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Carmen Alfaro Giner

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Résumé
Une équipe de l'Université Autonome de Barcelone, dirigée par Miquel Molist, travaille sur le site néolithique précéramique de Tell Halula, sur la rive droite de l'Euphrate, depuis 1991. La fouille a permis la découverte de vestiges de textiles, vanneries et nattes, qui sont particulièrement intéressants en raison de leur ancienneté. Le présent article décrit les textiles, qui sont le plus souvent associés aux pratiques funéraires. Les défunts étaient déposés dans de petites fosses creusées dans les sols de terre battue à l'intérieur des maisons. L'étude des procédés de filage et de tissage est rendue difficile par le manque d'instrumenta
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Keywords: *Near East; Syria; Pre-pottery Neolithic; Burials; Spinning; Twined textiles; Textile imprints.*
Mots-clés: *Proche-Orient; Syrie; Néolithique précéramique; Sépultures; Filage; Tissus cordés; Empreintes textiles.*

INTRODUCTION

It is now exactly ten years since the present author accepted an invitation from the director of the excavations at Tell Halula, M. Molist, and thus had the pleasure to get into contact with the exciting world of textile technology for such a crucial period as the Pre-Pottery Neolithic B in the Near East. The results of that study, based on a small number of mineralised textile specimens from special burial chambers, were published in the *Bulletin du CIETA* (*Centre International d'Étude des Textiles Anciens,* Lyon: Alfaro, 2002), a journal dedicated to textiles but unfortunately not widely read by general historians and Near Eastern archaeologists. The aim of the present paper is to propose a comprehensive overview of the textile crafts at Tell Halula, associating the results from 2002 with those obtained during the last ten years of intensive work at the site by a large team of specialists from the Autonomous University of Barcelona, led by M. Molist. The abundant literature dedicated to Tell Halula constitutes the fruit of an important research programme supported by several institutions (Molist *et al.*, 1992-1993; Molist, 1998, 2001 and 2009; Guerrero *et al.*, 2008; Molist and Faura, 1999; Molist *et al.*, 2011; Kuijt *et al.*, 2011).[1]

1. Programme of Spanish Actions Abroad, Directorate-General of Cultural Goods and the Spanish Historical Heritage Institute, the Spanish International Cooperation Agency (AECI), the Directorate-General of Antiquities and Museums, Syrian Ministry of Culture, and the large team from the Autonomous University of Barcelona with the collaboration of specialists from other universities.

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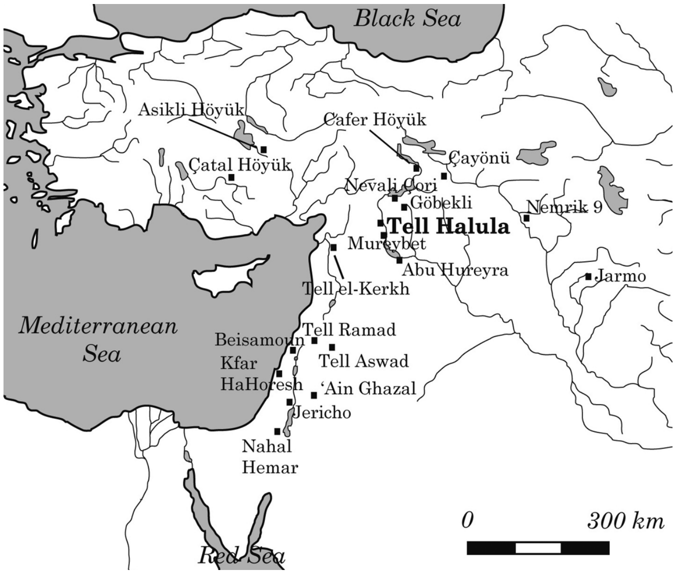


Fig. 1 – *Localisation of Tell Halula and other Neolithic sites in the Near East.*

The Neolithic site of Tell Halula (near present-day Jerablus in the Middle Euphrates Valley, Syria) dates to the Pre-Pottery Neolithic A and B periods (fig. 1). The site is well known by specialists of the Near Eastern Neolithic through the surveys carried out by a team from the University of Melbourne at Tell El Qitarin in 1986 and by a team formed by M.-C. Cauvin, A. Tahaand and M. Molist in 1989 (Molist 1992-1993: 50-51). M. Molist and his team from the Autonomous University of Barcelona began systematic excavations at Tell Halula in 1991 and this work still continues. The settlement is situated on the right bank of the upper Euphrates valley in Syria. The archaeological site, occupying the southern and steeper part of the tell covers just over eight hectares (360 x 300 m) and the stratigraphic sequence is 11 metres high (Molist *et al.*, 1992-1993; Molist and Faura, 1999; Molist, 2001; Molist *et al.*, 2010). There are several inhabited sites in the vicinity (Jerf el-Ahmar, Dja'de el-Mughara or Abu Hureyra) constituting a contemporary cultural environment that has recently provided a large amount of good-quality information about the way the earliest farmers and herders lived in the Fertile Crescent (Stordeur, 1997; Coqueugniot, 2000; Moore *et al.*, 2000).

The work carried out between 1991 and 1997 failed to discover any textiles or tombs in the dwellings. However, during the 1997-98 campaign, textiles began to be recognised in the context of very badly destroyed graves. Collecting and conserving samples were made extremely difficult by the important degree of limestone mineralisation rendering the fibres particularly fragile (M. Molist, personal communication, April 2012). The first analyses that were performed at the Instituto del Patrimonio Histórico Español (IPHE - Spanish Historical Heritage Institute) concerned only the nature of the fibres, which turned out to be flax.[2] Since then, textiles and some animal skins have continued to be found in funerary contexts together with cord used to tie the corpses and their protective textile shrouds that have also been interpreted as possible sacks (Molist *et al.*, 2009: 35, fig. 2b).

