo of a Tutankhamun Belt Fragment in the Egyptian Museum Carter 54p, JE62679, Crowfoot 1045. This band, according to Carter's measurements, is 5.5 cm h at the ends, 8.5 cm h in the middle, 39 cm w. (Photograph by author.)

Each pattern sample is identified with the Carter number and Egyptian Museum number. The tunic bands are numbered as in Crowfoot's article and the number she used for the belt fragment is added. Measurements noted by Carter or Crowfoot are cited height (h) by width (w). The number of picks of the weft-faced samples and the number of warp ends for the warp-faced samples are cited. *It is important to understand that the number of weft picks to complete a weft-faced pattern requires an equal number of warp ends to replicate the pattern as a warp-faced weave.*

Warp-Faced and Weft-Faced Woven Patterns of a Seven-Shed Pattern from a Tutankhamun Belt Fragment

The first example that I wove in 1990 was drafted from the belt fragment illustrated above (fig. 4), which was a linen band with a diamond and feather or chevron pattern described by Carter as *tapestry*

Warp of Coats and Clark Dual Duty Hand Quilting cotton/poly sewing thread. Weft of Coats and Clark Mercerized Egyptian cotton sewing thread: Tunic Bands Carter 367j, JE 62626 #1-5; Ankh Collar #8; Belt Fragment, Carter 54p, JE62679, Crowfoot 1045; Collar, Carter 21o, JE 62644 (931); Collar, Carter 21aa JE 62643 (937); Sett: 10 EPcm (ends per centimeter): Pass: 3, 4, 5, 6, 7, or 10 picks = 1 pass: Pattern Row: 1 pattern row = 3 passes. *Warp-Faced Samples*: Structure: Warp-Faced Plain or Pattern Weave with 2 or 7-sheds. Warp of Coats and Clark Mercerized Egyptian cotton sewing thread: Belt Fragment Carter 54p, JE62679, Crowfoot Textile 1045. Warp of Coats and Clark Dual Duty All Purpose cotton/poly sewing thread: Tunic Ankh Yoke Trim, 367j, JE 62626 #9; Sleeve Bands #11-12; Collar Trim, Carter 21o, JE 62644 (931); Collar Trim, Carter 21aa, JE 62643, (937); Weft of Coats and Clark Dual Duty All Purpose cotton/poly: All warp-faced samples.

woven.²¹ The same textile was used by Crowfoot to explain her Beduin weave theory.²² The seven-shed patterned band is similar in structure to the applied woven bands that decorate *The Tunic of Tutankhamun*. The s-spun dyed linen threads are light blue-green from indigo, and different values of brown from madder, according to Pfister's studies.²³ Natural s-spun linen was used along with the dyed threads in the weft and for the warp. This fragment has been described as part of a child-size *Amarna* belt.²⁴ The weft-faced sample of the band fragment pattern was drafted from my color photograph, which showed the full height of the pattern and almost one-third of its length. The color sequence for the seven-pick pass, analyzed from my photograph, repeats for a set of two or three passes to form each pattern row.

To demonstrate the difference in the warp-faced weaving process I wove both a weft-faced sample and a warp-faced example of the diamond motif from the above mentioned belt fragment. To translate the entire pattern of the belt fragment as a warp-face weave, approximately 1680 ends would have to be accurately put on the loom in color and numerical order according to the desired pattern. Crowfoot included a draft for the pattern in her article and suggested that there might be 780–880 ends or “slightly more.”²⁵ To weave the patterns there had to be some method of raising the appropriate warp ends in order to insert each weft pick. What you actually have is seven sets of warp stacked together. Picking through the dense bundle of warps with a shed sword to find the right color is not impossible, but would be very difficult. Once a shed is opened by whatever method, the weft pick is inserted, beaten in vigorously, and the shed closed. Opening each new shed means that the next set of pattern ends must be selected from, then pass through and separate from, the thick mass of ends. This would be more difficult with fine, fragile linen threads than with the smooth, strong cotton yarns of my sample and the assistance of a modern floor loom (fig. 5).

An examination of the two examples will reveal the similarities and differences between the patterns, surface, and structure of the same motif. The pattern units are similar in size and both fabrics are thick. The selvages, of course, are distinctly different. The warp-faced example has an almost scalloped edge with long floats from one pattern repeat to another. The weft-faced example has selvages comparable to any tapestry or weft-faced textile. The warp-faced piece has a thick, fringe made up of the ends showing all of the colors of the pattern. The weft-faced example has a sparse warp fringe of neutral color. The surface texture of the two examples is quite unmistakably either weft-faced or warp-faced. The weft-faced example has the smooth alignment of each pass and set of passes that is typical of tapestry or weft-faced pattern weaves. This same smooth alignment of the passes is evident on all of the tunic patterns, this belt fragment, and on the collars. The warp-faced example has a slightly rippled effect that reverses at the center of each pattern unit. The back of each textile displays floats that follow the same pattern. This type of fabric has a tendency to curl: the warp-faced sample from selva to selva, and the weft-faced sample from hem to hem. The patterns on the tunic have three, four, and even five colors in the same pass, and are multi-shed weave structures. It might not be possible to identify a plain weave fragment without selvages or fringes as warp-faced or weft-faced, but multiple-shed structures just do not have the same surface appearance.

²¹ Carter's description of a Belt Fragment (Carter 54p, JE62679, Crowfoot Textile 1045) follows: “tapestry woven strip, basted with ordinary cloth. A complete piece in itself. Presumably sewn on to something else . . . Colors: Yellow, green . . . Size: 8–5 cm h × 39 cm w.” Carter, *Handwritten Notes on the Textiles from Tutankhamun's Tomb, o54p*, courtesy of the Griffith Institute, Ashmolean museum, Oxford, www.griffith.ox.ac.uk/gri/carter/o54p.html.

²² See n. 13.

²³ For the dyestuffs used on the Tutankhamun bands see R. Pfister, “Les Textiles du tombeau de Toutankhamon,” *Revue des Arts Asiatiques* (11, no. 4, 1937) 208–10; Crowfoot and Davies, “The Tunic of Tutankhamun,” 116, n. 2; E. Riefstahl, *Patterned Textiles in Pharaonic Egypt* (Brooklyn, 1944), 28; Vogelsang-Eastwood, *Tutankhamun Textiles*, 5.

