

Technical analysis of the Supplementary weft weaves in Archaeological Egyptian Textiles.

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ABSTRACT: Supplementary weft technique is considered one of interesting techniques for the archaeological complex textiles which were known in Egypt. This technique may be considered the first try to produce ornamented textiles. There are many resemblance appearances between this technique and other techniques, such as embroidery technique or brocade, so there are many mistaken concepts in regard to this weave. Also this technique is called as an extra or additional weft. This study aims to show the main characteristics of the supplementary weft and explain differences and resemblance appearances in this technique, by using of some recent means to examine the weave structure exactly, such as Stereo microscope (SM), binocular microscope (BM), and scanning electron microscope (SEM). The study introduced many important results that lead to understand of ancient textiles, weave structures and their distinctive characteristics.

KEYWORDS: supplementary weft, embroidery, brocade, towel fabric, plain, twill and satin weaves, velvet, carpets, rugs.

2. INTRODUCTION

Egypt is one of the earliest civilizations which know manufacturing of textiles. Egyptian weavers were familiar with most ancient techniques, such as plain, twill and tapestry textiles (weft-face textiles). They also recognized other types of complex textiles, such as weft-looping and pile textiles (towel and velvet cloths), in addition to supplementary (additional) weft/warp techniques. Most these techniques appeared in Egypt 5000 years ago. However there are some other techniques were not known in ancient Egypt, at the very least before Islamic periods, such as the knotted pile (carpets), satin, brocade (*damask* textiles), and wrapped weft techniques (*Soumak*). These techniques came to Egypt at least after Arabic conquest (*Maher, S.1977*). This study focuses on one of these techniques: it is the supplementary wefts, because the supplementary weft textile like brocade weave entirely, some previous studies thought that the first technique is kind of embroidery techniques although there are many differences between supplementary weft and embroidery technique. Therefore

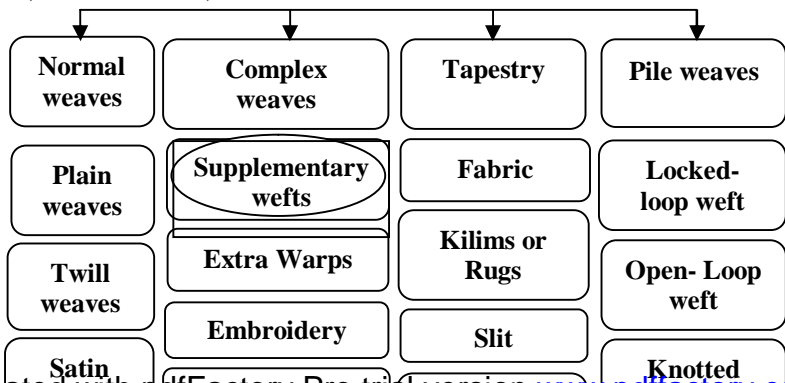
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appearances, in addition to, study of characterizations of the supplementary weft.

3. TYPES OF THE TEXTILE STRUCTURES

There are four main types of the archaeological textiles which appeared in Egypt along different periods. These textiles could be categorized according to textile structures to normal, compound, tapestry, and pile textiles. Each type is divided into several branches according to interlacing method of the weft and warp threads in the weave structure. For example, in the normal textile there are many derivative weaves produced by varying the thickness of the yarns and the number of ends or picks used as one. Therefore there are three categories could be derived from normal textiles, such as plain, twill and satin weaves (fig.1).