The tombs of Tell Halula have been thoroughly studied and a doctoral thesis is currently being written on the funerary practices.[3] These tombs, in the form of small wells, are located within the domestic space, just at the entrance to the main rooms of the houses most of which, at the particular moment when textiles appear at the site (between the phases 7 and 14), were built on a rectangular ground plan. These phases cover a period of 300 years (7600-7300 BC) and an estimated 37-40 generations of the population of the site.[4] The mineralisation of the fibres resulting from the absorption of mineral salts from the soil is the main reason these textiles have been preserved.[5] The morphology of the textile bonds does not seem to have varied very much in the course of these three centuries, as we shall see below.[6] Nor are any important changes observed in the shapes and uses of mats and baskets from the latest archaeological excavations compared to those known previously. It is generally considered that basketry and mat-making from vegetable materials, even though stemming from a very ancient tradition, are less complex and undergo fewer changes

2. C. Martín de Hijas: "Las muestras de fibras, observadas al microscopio óptico y valoradas en ensayos microquímicos, morfológicamente presentan las características de las plantas herbáceas anuales, como lino o cáñamo. Estas características son: marcas transversales en forma de X y canal central". New analyses are currently being carried out by R. Buxó at the IPCE in Madrid to identify the fibres of the new textile fragments that have been found. In order to have a second opinion, some samples were sent to the Larco Química y Arte laboratory in Madrid in 2012 with the intention of including the results in this article. According to this laboratory, the presence of flax and some other type of plant, such as palm (in some of the mat samples) is clearly supported. Some organic matter, such as (fox) fur may also be present. Although the laboratory reports that cotton was mixed with the flax to form the threads of the fabrics, it would seem prudent to wait for further confirmation of this.
3. Anabel Ortiz López, *Prácticas funerarias en el Próximo Oriente: el caso de Tell-Halula (Syria)*, UB, under the direction of M. Molist.
4. M. Molist, personal communication.
5. All the samples indicated that the majority of the components are calcium carbonate, silica, clays and traces of magnesium carbonate, gypsum, sodium chloride and other salts (sodium and potassium carbonate). In some areas traces of titanium dioxide and strontium carbonate were also detected (*Larco Química y Arte*, Madrid, 2012).
6. At least this is what has been observed in the small specimens given me to study in 2000 and to which I refer again here.

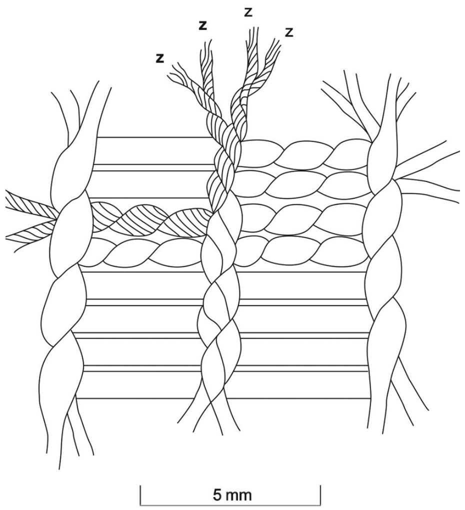


Fig. 2 – *Schematic representation of the technique used to produce the fabrics found at Tell Halula.*

Fig. 3 – *Twined textile. Grave 98 of the finds of 2000.*

over time than textile production, which is constantly subject to technological progress (Adovasio, 1977; Alfaro, 1984).

SPINNING AT TELL HALULA

The yarns that form the surface of the best-preserved fabrics at the Tell Halula site are all **S**-plied and made from two simple **z**-spun threads (fig. 2).[7] This can be visualised with the formula **S**2**z** (a double-ply yarn made by joining together two simple threads with a primary z-twist). The double yarns are between 0.7 and 1.6 mm in diameter (depending on the different items), whereas the simple yarns measure between 0.3 and 0.5 mm in diameter.

The spinning and twining are quite regular and well-balanced (fig. 3). In most cases the twist angle of the single threads is 25º and that of the double threads is 45°. The thread thickness is often uneven as the result of a spinning process that is not yet highly standardised. This can be seen in the vertical *passive elements* in figure 4, even though at first sight they may seem fairly even due to the poor conservation of the

Fig. 4 – *HL'09 MS 10. Twined textile.*

7. As a matter of convention, in textile terminology S is used to denote a clockwise twist and Z to denote an anti-clockwise twist. When these letters are in lower case they denote simple threads, i.e. those obtained by simply twisting the combed fibres on their own. When they are in upper case they denote double threads resulting from joining two simple threads together. Because of the fibres natural propensity, a z-spun thread demands S-twining, and vice-versa. It was once thought that each cultural area used a primary twist direction. However, important historical textiles display opposite twists in warp and weft. All the fabrics found so far at Halula have a simple z-twist (Alfaro, 2002: 19).

small samples. This tells us that the inhabitants still possessed a spinning technique that was sufficiently advanced to produce yarns of considerable quality. Almost all the *active elements*— the vertical yarns in Figure 2— have been eroded, probably because they protrude more from the surface of the cloth as they are double threads twisted together (also Z-twisted), but with two *passive element* double threads in between them at each twist. In spite of this, it can still be seen that the twists are all done in the same direction as described above.[8]

The difficulty lies in reconstructing the techniques that were used to make the yarns. As usual, when studying such early periods, there are no remains of spindle whorls, which, according to the available archaeological data, came into use at a later date in the Near East and did not become common until around 4500 BC (Ryder, 1993: 38; Breniquet, 2008: 196). The evidence from some more recent sites in the surroundings of Tell Halula, where spindle whorls are rather frequent, seems to confirm this hypothesis (for example Frangipane *et al*., 2009: fig. 8, 9, 13 and 25; Bocquet et Berretrot, 1989: 117-126, fig. 5).