²⁴ Vogelsang-Eastwood, *Tutankhamun's Wardrobe*, 18, 58–62; idem, *Tutankhamun Textiles*, 20.

²⁵ Crowfoot and Davies, “The Tunic of Tutankhamun,” 124.

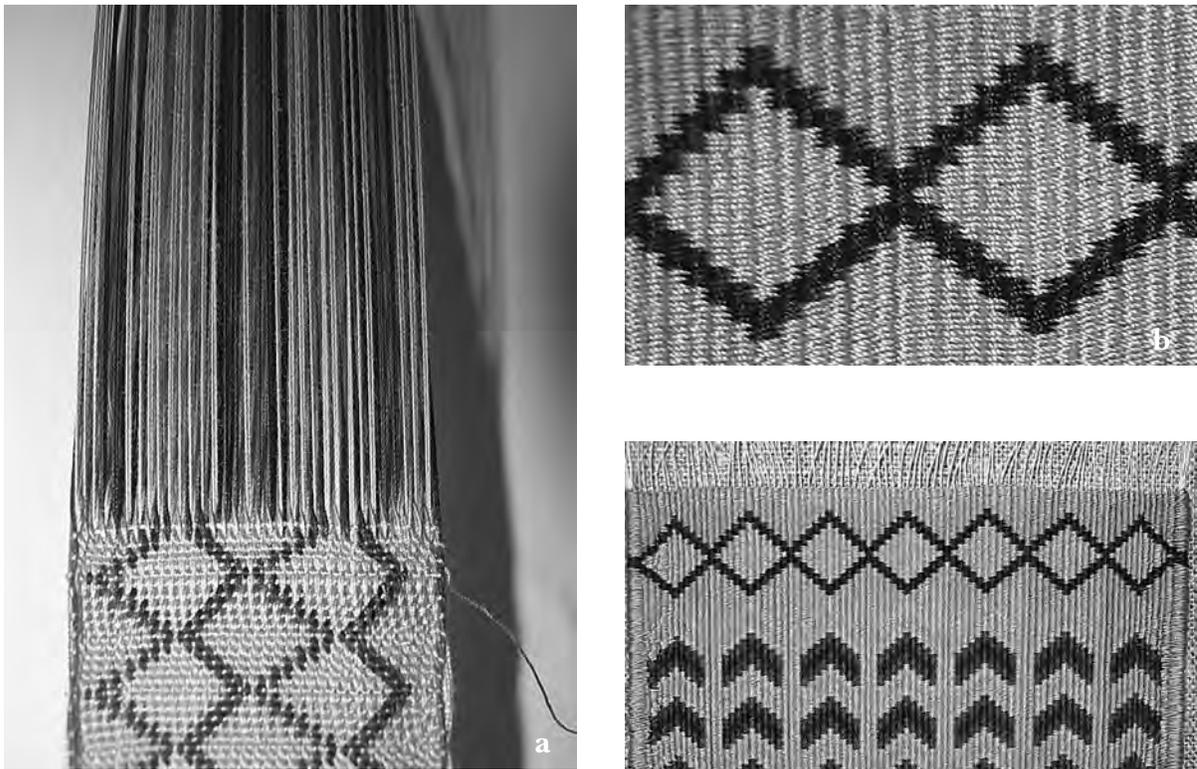


Fig. 5a. Re-creations of the pattern from a Tutankhamun Belt Fragment, Carter 54p, JE62679, Crowfoot 1045. a. Sample of the seven-shed, warp-faced, point twill, diamond motif (size: 3.3 cm wide, 462 warp ends for two repeats of the diamond pattern); b. Detail showing the diamond motif from the seven-shed, weft-faced, point twill sample; c. Seven-shed, weft-faced, point twill sample (size: 8 cm h × 10.3 cm w, Number of Weft Picks: 1680).

The warp yarns at the beginning and end of each weft-faced woven piece would have to be either knotted to secure the weft, stitched back into the web, turned under, or bound with another strip of cloth. If knotted a warp fringe can be left on the textile. A binding cloth is visible at the top of the belt fragment in my photo. This is, perhaps, part of the backing cloth mentioned by Carter.²⁶

Another recommendation for the theory that they are weft-faced is that several other Tutankhamun textiles are weft-faced, but woven with tapestry techniques. For example, there is a sadly deteriorated tunic, a piece of cloth, and gloves, all tapestry woven.²⁷ The same loom and warp could be used for both plain weave/tabby, tapestry weave, and weft-faced pattern weave. Tapestry techniques would only differ in that the wefts are discontinuous, do not travel from selvage to selvage, do not leave floats on

²⁶ See n. 21.

²⁷ Carter, *Handwritten Notes on the Textiles from Tutankhamun's Tomb*, 367; Riefstahl, *Patterned Textiles*, 28; Vogelsang-Eastwood, *Tutankhamun's Wardrobe*, 88–89; idem, *Tutankhamun Textiles*, 19–20. Tapestry Glove, Carter 367f, JE 62675; Tapestry Glove, Carter 50u, JE 62669. Tapestry Gauntlet, Carter 50u, JE62669.

the back, and are plain weave structures.²⁸ The segue from tapestry to a weft-faced pattern would be a logical development of the technique: a way to form a pattern that is more efficient than tapestry technique. It would not be unusual for a weaver to be proficient at weaving tabby, tabby-tapestry, tapestry, warp-face, and weft-faced textiles.

Although Barber assumed in her 1991 book that the Tutankhamun tunic bands were “warp-woven,” after reading my 1992 chapters on the Tutankhamun patterned bands and belt she wrote,

I read your piece . . . and I must say that your arguments seemed completely convincing . . . I just ASSUMED bands would be woven with the warp running the long directions. . . when I read the weft-faced instructions . . . and saw the terrifically INCREASED complexity of weaving it as warp-faced . . . You’ve got to be right.