Plain weave or tabby is considered one of the simplest of all weaves, one up and one down in both directions, producing a uniform surface back and front when warp and weft are both of the same weight of yarn (fig.1). Twill weaves give a diagonal effect by allowing the ends to float over at least two or more picks, the binding point being shifted sideways on each successive pick. Variations include chevron, herring-bone and diamond twills. The smallest unit of design is three ends and three picks (fig. 2). In a satin weave a similar binding system is used as for a twill, except that the unit is at least five and the binding points are spaced in such a way as to avoid the creation of a regular pattern (fig. 3) The surface so produced is close and glossy on the front, and dull on the reverse. This characteristic is exploited in a damask weave by contrasting the two in a pattern. From these three binding system all other are derived (*Landi, S. 1998*)



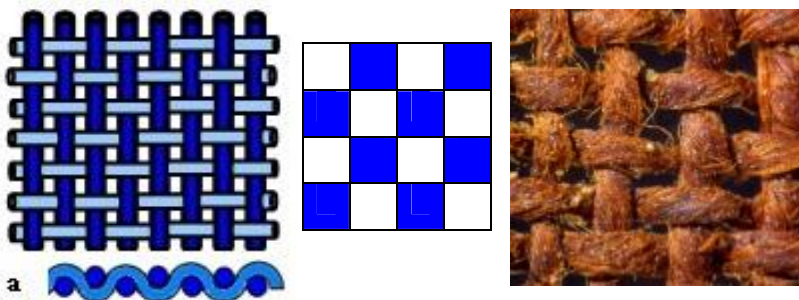


Fig. 1 The normal textile (balance plain weave or tabby) the simplest of all weaves in archaeological textiles

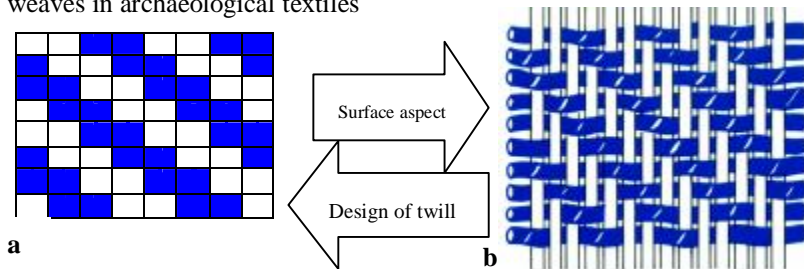


Fig. 2 The normal textile; twill weave 2/2

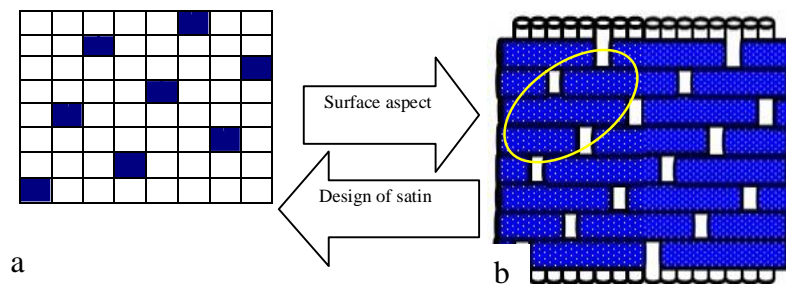


Fig.3 Normal textiles: Satin weave; 8 to number 3



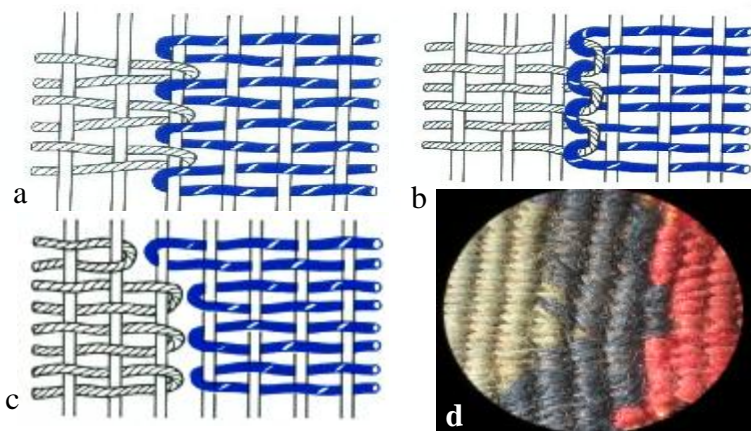


Fig.5 the tapestry weaves: (a, b) dovetailing wefts and (c, d) slit wefts tapestry. (See appendix section)