In the absence of tools clearly used for spinning at Tell Halula, two suggestions of how yarn was manufactured can be advanced:

– The yarns used in the fabrics described above were entirely hand-spun, i.e. without the use of a tool. People who skilfully manipulate vegetable fibres to make thin ropes or delicate baskets may have used the same technique for even finer fibres even though they are more difficult to keep erect. The spinner would then roll the fibres down his or her leg or hip with the palm of the hand.[9] This technique could be used for making both simple spun threads twisted in a single direction and double, or plied, threads from two simple threads twisted in the opposite direction.[10] This procedure would not leave any material trace in the archaeological record. However, the yarn manufactured in this way would probably need to be rolled onto a wooden rod or bobbin to prevent it from getting tangled.
– The yarns could also have been produced either with the help of a wooden spindle that has since disappeared and/or a whorl that was also manufactured from a perishable material (wood, unbaked clay, asphalt, etc.). Examples of this are noted from Neolithic sites in Europe where all that remains, though in very good condition, is the wood of the spindles.[11] At Tell Halula no wooden items have been found and no wooden rods may thus be identified as spindles. Spinning with a spindle, but without a spindle whorl, was practised all over Europe until the beginning of the last century (Østergård, 2004: 47-49, fig. 17).[12] More recent societies also provide us with examples of spinning without the use of a spindle whorl.[13]

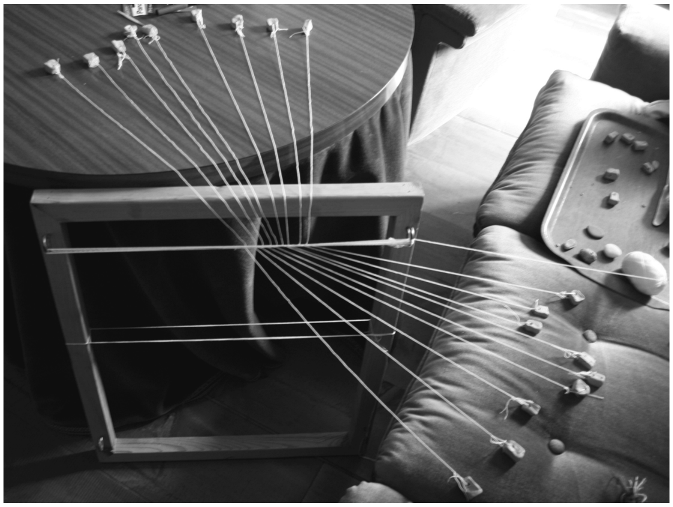
8. The concept of "passive and active elements" will become clearer in the description below of the conserved textiles and the techniques used in making them.
9. Through experimentation we have been able to spin very fine wool and flax in this way. This type of women's work is very common in primitive societies (Médard, 2003: 83, fig. 3).
10. I do not adhere to the suggestion made concerning Wetzikon-Robenhausen that the absence of simple thread from the site indicates that it was imported as such and then used to ply yarns (Altorfer et Médard, 2000: 64). This absence is likely to be due to taphonomical reasons.

THE TELL HALULA TEXTILE MANUFACTURING TECHNIQUE

Close observation of the textiles found in graves at Tell Halula show that these were produced through a particular technique: *twine weaving* (fig. 2-4).

Twining is an early method of constructing basketry and fabrics with two interacting sets of elements: "active and passive elements" (Schick, 1989: 43; Rast-Eicher, 1994: 24-25; Nielsen, 1999: 49-54). The description of the twined basketry or twined weaving technique is based on definitions established several decades ago, concerning basketry and textiles (Vogt, 1937; Bird and Mahler, 1951-1952; Burnham, 1965; Emery, 1966; Adovasio, 1977; Nielsen, 1999).[14] Two different procedures are usually recognised within the twine weaving technique: "warp-twining" and "weft-twining".

11. The magnificent wooden spindles found at the Neolithic lake site of La Draga (Banyoles, Girona, Spain) may serve as an example. The anaerobic environment at the bottom of the lake enabled the wood to survive in perfect condition, but no wooden, ceramic or stone spindle whorls have been found. The size of these spindles, which are thick in the middle and tapered towards the ends, varies between 15-22 cm and 35 cm (Bosch *et al*., 2006: figs. 43, 50, 70, 82 and 110; see also Altorfer et Médard, 2000: 63).
12. Some spindles found in Greenland have a slight widening in the middle or towards the bottom to hold the spun thread in place and prevent it from slipping off.
13. The 27.6 cm long spindle found at *Cueva Sagrada*, Lorca (Murcia, Spain) and dated to 2200 BC, did not have a spindle whorl when it was discovered. In an anaerobic atmosphere allowing the preservation of numerous wooden items, the spindle was clearly associated with fine linen textiles made from a 0.4 mm thick double flax yarn (S2z). The Lorca spindle has three simple notches along its cylindrical body to prevent the yarn rolled on it from moving: Alfaro, 1992: 20; Alfaro, 2005.
14. The bibliography on this ancient technique is huge and cobres both the pre-pottery and recent periods of many cultures in Africa, America, Asia and Europe.