When asked a question about Tutankhamun’s tunic at a 1998 lecture, she referred to my book and said that it “seemed to have the most sensible analysis.”²⁹

The Tutankhamun Tunic Band Patterns

Patterned bands (figs. 6, 7, 8) run down the sides of the tunic on both the front and back. Carter noted red, green, and black hues, while dark blue, pale blue, brown, and natural hues are mentioned by Crowfoot.³⁰ I can only detect the pale blue-green, natural, and different values of brown. Five colors show in one pattern row in the ‘*squares within squares*’ portion of the pattern. It is a striking pattern for the pharaoh’s tunic. The textile is thick. Where some weft threads have worn away, the paired s-spun warp ends that the weaver used for extra strength are visible, as are wefts that float from one pattern repeat to another on the reverse. Though my sample is only 13 cm wide, the width of the original #1 tunic bands, which is approximately 39.5 cm, would not present a weaving problem.

The weaver of this ten-shed pattern was a master of the technique, but I think this patterning method was doomed to disappear—and seemed to. Either the skill was no longer passed on from weaver to weaver or, because of the excessive amount of precious hand-spun, hand dyed yarn on the back of the textile, its thickness, and tendency to curl, it was not a practical fabric.

Imagine weaving a warp-faced sample of this 10-shed pattern! Two thousand seven hundred warp ends of very fine, dyed, linen yarn would have to be arranged on the loom in perfect color order. Then some method of raising the colors in perfect numerical order for each of the ten sheds would have to be set. In order for the pattern to show, the warp ends must be tightly woven at approximately 200–300 ends per centimeter. Crowfoot estimated that there were 558 ends in the pattern, but thought that the figure was “probably too low.”³¹ Each band is about 39 cm long; the total length of the four bands would be about 156 cm. Weaving this with spliced or spun linen yarn would indeed be a challenge. A sample woven, if it could be done as described above, would support the warp-faced weaving theory.

²⁸ For definitions, descriptions, and diagrams of tabby-tapestry and tapestry woven textiles see N. A. Hoskins, *The Coptic Tapestry Albums and the Archaeologist of Antinoë Albert Gayet* (Seattle-London, 2004), 38–42. For an example of an ancient Tuthmosis IV tabby-tapestry textile (JE 46526) see Vogelsang-Eastwood, *Tutankhamun’s Wardrobe*, 25 fig. 2:6, and Barber, *Prehistoric Textiles* (Textile Museum TM 81, JE 46527, 46528) pl. 1.

²⁹ Elizabeth W. J. Barber, 27 July 1998 (pers. comm.); idem, “Plaids and Stripes Forever (Well, for 6000 years Anyway!),” lecture presented at Convergence 1998 (Atlanta, GA, 1998).

³⁰ See nn. 2, 4; color photo of Tunic Band #1 is illustrated in Vogelsang-Eastwood, *Tutankhamun’s Wardrobe*, 78.

³¹ Crowfoot and Davies, “The Tunic of Tutankhamun,” 118.