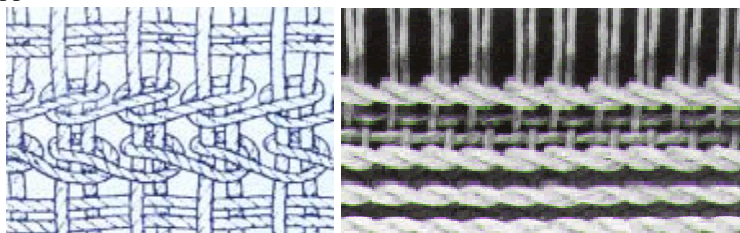
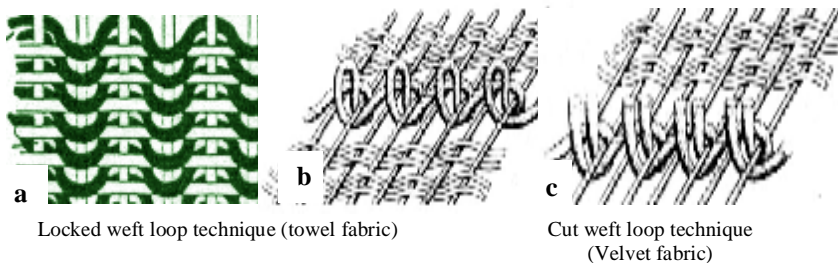


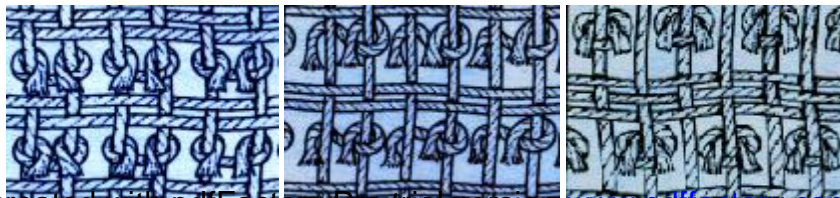
Fig.6 the running weft weaves (*Soumak*) (see appendix section)



a Locked weft loop technique (towel fabric)

c Cut weft loop technique (Velvet fabric)

Fig. 7 two types of looping weft technique (see appendix section)



4. THE SUPPLEMENTARY WEFTS TECHNIQUES

The structure of a fabric is classified as "simple textile" when composed of only one set each of warp and weft elements, and as "complex textile" when there is more than one set of either or both, additional warps and wefts added to simple weave, which in itself serves as a complete "Foundation" or "Ground" are by their very nature supplementary. Other more complex structures, however, have at least two sets of one type of element either warp or weft, which are complementary to each other. (*Barnard, N. 2000*) If the weave structure consists of two sets of warp threads, it is classified as supplementary or extra warp weave, while the weave structure that consists of two sets of weft threads, it is classified as supplementary or extra weft weave. The last technique can be divided into basic three types as the following:

- ü None running supplementary wefts
- ü Running supplementary wefts
- ü *Zilli* supplementary wefts

4.1 NON- RUNNING SUPPLEMENTARY WEFTS

In this technique, the weft thread- float patterning is a way of decorating a simple weave with supplementary wefts. The coloured extra-weft threads are woven into the fabric to create either a scattered motif (fig. 9), while in the brocade or embroidery techniques, the embroidery's threads are added on the main fabric by the needlework (fig.10). Therefore this technique is often mistakenly thought that the extra wefts from which the pattern is formed are embroidered into the piece after the ground weave is finished, for example, *Geijer* referred that the additional pattern weft may be known as brocaded weave. (*Geijer, A. 1982*) They are interlaced as the work progresses, Since the extra yarn is generally thicker than the warp and the weft raised or couched pattern forms (*Barnard, N. 2000*) (fig.11) This technique was not used in Egypt in Pharaonic times, but it was used after that in Islamic times in all areas, from Morocco to Afghanistan, but extensively in Turkey, (see appendix section).