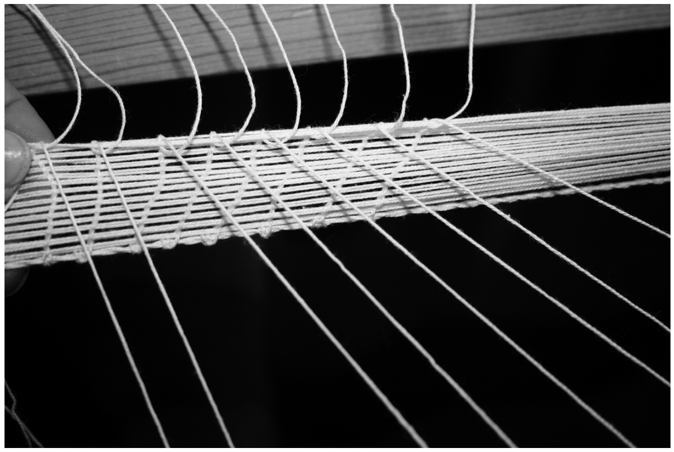


Fig. 6 – *The warp-twined weaving experimental reconstruction.*

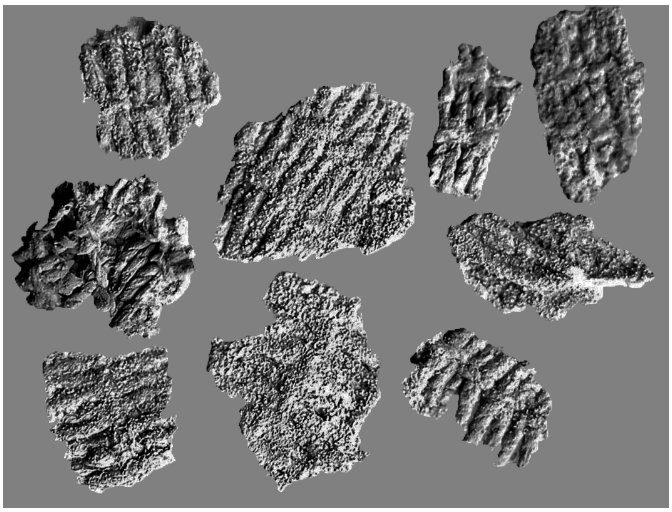


Fig. 5 – *Twined fabrics found in 1999 in grave 98.*

In "warp twining", the warp threads are active and cross and twist over each other all while fixing the weft yarns. On the contrary, in "weft twining" the weft yarns are active and hold the warp yarns in place. Although this technique for making flat surfaces from yarns was a big technological advance occurring in the Fertile Crescent from at least the 8th millennium BC, it should be remembered that the concepts of warp and weft are better adapted to the use of a loom with heddles. A loom indeed makes the work quicker and easier; only the weft is active and fixes the warp yarns in order to produce the fabric. In the case of twining, the difficulty lies in handling threads as fine as those found at Tell Halula, Nahal Hemar, etc., as well as later in Italy and central Europe (Perini, 1967-1969; Rast-Eicher, 1992: 12; Altorfer et Médard, 2000: fig. 26.4). This is particularly true when using the weft-twining technique, much better suited to thicker and tougher but still flexible yarns (Seiler Baldinger, 2003: Figs. 3 and 4).

The fabrics found at Halula were all made using "open twined weaving", in other words with the yarns or active elements separated by a space of 0.5 to 0.8 mm (fig. 5). This system is half way between true weaving and certain prehistoric basketry techniques (Vogt, 1937; Alfaro, 1984: 159-167; Barber, 1991: 126-130; Altorfer et Médard, 2000: 66-68; Alfaro, 2002: 19). Because of the fineness of the threads employed, twined weaving needs a support.

As already mentioned, there are two different ways of making these fine fabrics and how they are actually manufactured is best understood through experimentation.[15]

– In the case of warp-twined weaving the starting edge begins with a strong cord (formed by four twisted threads) fixed to two hooks inserted on the sides of a wooden support (fig. 6).

  This cord can be moved down and attached to new hooks as the cloth grows. In our experiment the "active" elements or threads have been ballasted with small clay weights dried near the fire and tied to the lower end of each thread. In pairs, these "active" elements fix each

15. This technique has been reconstructed on several occasions; some hypothetically (Winiger, 1995) and others based on experimentation (Siewertsz van Reesema, 1926; Reinhard, 1992; Nielsen, 1999: fig. 29 A; Bird and Mahler, 1951-1952: 75; Médard, 2010: 86-92).

new "weft" thread (or "passive" element) in place. The threads left at the front of the wooden frame will go behind as threads at the back come forward. However, this will be done with the same pattern at each crossover to ensure that the resulting cords come out with a twist that is always in the same direction (Z or S). Placing the vertical "active" threads far apart produces an open warp-twined weaving, whereas if placed close to each other, the cloth will be more densely woven and we can talk of "close warp-twined weaving". The surface of the cloth grows from the bottom upwards.[16]

The hypothetical reconstruction by Winiger (1995) shows the work growing from the top downwards and a manual twisting movement of the pair of threads that ends at one of the loom weights. The system might work using very thick yarns and with each pair of threads (uneven and even) held in place by the tension produced by a large stone weight for both threads. But this system cannot be applied to fine threads such as those used here. In Reinhard's experiment, the cloth grows downwards and weights were used to keep the active elements taut and possible to manipulate (Altorfer et Médard, 2000: 67; Alfaro, 2002: 16).[17] In our reconstruction, we had to find extremely light instruments (small clay pieces). The aim was not to reconstruct these items exactly, but to produce homogenous and lightweight pieces allowing us to obtain a textile that would be as even as possible. During the archaeological excavation of 2010, a flat, elongated bone object was found that was 3.5 cm long and weighed only some grams. It was polished on both sides and bore an indentation on each of the shorter sides, seemingly ideal for twisting the "active elements" around (fig. 7).