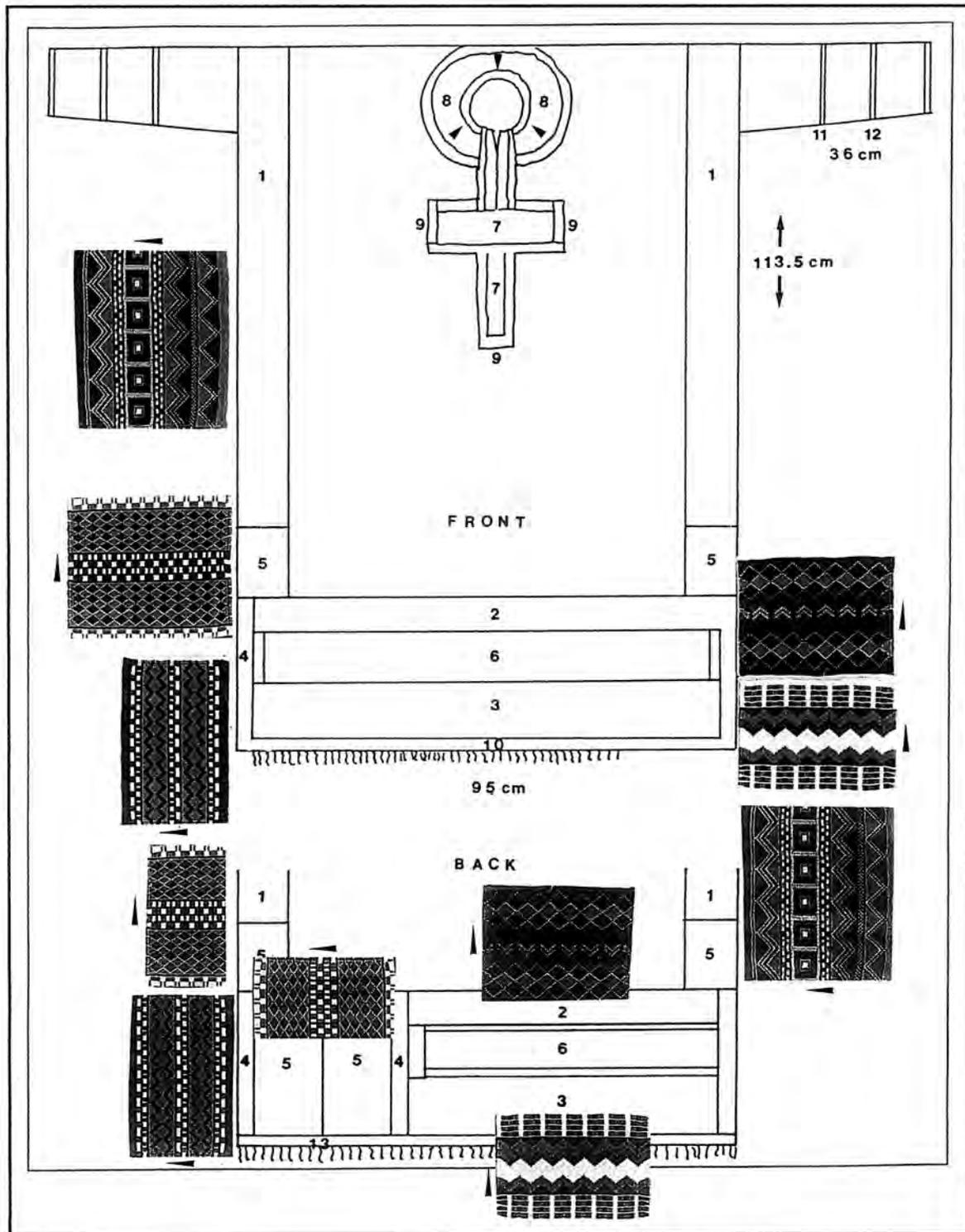


Fig. 6. The diagram of the Tutankhamun tunic is labeled with the pattern numbers assigned by Grace Crowfoot. The five large tunic patterns are shown close to their location on the tunic with arrows indicating the direction of the warp. The ankh collar is #8, the woven band on the ankh yoke is #9 and the sleeve bands are #11 and #12. The embroidered panels are #6. (After the Carter and Crowfoot diagrams.)



Fig. 7. Detail of Tunic band #1 from the Tunic of Tutankhamun, Egyptian Museum, Cairo, Carter 367j, JE6262, Crowfoot #1. These bands, according to Crowfoot's measurements, are 9.5 cm high \times approximately 39 cm wide. (Courtesy of Z. Hawass.)



Fig. 8. Ten-shed, west-faced, point twill sample of the pattern on Tutankhamun Tunic Band #1 (Sample Size: 9 cm h \times 13 cm w; Number of Weft Picks: 2700).



Fig. 9. Seven-shed, west-faced, point twill, sample of the pattern on Tutankhamun Tunic Band #2 (Sample Size: 8 cm h \times 10 cm w; Number of Weft Picks: 1680).

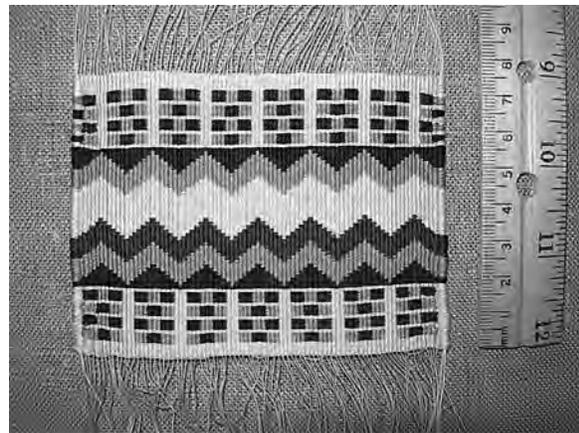


Fig. 10. Seven-shed, point twill, west-faced sample of the pattern on Tutankhamun Tunic Band #3 (Sample Size: 7.5 cm h \times 10 cm w; Number of Weft Picks: 1680).

This band (fig. 9) runs horizontally across the front and back of the tunic above the embroidered panel. The field at the center is brown accented with blue chevrons. The diamonds in blue and brown are outlined with natural linen.

Below the embroidery panels on the front and back of the tunic there are bands woven in this pattern (fig. 10). The original textile is woven in blue, reddish brown, and natural.

Only small pieces of this band (fig. 11) appear on the front and back of the tunic. This seemed to be a five-shaft draft based on the drawings in the Crowfoot article. The pattern has two bands of blue diamonds with three registers of a bar pattern above, below, and in between in natural and brown. A small part of this band sewn to the embroidery panel is shown in one of my 1983 photos. A fragment of the back of the band, which reveals the floating weft threads on the back of the band, lies across the lost stitches of the embroidery.

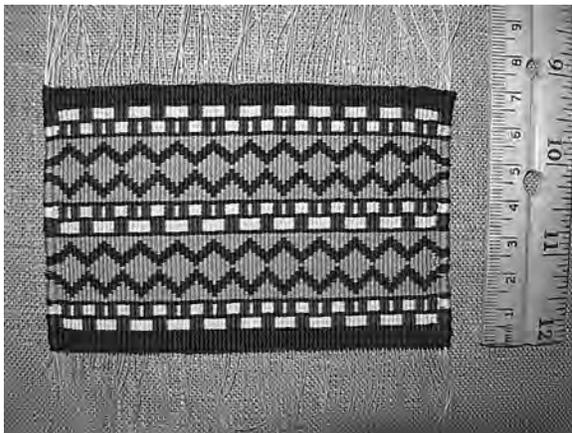


Fig. 11. Five-shed, west-faced, point twill sample of the pattern on Tutankhamun Tunic Band #4 (Sample Size: 7 cm h \times 11 cm w; Number of Picks: 945).

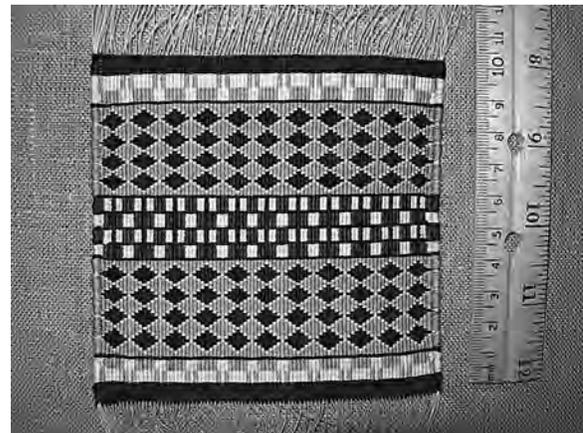


Fig. 12. Five-shed, west-faced, point twill, sample of the pattern on Tutankhamun Tunic Band #5 (Sample Size: 10.5 cm h \times 11 cm w; Number of Weft Picks: 1800).

Six separate pieces of this band (fig. 12) appear on the tunic. Four almost square pieces are at the bottom of each of the long bands on the sides of the tunic and two rectangular pieces of this pattern are on the back at the lower left side of the tunic. The band is 14 cm. in the warp-wise direction according to Crowfoot.³² This tunic band is another five-shaft weave. The grid pattern in between the rows of diamonds is woven in natural, medium brown, and dark brown. As a warp-faced woven textile this pattern would require approximately 1800 ends in precise color and numeric order.