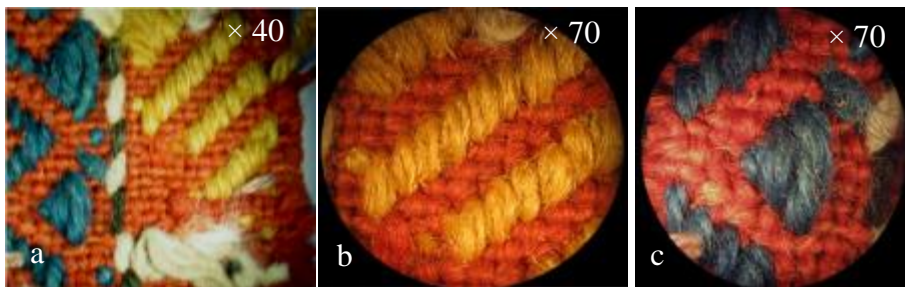


Fig.10 binocular microscope micrographs illustrate none running supplementary weft technique on plain weave in Turkish textile object. Note the extra yarns (yellow and blue colors) are generally thicker than the base textile structure (red color).

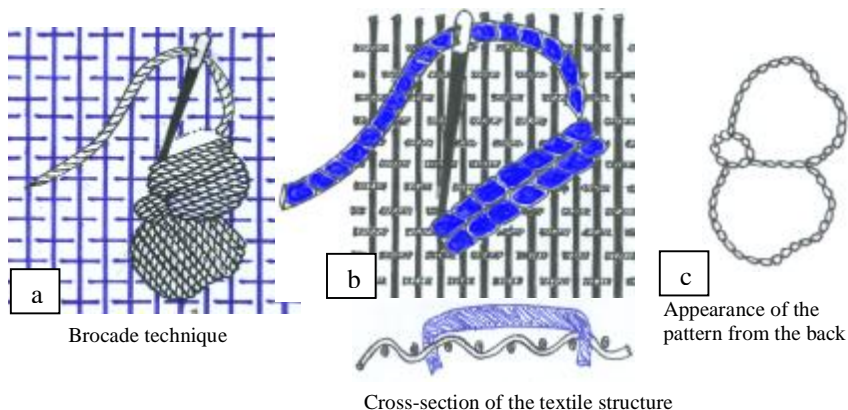


Fig.11: Brocade technique; note that the embroidery's threads were added on the base weaves by the needlework. Also, they are thicker than the main structure.

Another type of this technique was used in Egypt in some of the Middle Kingdom linens. In this kind, the weavers used heavy supplementary wefts to amplify along the selvedge of the cloth by laying an additional bundle of thread into the shed at edge (selvedge) (see appendix section) of the cloth for a short space, then bending it back in a U-shape. The weaving technique of laying a supplemental thread into the regular shed for ornamental purposes – called *inlay* (fig 12a). This technique was found in the 11th Dynasty's cloths in the Egyptian Museum in Cairo. Also, there is another type from non running extra weft. It was found on Egyptian linen cloths from the Middle Kingdom period. A heavy supplementary weft thread is laid in the shed along with the ground weft

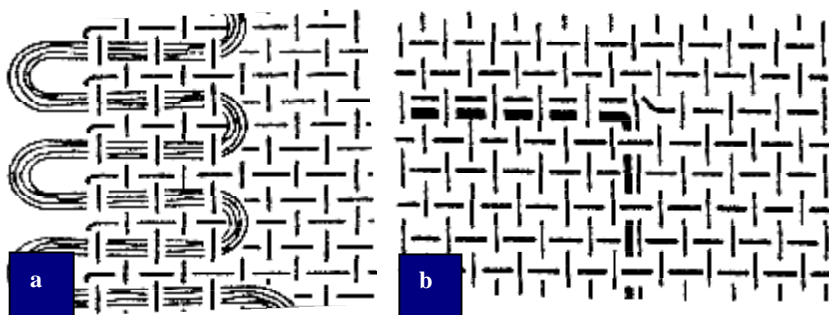


Fig. 12 (a) type of Egyptian inlaid selvedge done with none running supplementary weft (like letter U) to produce a strong edge. (b) Supplementary weft laid into the shed, then turned to become warp.