– In so-called weft-twined weaving, the "passive" elements are placed in the direction of the warp (vertically), while the "active" elements are placed in the direction of the weft (horizontally) (fig. 8).[18] The former need weights to keep them taut (but with fine yarns this is better done by fixing them to a bar at the bottom). The active weft is formed by a pair of threads that must be inserted by hand between the "passive" threads with the aid of bobbins. As they pass over and under the vertical

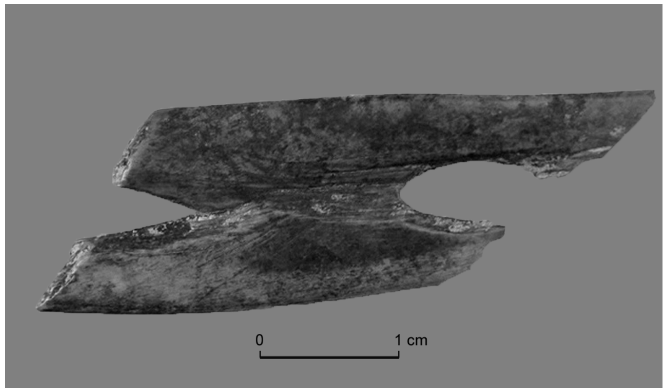


Fig. 7 – *HL-IO-14. Highly polished bone instrument found at Tell Halula.*

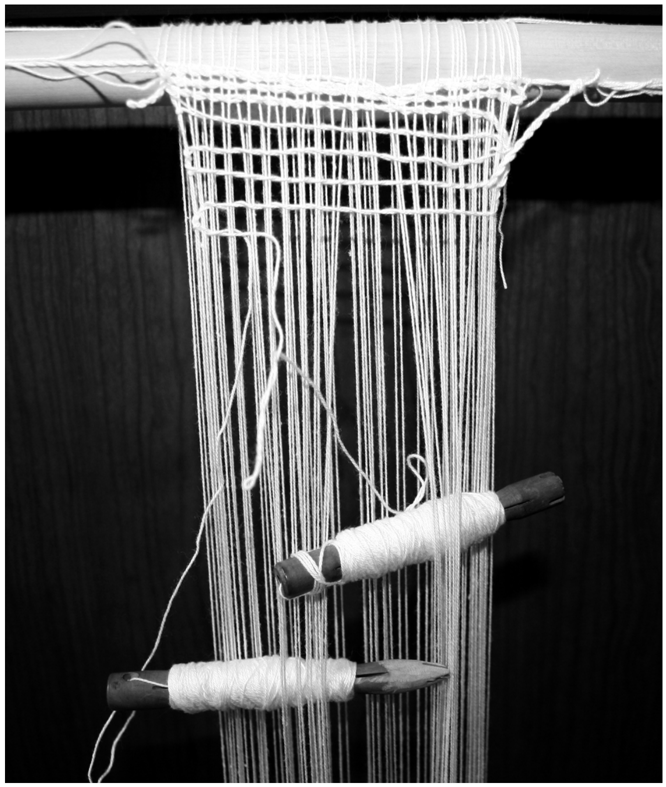


Fig. 8 – *The weft-twined weaving experimental reconstruction) two bobbins for the introduction of the double weft.*

16. The weaver works with an odd and an uneven thread at the same time. As the threads cross each other always in the same direction, they gradually form cords that hold the cloth together. In the next stage, the odd threads are placed on the frame one by one with the even threads in front. It is extremely difficult to keep the threads hanging vertically; because they are so fine and light, the weights get tangled up with each other and become jumbled. However the work progresses relatively quickly if the threads are kept in the right position.
17. Rather than fabric, it is perhaps more appropriate to talk of mat, as the experiment was carried out with fine strings in warp and weft that were held taut by pebbles of different thicknesses.
18. E. Barber, following Burnham, provides only the *weft-twining* version, which is the more complicated of the two systems described for delicate textiles (Barber, 1991: 128, fig. 4.5).

threads, they must be twisted in order to produce a cord that will keep the warp firmly in place. In this case the crossovers between the "active" elements must be open; otherwise it is impossible to manage the bobbins.

– According to our experience, the first of these twined weaving techniques is much simpler to use than the second one. Working on the warp enabled us to use our simple reconstruction at considerable speed and maintain good control of the twist (Z) of the active elements. Weft-twined weaving, on the other hand, is extremely complicated to do with threads as fine as the cotton used in our experiment (0.8 mm in diameter). Among the bone instruments found at the Halula site there were some delicate spatulas that we could pick out as possibly involved in textile production. However, they turned out not to be operative for holding the weft in place, as there is no open passage available between the sets of two even threads. That is why the warps must be placed in straight lines using the fingers. Moreover, the passive elements are quite far apart from each other. For all these reasons, it is highly probable that the cloth fragments from Halula were made using the warp-twined weaving system.