Woven bands and embroidery are artfully arranged on the elegant *Tunic of Tutankhamun* to form an opening and neck placket that resembles an ankh (see fig. 1). A curved west-faced patterned band creates a circular collar in faded blue-green, dark brown, and ecru. The outer rim is a dark and light check pattern. Vertical/warp-wise columns, that descend from a stepped base and end in a small dark diamond, divide the pattern into sections resembling a cartouche. The middle portion of each section is now so faded that it is difficult to decipher, but the faint blue-green colors suggest the original motif of Tutankhamun's prenomen *Nebkheprure*. A scarab beneath the symbol of *Re* appears in this space in the Winifred Brunton sketch of the collar.³³ Three columns of blue-green above a dark triangle are visible below the scarab. A pattern of brown, blue, and ecru stripes and bars form the interior rim of the collar. This pattern can be replicated as a six-shed or seven-shed point twill, west-faced weave (fig. 13a). A portion of the pattern was woven on a curve (fig. 13b).

Warp-Faced Tutankhamun Tunic Bands

The pattern samples of the border band on the ankh and the fringed bands on the tunic sleeves were woven as simple two-shed, warp-faced bands (fig. 14). A blue-green, brown, and ecru band outlines the neck placket, embroidery, and yoke stem of the ankh. Dots, lines, and bars can be planned on a warp-faced plain weave band by the careful placement of the colors: these three simple design elements can be combined for more interesting patterns. While the widest band surrounding the ankh placket and

³² Crowfoot and Davies, "The Tunic of Tutankhamun," 115.

³³ Crowfoot and Davies, "The Tunic of Tutankhamun," pl. 18; Vogelsang-Eastwood, *Tutankhamun's Wardrobe*, 82-83.

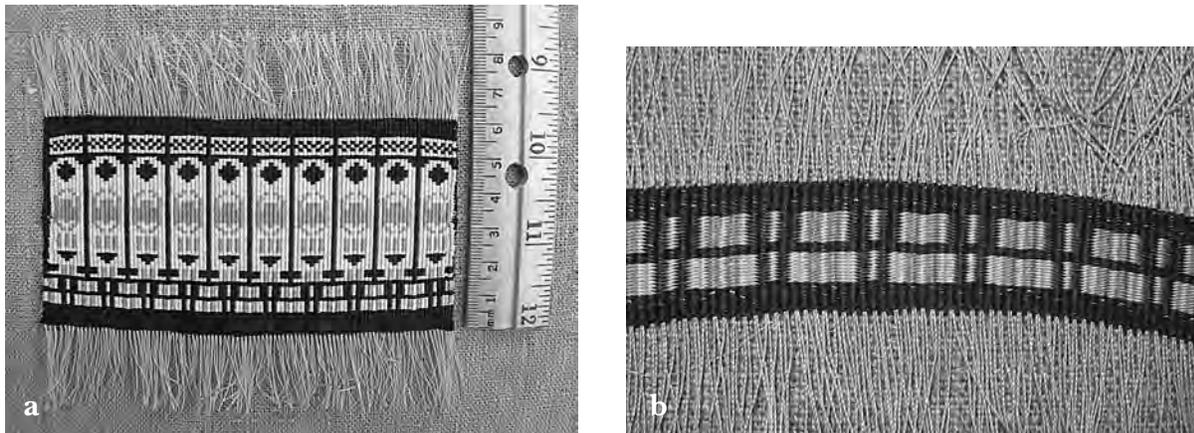


Fig. 13a. Six-shed, west-faced, point twill, sample of the pattern on the Tutankhamun Ankh Collar #8 (Sample Size: 5.36 cm h \times 12 cm w; Number of Weft Picks: 918); b. A curved sample of a section of the pattern was woven on a parallel warp.

yoke has a controlled design, the others seem to be of randomly placed warp colors.³⁴ Any group of colored yarns woven as a warp-faced, plain weave will produce a colorful band, but not a pre-conceived pattern. These yoke and sleeve band samples simulate the original patterns, but were difficult to draft through glass in their deteriorated state. The weft fringes are over long on the samples.

The two detached tunic sleeves are above the body of the tunic in the exhibit case. On each sleeve there are some frayed band fragments tenuously attached and some scattered. Whip-stitches can be seen holding some of the bands. Needle holes indicate where others were sewn to the foundation fabric. Carter's sketch and Crowfoot's diagrams indicate that at one time there were three on each sleeve.³⁵ The small bands in a faded blue-green, brown, and ecru palette are very narrow. The simple two-shed bar patterns on the warp-faced bands with weft-fringes can be woven with fewer than twenty warps. A narrow solid blue tape is visible on the edge of some

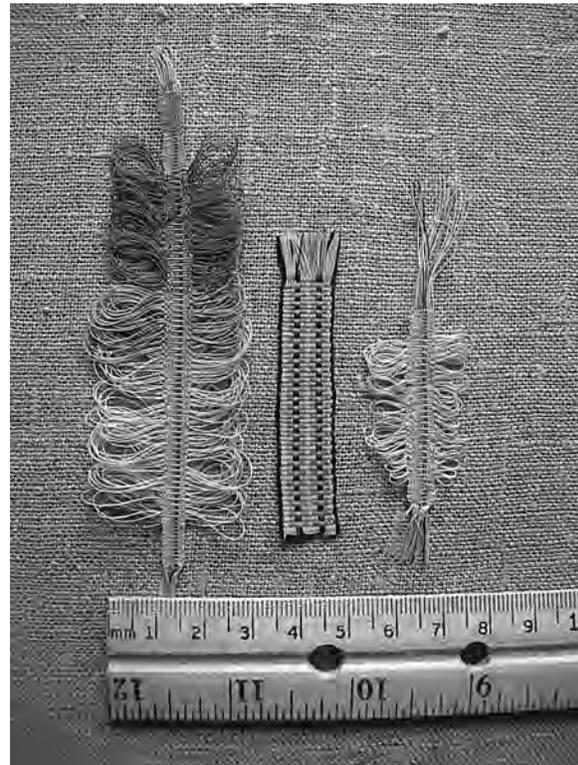


Fig. 14. Two-shed, warp-faced, plain weave samples of patterns on the Tutankhamun Tunic Bands. Left and Right. Sleeve Bands #11 or #12 (Sample Size: Left. 5 cm w, 3 cm w with fringe; Right. 3 cm w, 2 cm w with fringe (Number of Warp Ends: 31), Middle. Yoke Trimming Band #9 (Sample Size: 3 cm w; Number of Warp Ends: 67).