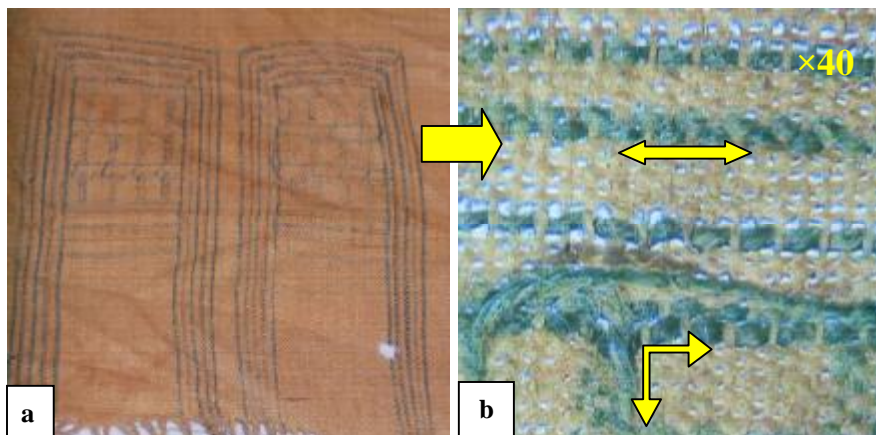


Fig. 13(a) piece of linen dress was woven from linen and extra weft which laid into the shed, then turned to become warp, (b) Details of the supplementary wefts

This technique was found on one of linen cloth in the Egyptian Museum in Cairo, Serial No. 16/1/26/21. This piece was a part from linen dress; it was woven from linen fibers as a ground weave and blue linen fibers as supplementary weft (Fig. 13).

4.2 RUNNING SUPPLEMENTARY WEFTS

In this technique, the coloured extra wefts are woven into the fabric continuous
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there are tow pieces of Egyptian linen clothes, in balanced plain weave with supplementary-weft stripes: ca.3000 B.C. (fig.15). But it may also be brocaded to produce regular geometric ornamentation (*Geijer, A. 1982*). Usually these ornamentations are forming on a zigzag shape or (X) letter shape (fig.16). Also it may be used to produce other regular geometric ornamentations such as the hexagonal shape (fig.17). In all these motifs the supplementary wefts float over and under specific number of the warp threads with balanced plain weave, since the extra wefts appear in the decorative areas only.

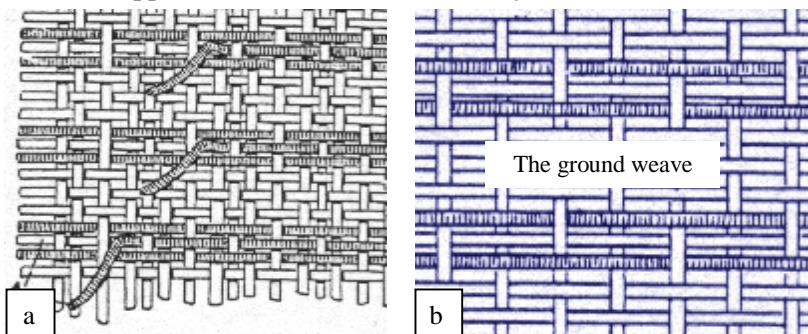


Fig. 14 The running extra wefts were woven in the ground weave with different color