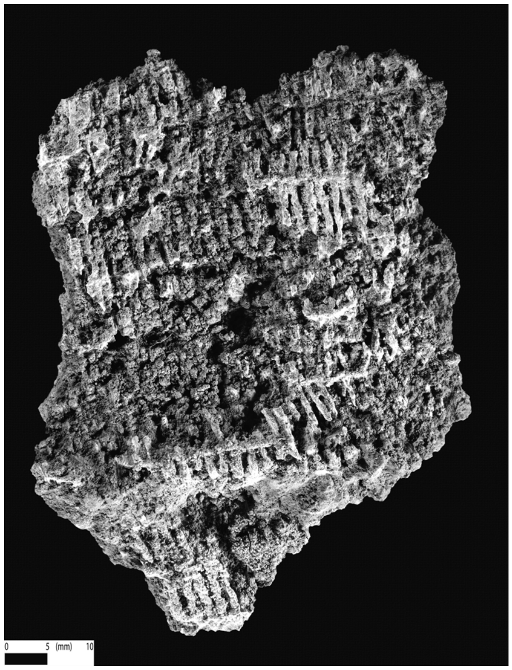


Fig. 9a – *HL'09, IV-4EF-E106-MS-5. Fine-twined woven textile from grave 106.*

ASPECTS OF THE QUALITY OF THE FABRICS: MEASUREMENTS AND POSSIBLE FUNCTIONS

Most of the textile remains found at Tell Halula have been deposited in the Archaeological Museum of Aleppo while 30 small specimens, recovered during the excavations between 1997 and 2011, are kept in the laboratory of the Autonomous University of Barcelona. Some of the latter have already been discussed elsewhere (Alfaro, 2002). However, in order to give an idea of the range of qualities met with among the fabrics from the site, we have chosen two examples among these fabrics manufactured by open-twined weaving using threads of variable thickness. Different variables will be presented such as the size and the density of threads as well as the types of twist used.

Fig. 9b – *Detail of the yarns and torsions. MEB.*

HL'09, IV-4EF-E106-MS-5

This sample consists of three mineralised textiles fragments, one larger (*ca* 5 x 4 cm) and two smaller (*ca* 2 x 2 cm). Among the latter only one has been analysed in detail (fig. 9 a-b).

The threads are deteriorated considerably and have lost much of their original thickness. Nevertheless, it can be seen that they are **S**-plied (*i.e.* double threads) and have a diameter of between 0.7 and 0.9 mm (699.27 µm: fig. 9b), the twist angles are not uniform, but at the top of this small fragment a 52º angle can be clearly seen (fig. 9b). The **z-**spun simple threads from which the double threads were made have a

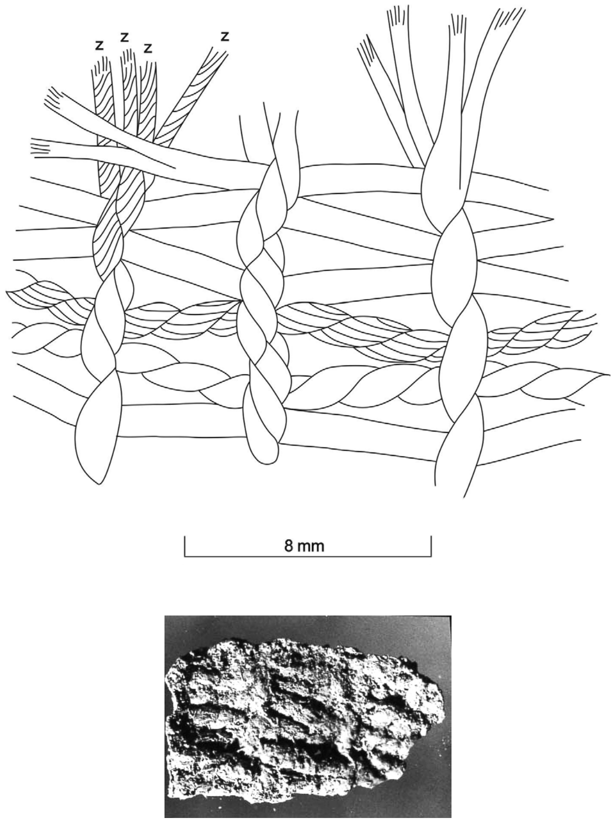


Fig. 10 – *Grave 98, Tell Halula.* ***down****, open diagonal twining;* ***up****, Diagram (drawing C. Alfaro).*

diameter of around 0.5 mm. The "warp" threads (the vertical threads in the photo 9a, and horizontal in 9b: active elements) are double and similar to those described (S-plied). As they are joined together they gradually form a Z-twisted cord or cabling that can be translated into the formula Z4S2z (fig. 2).

There are eight to nine double threads per square centimetre in the weft (the horizontal threads in the photograph fig. 9a) and three cords/cm^2 in the warp.

HL'09, IV-4EF-E106-MS-10

A second sample (three pieces) consists of one larger fragment (fig. 4) and two smaller ones, of which one was used for detailed analysis. The larger fragment is 2.7 cm high by 2.1 cm wide and the smaller one 1.2 x 1.2 cm. The threads in all three fragments were mineralised and well preserved. They are S-plied, *i.e.* made of double threads, between 1.2 and 1.6 mm thick that have been obtained by associating two simple z-twisted threads of 0.9-1 mm in diameter. The twist angles of the plied threads are between 40 and 45º and those of the simple threads 30º. However the twists are less uniform along the threads than it appears at first sight. The "warp" threads (the vertical threads in the photograph) are double and similar to those described above (S-plied), although they have been heavily eroded (now only we conserve 1 mm in diameter). As they are joined together they form a Z-twisted cord. The final formula is also Z4S2z (fig. 2). There are five double threads per square centimetre in the weft and two cords in the warp every 0.7 mm^2.