³⁴ Contemporary weavers usually refer to two-shed, warp-faced plain weave bands as 'inkle bands.' M. M. Atwater, *Byways in Handweaving; An Illustrated Guide to Rare Weaving Techniques* (New York, 1973), 24-31.

³⁵ Carter. *Handwritten Notes on the Textiles from Tutankhamun's Tomb*, 367f; Crowfoot and Davies, "The Tunic of Tutankhamun," 115.

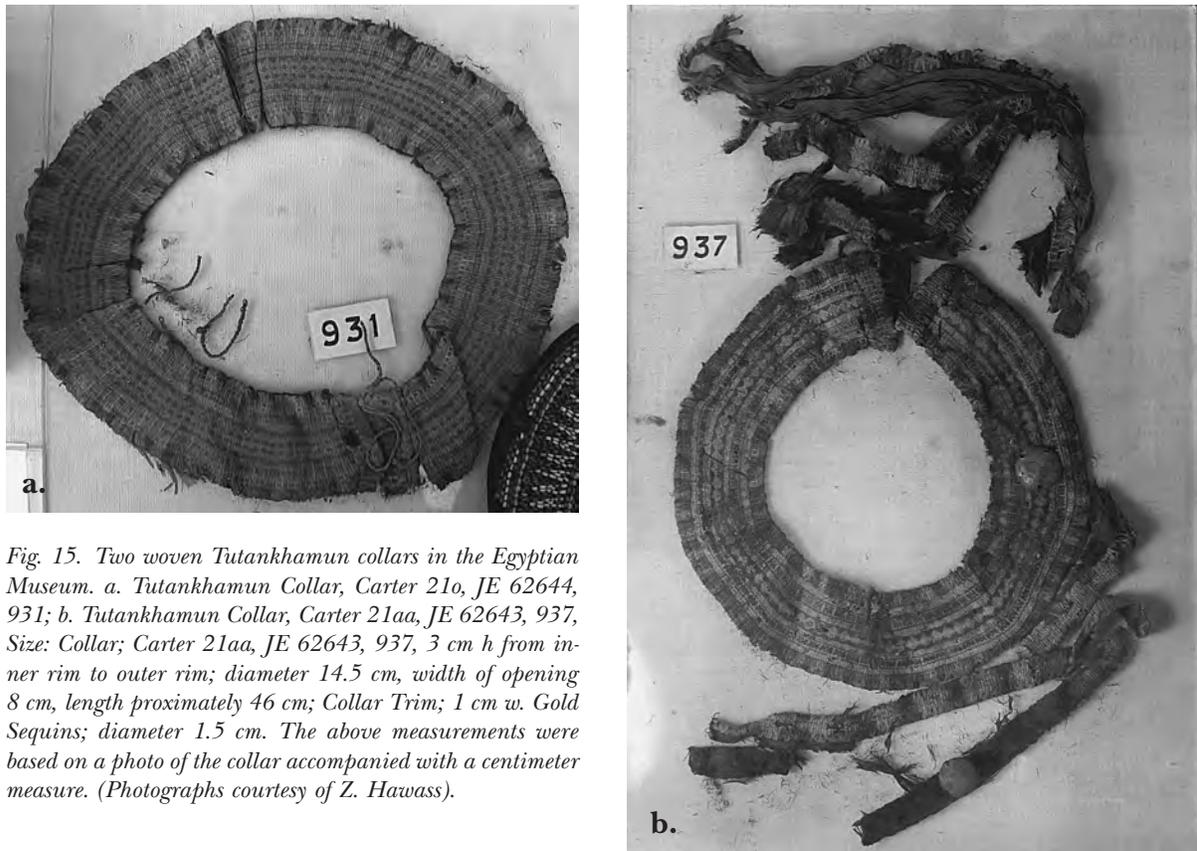


Fig. 15. Two woven Tutankhamun collars in the Egyptian Museum. a. Tutankhamun Collar, Carter 21o, JE 62644, 931; b. Tutankhamun Collar, Carter 21aa, JE 62643, 937, Size: Collar; Carter 21aa, JE 62643, 937, 3 cm h from inner rim to outer rim; diameter 14.5 cm, width of opening 8 cm, length proximately 46 cm; Collar Trim; 1 cm w. Gold Sequins; diameter 1.5 cm. The above measurements were based on a photo of the collar accompanied with a centimeter measure. (Photographs courtesy of Z. Hawass).

of the pieces. The fringes on my samples were woven without extra warps at each side to act as guidelines and are considerably longer than on the original bands.

Weft-Faced Tutankhamun Collars with Warp-Faced Trimming Bands

Two woven collars from Tutankhamun's tomb are similar to the collar in the ankh décor on the *Tunic of Tutankhamun* (fig. 15).³⁶ Considering their antiquity, they are surprisingly intact. These collars share so many of the same characteristics that they could have been created by the same weaver. The two collars are woven in the same faded palette of light blue-green, brown, and ecru linen and are similar in size and shape. Rows of weft-faced geometric patterns dominate the design. Both the outer and inner collar rims have multi-hued warp fringes. The collar warp appears to have been made with a continuous looped yarn. However, the color of the warp fringe changes from natural to blue to brown in sets of three or four loops. I cannot detect where two colors have stopped and started, but in places, I think that I can see where two colors have been spliced and twisted together (fig. 16d). If so, this is an ingenious way to make the yarn for the multi-colored decorative fringe that correlates with their method of making flax fiber into yarn.³⁷ The warp-wise ribs on the inner rim contain a bundle of three or four of these looped yarns: this varies on the outer rim.