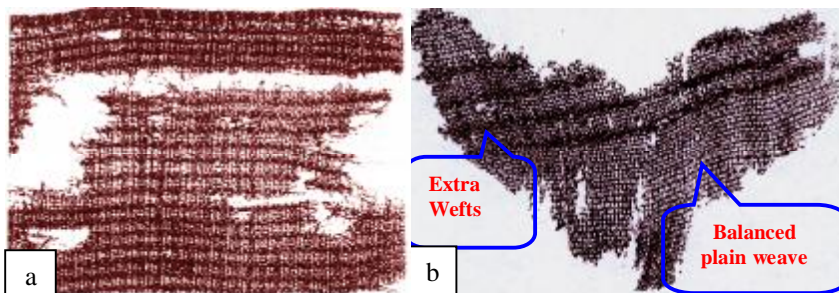
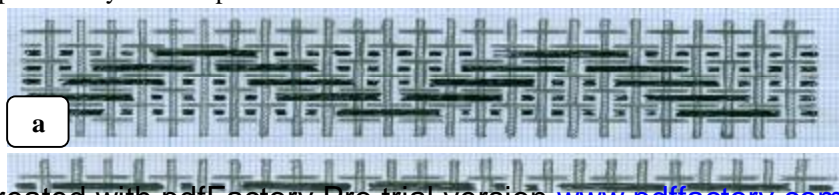


Fig. 15 Tow pieces of Egyptian linen clothes, in balanced plain weave with supplementary-weft stripes: ca.3000 B.C. Swiss National Museum.



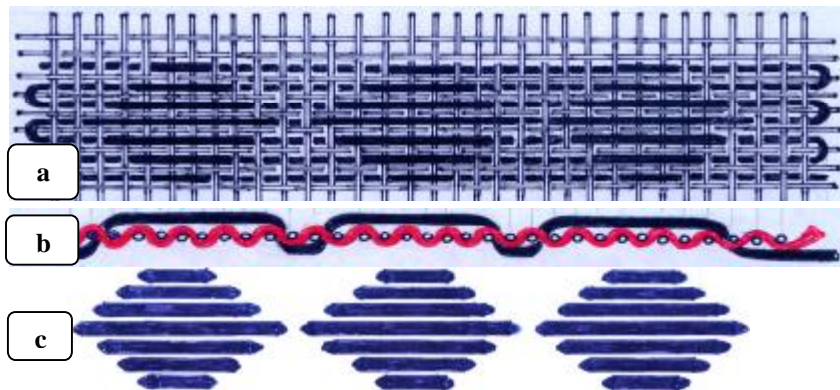


Fig. 17 using supplementary weft technique in making hexagonal geometric ornamentations. (a) Weave structure, (b) Cross-section. (c) Surface aspect of the hexagonal geometric motifs

4-3 ZILI SUPPLEMENTARY WEFT

There is a supplementary weft technique that, like-faced patterning is also a Float weave. Called *Zili*, a Turkish word meaning "small bells or chimes" it is a method used exclusively in turkey, especially in making the kilim. (*Barnard, N.2000,*). It gives a distinctive cording or contoured look to the front of the Kilim (running parallel to the warps). Sometimes employed as a generic name for unattributed items woven using this technique. (*Allane, L.1995,*). Extra weft are wrapped round the warps in a common 2:1, 3:1, or 5:1 with the longer float in thick-spun wool on the face of the rug.