Among the textiles studied in 2002, a small group of pieces from grave 98 were produced by a weaving variant that may be described as *diagonal twining* (fig. 10). In this technique, the active elements surround two passive ones, but alternate their positions as shown by the diagram (fig. 10). There are two "active" elements and four to five "passive" elements every 0.8 mm^2. The composition of the surrounding, or active, threads is also Z4S2z (with thicknesses of 1 mm, 0.7 mm and 0.4 mm respectively), whereas that of the surrounded, or passive, threads is Z2s (with thicknesses of 0.8 and 0.5 mm).

OTHER OBJECTS ASSOCIATED WITH FIBRE REMAINS OR BEARING TEXTILE IMPRESSIONS

METAL ALLOY BALL WITH TEXTILE IMPRESSION

In 2003, three balls of lead-rich galena were found in funerary contexts inside houses at Tell Halula. They were covered in a whitish substance whose origin is still being debated, but which at some point was soft enough for the small textile container they were put in to leave its imprint on their surfaces.[19] The piece presented here comes from burial 206 (fig. 11). It measures 11 cm in diameter and has a perfectly preserved, almost complete textile impression on its surface (Molist, 2009: 39-44). These objects, now in the museum of Aleppo, have undergone a metallographic analysis, but the impressions had to be studied from photographs. According to M. Molist, not a single textile fibre remained attached to the object that had only kept the impression made by the fabric on the soft surface of the metal compound (Molist, 2009: 41-44). It seems clear that the fabric that held these balls was fine, ductile and adaptable to the object's spherical shape. Although this textile

19. Molist, 2009: 39-44 and personal communication.

Fig. 11 – *Spherical metal object with a textile impression. Burial 206. See twists in the thread.*

may appear at first sight as a tabby 1/1, its circular shape, perfectly adapting to the spherical ball, and the fact that the distance between the "active elements" varies (they are further apart in the bulky areas in the middle of the sphere than at the edges) suggest that it was similar to the *twined weaved textiles* described above.

The fabric manufactured with this technique is very flexible, which accounts for the fact that there are no folds in the imprint left by it. The small container must have been made by sewing together the two edges at the beginning and end of a rectangular piece about 30 cm long (in the direction of the warp; horizontal in the photographs) and about 20 cm wide (in the direction of the weft; vertical in the photographs) The lower part of this cylindrical shape was probably tied in a knot which cannot be seen, as this part of the piece is extremely deteriorated. The small sack obtained in this way must have been drawn together by another knot at the top of the metal ball, which would explain its well-preserved irregular shape (fig. 11). The impression left by S-plied threads can be seen, albeit with difficulty, in the central areas.

The lower part of the ball cannot be seen, as most of its mass has deteriorated. However, if, as is most likely, the fabric was sewn from a rectangular piece, the whole of it must have been held in place by an internal knot such as the one made in the experiment with a small, cylindrically shaped plastic mesh into which a sphere was inserted.

Fig. 12 – *Tell Halula. Copper bead (burial 206) preserving a part of the original string.*

COPPER BEADS CONTAINING FIBRE REMAINS

Remains of a string were found inside three of the small necklace/bracelet copper beads (8 mm in size), found welded together as a result of the decomposition of the mineral salts, in a grave belonging to a perinatal (burial 4J-E46) (Molist, 2009: 37). As these beads are in the Archaeological Museum of Aleppo, it has not been possible to see and analyse the fibres from which the string was made. Still we can conclude from the photograph that the string seems to have been made according to this model Z2S2z (fig. 12). In other words, it is a Z-twisted string with a 30° twist angle and a thickness of 2 mm made of two S-plied threads with a thickness of 1 mm and a 40° twist angle. The simple threads seem to be around 0.6 mm thick and have a z-twist. Thus, their dimensions are similar to those of the threads examined above.

According to archaeologists working in Halula, the copper did not come from the immediate surroundings of the settlement, but was brought from some distance (from around 1000 km to the north). However, it seems likely, due to the observations presented above, that the beads, even though imported from elsewhere, were strung locally on a string produced at Tell Halula.

An interesting comparable find was made at Neolithic Mehrgarh in Pakistan where fibres identified as cotton were discovered preserved inside a copper bead similar to those from Tell Halula (Moulherat *et al.*, 2002). The cotton string found at Mehrgarh corresponds to the earliest known use of this textile fibre in the Old World.

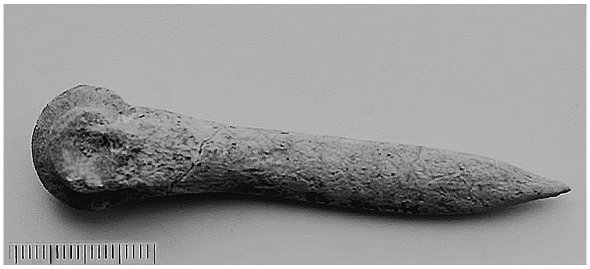


Fig. 13 – *HL-IO-53(4).Thread-separating punch.*

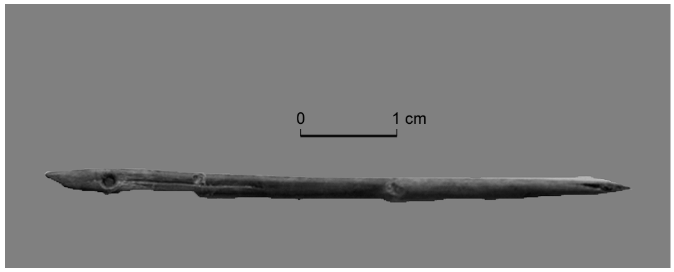


Fig. 14 – *HL-IO-88. 1996. Bone needle.*

Both the balls and the metal beads were found in a stratigraphic unit situated between the occupation phases 11 and 14, in particular in certain of the more important burials. They were part of the belongings of both sexes and of children, and may have had a symbolic meaning or represented social status (Molist *et al*., 2009: 37).