³⁶ An enlargement of the Egyptian Museum photographs and those in Vogelsang-Eastwood, *Tutankhamun's Wardrobe*, 26, 31, clearly show where sets of warp ends split to form several single warp ribs.

³⁷ Barber, *Prehistoric Textiles*, 39–74; Vogelsang-Eastwood, *Tutankhamun's Wardrobe*, 22; Heinrich, "Linen: Cloth of the Ancient Egyptians," *The Magic of Linen*, 173–90.

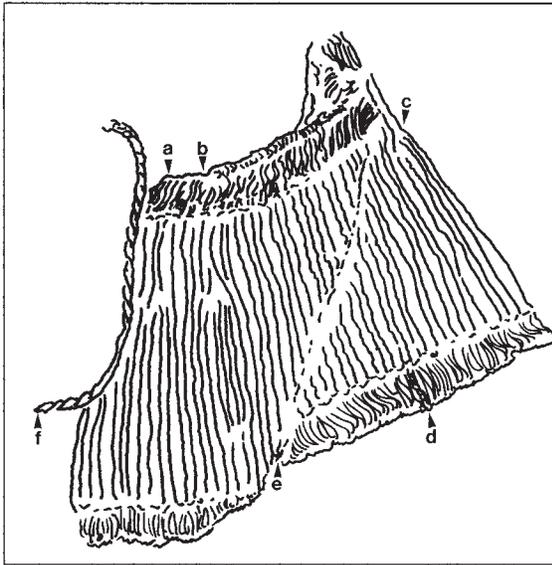


Fig. 16. The divided warps can clearly be distinguished at a, b, and c on a tracing from a portion of Collar, Carter 21o, JE 62644, 931. On the diagram 'd' points to where two colors seem to be spliced together, the diagonal line at 'e' indicates a fold in the fabric, and 'f' identifies the cord. (Traced by the author from the Egyptian Museum photograph.)

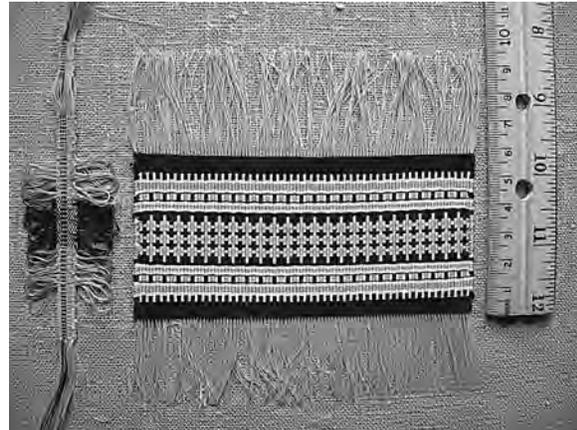


Fig. 17. Three-shed, weft-faced, point twill, sample of the pattern on a Tutankhamun Collar, and the warp-fringed Collar Trim, Carter 21o, JE 62644, 931 (Size: Collar Sample; 5.5 cm h × 12 cm w; Number of Weft Picks: 333. Collar Trim; .7 cm w, with fringe 3 cm w. Number of Warp Ends: 13).

divide to become several ribs on an enlarged photo. This method is used in a random fashion twenty or more times around the collar to control the curve. The question arises about the type of loom used for these curved textiles. Small areas of curved fabric can be woven on a parallel warp, but that would not suffice for a full collar. A circular loom made the size and shape of the collar with nails or pegs to hold the radiating warp can be made. I wove a section of fabric on a model of a curved loom with the radiating warp wound around nails and small test samples where a set of warp ends were divided into several single ends. Both methods are ways to make the fabric flare. A cord that tied the collar shows running through the loops on the inner rim of one of the collars (fig. 15a). This may have been a holding cord during the weaving process and would also help shape the piece.

The description and details of both collars for my weaving drafts were derived from their examination in display cases in 2009 and 2010, the photographs taken for my study by the staff at the Egyptian Museum, and published photos.³⁸ This pattern was a three-shed point twill pattern (fig. 17). The collar pattern is composed of lines, bars, small diamonds, and a stepped triangle in three colors. The design centers on a triple row of diamonds, and repeats the same line and bar registers to both rims of the collar. In publications this is cited as a “woven collar for a tunic.”³⁹ There are pieces of a plied cord sewn to the inner rim of the collar that ties the inner edges of the collar together. This three-shed weave, currently a popular structure for rugs, is technically a 2/1 point twill weave with the traditional

³⁸ See the collar photographs, Vogelsang-Eastwood, *Tutankhamun's Wardrobe*, 26, 31.

³⁹ Vogelsang-Eastwood, *Tutankhamun Textiles*, 17.

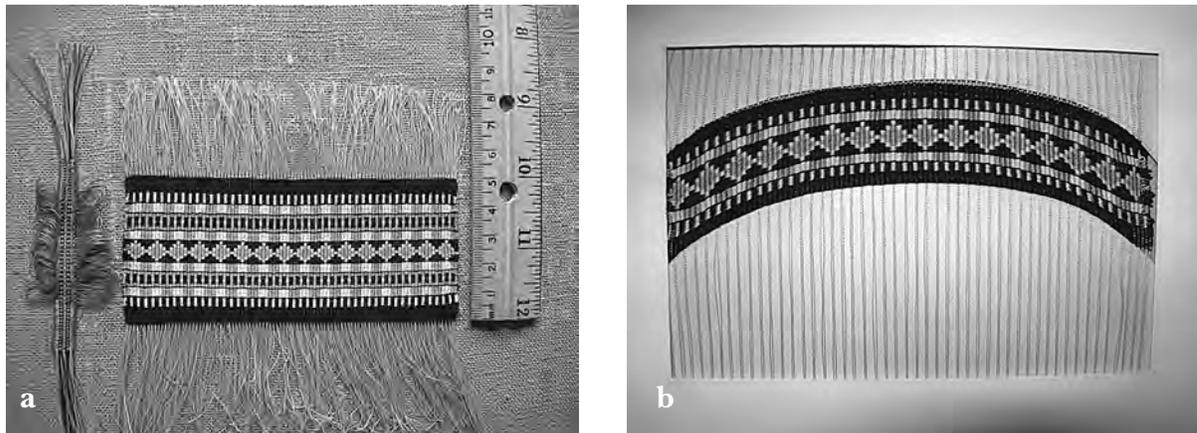


Fig. 18a. Four-shed, weft-faced, point twill, sample of the pattern on a Tutankhamun Collar and the warp-fringed Collar Trim, Carter 21aa, JE 62643, 937 (Size: Collar Sample; 5 cm w. Number of Weft Picks: 472; Collar Trim; .6 w, 2.2 cm w with fringe. Number of Warp Ends: 19); b. An example of the bar and diamond pattern of the collar when woven-to-shape on a parallel warp.