Two or three rows of hidden ground weft are shot between each row of floating weft and the surface is completely covered with float over two, three or five warps,(fig.18 a) with each color turning back in its own color block: contours may be created with the same 'floating two, three or five system. *Zili* is an easy technique for weaving horizontal and vertical lines. The weaving of diagonals is a good deal more complicated and can only be done by offsetting the weft floats with a single warp. The plain ground of most *Zili* can be distinguished by its colored, a characteristic raspberry red, dark grey or white, depending on the area of origin. Also, there is another type of the

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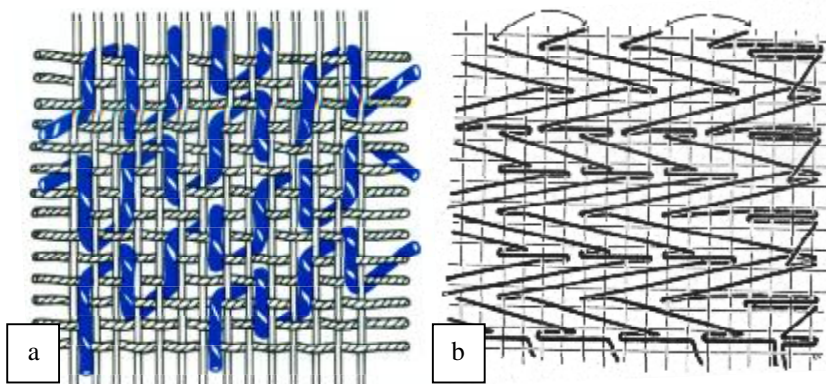


Fig. 18 (a) *Zili* pattern as a horizontal supplementary weft. (b) Another type of the supplementary weft techniques known in Europe, Switzerland; ca. 3000 B.C.

5. DISCUSSION

The supplementary weft technique is considered one of the most important techniques that are used in the archaeological textiles, because it is thought that is as a primary attempt to make simple ornamentations before tapestry textiles were created or none running weft technique which was used to make ornamented textiles. There are three important types from the supplementary; the running supplementary weft, none running supplementary weft, and *Zili* supplementary weft. These types could be recognized them easily, because each type was woven by different method. This study introduced all types which can be used in weaving the supplementary weft technique. Also, it shows the distinguished characteristics of both the supplementary weft and the embroidery technique (brocade). For example, in the first technique, the weft- float patterning is a way of decorating a simple weave; therefore, the colored extra-weft threads are woven into the fabric to create either a scattered motif, while the embroidery's threads in the brocade are added on the basic fabric by the needlework. So there are main differences between the supplementary weft technique and embroidery or brocade techniques.

In contrast to other opinions, the Egyptian weavers recognized the supplementary weft technique. Also they usually employed it in several techniques such as Egyptian inlaid edge done with none running supplementary weft to produce a strong edge for their textiles, since a heavy supplementary

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APPENDIX:

Carpet: This term is used for knotted pile textiles; there are three types of these knots; the Turkish or *Ghiordes*, the Persian or *Senna* and Spanish knot. The first and second knot is tied on double warp threads, while the third knot need only single warp threads.

Damask: In its classic form the term is used for a self-patterned weave using the contrasting effect of the dull and shiny faces of the satin weave.

Embroidery: In this technique, the weave structures which are distinguished with a raised pattern by using additional threads that are generally thicker than the original warp and weft threads. Also, they are usually made of metal threads whether gold, silver, copper, gilt silver or gilt copper.

Kilim: Used to describe a flat, tapestry or rug woven from non-running weft threads (weft-face textiles).

Selvedge: the longitudinal edge of a textile closed by weft loops. Often distinguished from the rest of the fabric by warp ends differing from those in the body of the textile and sometimes by a change of binding system.

Tapestry: A weave with one warp and a weft of several different colors which do not pass from selvedge to selvedge but are confined to the area of pattern in which they are required.

Velvet: A weft-pile weave in which the pile is produced by pulling a pile weft above a ground weave by means of rods. The loops thus made can be cut or left uncut (Towel fabric).

Warp: the longitudinal threads of a textile: those that are arranged on the loom. A single thread of warp is called an end. Alone the term warp denotes all the warp ends in the textile.

Weft: the transverse threads of a textile: those that are passed through the sheds. Alone the term 'weft' denotes all the picks in a textile.

Warp or weft count (density): the number of ends or picks contained in a unit of length.

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