name of *Krokbragd*.⁴⁰ The collar is trimmed with a narrow two-shed, warp-faced, fringed band. The yarn in the trimming band is not as fine as that on the collar. Carter thought the original garment was for a young child.⁴¹

Another small sample of one portion of the pattern was woven on a simple frame loom wound with a continuous warp to test a completely non-mechanized method. The method is slow, but it is not difficult to replicate the pattern and—after all—if you are weaving for the pharaoh time means nothing.

Once five large and five small gold sequins decorated this woven collar (fig. 18): now, only one is still sewn to the collar, another rests beneath the edge of the collar, and a third shows in the photograph resting on a band fragment (fig. 15b.)⁴² One or two of the missing disks have left their impression on the ancient fabric. There are three holes in the discs for sewing them to the collar. The collar is described as a “woven collar from a tunic.”⁴³ Ecu-edged blue diamonds on a brown field are at the middle of the four-shed, weft-faced, pointed twill collar design. Lines and bars form symmetrical pattern rows to the outer rims. The collar is trimmed at the opening with a multi-colored, fringed, warp-faced band of a thicker linen than that of the collar. This tunic collar is displayed with the remnants of a dark linen fabric and several randomly placed warp-faced fringed bands. Though it is now difficult to draft the pattern on the warp-faced collar trims with the colors so degraded, the right and left bands seem to have about the same number of warps, but slightly different designs. The fringes on both of the samples of the warp-faced collar trims are exaggerated.

⁴⁰ Hoskins, *Weft-Faced Pattern Weaves*, 69–73.

⁴¹ Carter, *Handwritten Notes on the Textiles from Tutankhamun's Tomb, o21o*, “Collar band from shirt: Collar of a shirt of thick coarsely woven cloth of different coloured threads, borders at any rate were alternate bands of dark & light. This was applied to the top of the garment proper, which was of a very fine weave, now almost disappeared. The band was open in front, and tied in a half bow, at its top edge with very fine cord. Width of band 3 cm. Neck opening 8.5–9. This garment obviously that of a young child.”

⁴² See fig. 15b and also Vogelsang-Eastwood, *Tutankhamun's Wardrobe*, 31. The photograph by Harry Burton shows ten gold sequins. Carter, *Handwritten Notes on the Textiles from Tutankhamun's Tomb, o21aa*, “Collar of a shirt in tapestry-woven cloth, Diam. of inside of neck 8.5 Width of band 3, Tapestry woven alternate narrow bands, colours (?). Decorated with gold sequins, at intervals about 2.5, large 1.6 diam. and small 1.3 diam. alternately. Body of garment of ordinary fine cloth, to the edges of which braids 1 cm wide were sewn. This must obviously have been a child's garment.”

⁴³ Vogelsang-Eastwood, *Tutankhamun Textiles*, 20.

Summary

My study of the Tutankhamun tunic, belt fragment, and collars have been “through a glass darkly.” Details have been difficult to discern. Since all of the “740 garments, shrouds, covers of statues, and textile objects like quivers and sails of boat models”⁴⁴ have yet to be published, basic textile documentation on these is not available. There may be comparable pieces in the huge collection of the king’s textiles that I am not familiar with.

The Tunic of Tutankhamun is an incomparable treasure. Howard Carter recognized that, “The material from this tomb will be of extreme importance to the history of textile art and it needs very careful study.”⁴⁵ Crowfoot’s analysis of the tunic bands was invaluable for my study, though I disagree with her theory that they were warp-faced textiles woven in the Beduin technique. An excellent overview of Egyptian patterned textiles is found in Riefstahl’s text. Barber’s volume, *Prehistoric Textiles*, provides archaeological and historical context for the Tutankhamun collection. Dr. Emily Teeter, said that, “Vogelsang-Eastwood’s project to catalog the Tutankhamun textile collection is of tremendous importance.”⁴⁶ It is unfortunate that the catalog has not yet been published. However, her *Tutankhamun’s Wardrobe* is a significant contribution to the understanding of the garments worn by a pharaoh and adds to the documentation of the tunic, belt fragment, and collars.

The Tutankhamun textiles are just a few items in the midst of the immense, seemingly infinite, number of Egyptian artifacts and monuments that scholars in a multitude of disciplines strive to discover, document, protect, and publish. There are a few other garments and pieces that beg investigation and during the New Kingdom a flurry of colorful patterned belts, dresses, cushions, curtains, quivers, and even horse trappings, not unlike the band, belt, and collar designs, appear in the wall paintings and sculptures. These are a rich resource for future study.

Is it really important to puzzle over how a few pieces were woven or to challenge the accepted theory about their construction? I believe that it is. My samples are not replicas of the original weft-faced and warp-faced fabrics, an impossible task, but *reconstructions* of their patterns and weave structure. The samples give us a glimpse of what gorgeous patterns were being created so very long ago and how they could have been woven with the simple technology of that time period. Within the warp and weft of the Tutankhamun tunic bands, belt fragment, collars, and trimming bands there are clues to their connection to the rich cultural web of the ancient world.

Independent Scholar

⁴⁴ A list of the textiles from Tutankhamun’s tomb by Vogelsang-Eastwood can be found on this website: <http://egypt-archaeology.com/Tutan2.html>.

⁴⁵ Carter, *The Tomb of Tutankhamen*, 77.

⁴⁶ Fowler, “Forgotten Riches of King Tut: His Wardrobe,” 1.