THE SMALL BONE PUNCHES

There is a large group of small bone punches from Halula that have been highly polished by use. They are pointed and sharpened bone epiphyses (fig. 13) of the type today described as instruments used for separating threads while making fabrics (Breniquet, 2008: 149, fig. 37; Alfaro, 2005). It is not possible to say whether or not this instrument was used in making the fabrics studied here.

DISCUSSION

Despite the difficulty of knowing precisely the origin of twined weaving, due to the lack of material evidence, the technique is thought to have arisen in the Natufian period (Breniquet, 2008: 197). Fabrics produced by *twined weaving* have been found alongside *plain weave* textiles at Çatalhöyük (*ca* 6000 BC) as well as at later sites, among them Tell Karrana (for example Burnham, 1965; Schick, 1988; Hägg, 1993: 210 and fig. 6; Barber, 1991: 128, figs. 4.3-4.4; Helbaek, 1996). The present author agrees with the idea that "le tissage ne peut pas être pensé en termes d'exclusivité des techniques au Proche-Orient, que ce soit dans le temps ou dans l'espace, encore moins en termes d'évolution linéaire" (Breniquet, 2008: 197). The possible presence of horizontal earth looms in El Kowm (Maréchal, 1989: 64-65; Stordeur *et al*. 2000: 49, concerning elements of fixation in the earth), warp-weighted looms[20] and even imprints of tabby 1/1 fabrics (Maréchal, 1989: 63) reveals the existence of a more complex textile technology. Looms requiring heddles, which cut down the time needed to produce a piece of cloth, co-existed in many Near Eastern settlements with twined weaving, the technique described above. However, these two technologies have not so far been found together at Halula. The curious co-existence of the two systems for a long period raises the possibility that there was a specific textile tradition associated with funeral rituals. Only a thorough study of a wide range of examples from burial contexts is liable to shed light on this matter.

Although the fragments that have survived at Tell Halula are too fragmentary for their original size to be known, there are two arguments that suggest that they may not have been very big. First, we have the archaeological example of the famous whole piece from the funeral cave at Nahal Hemar in Israel (6000 BC) (Schick, 1989: 48, fig. 14). This item, measuring 34 x 20 cm, was associated with several small fragments made with the same technique, but from which only one selvedge had been preserved, thus preventing an estimation of their size.[21]

Secondly, several observations made during the twined weaving experiment as well as while studying the archaeological textiles may be of interest in this context. The experimental weaving revealed how slow and difficult it is to use this technique, especially for producing larger pieces (with very fine threads) even though the ancient inhabitants of Tell

20. Whose existence we know of due to the finds of light weights, which are closely associated with this type of looms.
21. All the fragments in the Nahal Hemar Cave are small. This environment is very similar to the famous Cave of the Warrior. Although the latter is from a somewhat later period (4th millennium BC), it contained the remains of smooth-woven (tabby 1/1) fabrics of up to seven metres in length: Schick, 1998: 8, fig. 3.6. It is not an argument of great weight, but a larger twined weave fragment could theoretically have been conserved in Nahal Hemar too.

Halula certainly had more experience than we and thus probably worked faster. As already mentioned in relation to figure 6b, the result of twined weaving is more reminiscent of a mesh than of an actual tissue.[22] Even though a fabric produced with thicker threads (fig. 4) may seem rather strong, a textile in which threads hold passive elements in place will be subject to changes in position and shape (especially in the case of weft-twined weaving). Moreover, the discovery in one grave (Halula E 106) of fabrics made with threads of different qualities (fig. 4 and 9) indicates the presence of a composite covering consisting of at least two fragments of different manufacture. Therefore we think that separate rectangular pieces of cloth may have been sewn together to obtain a single larger cloth in which the body, after having been put in a flex position, was wrapped and protected.[23] Therefore, if any more bodies appear wrapped in cloth, careful observation *in situ* of the textile remains is recommended, as they may reveal possible seams joining separate rectangular pieces together.

Among the objects found at Halula there is an interesting group of bone needles (of the so-called Mureybet type, with an eye and incised sides) that may have been used to sew some of the cloths together (fig. 14) (Molist and Faura, 1999: 29).[24] The mesh format of the fabrics studied would easily allow such pieces (the one in the photograph is 6 cm long) to pass through them. It has also been suggested that the bodies were put in sacks made from this type of cloth (Molist *et al.*, 2009: 34-36; Kuijt *et al.*, 2011: 507). In any case, the placing of the body in the small wells (around 45 cm in diameter and 40 cm deep) dug into the floor of houses would have been equally difficult if it was wrapped in a shroud or contained in a sack.[25]

Ritual use of textiles is an issue of great interest, but difficult to approach on the basis of the scanty material remains available. The practices of protecting a dead person's body with the aid of cloth (Helbaek, 1996: 41), motivated by practical needs and/or religious beliefs, may vary quite a lot from one society to another and existed also in the so-called Mediterranean classical cultures.[26] In 1999 and 2000 textile remains were found inside the graves of two adult women (graves 98 and 105 respectively). The body found in grave 106 in 2009, from which most of the samples dealt with in this article came, is very interesting. Detailed study of other similar examples may be very helpful for interpreting the precise use of textiles in funerary contexts at Tell Halula (Hägg, 1993: 210-212).

Is it possible to think of these small, fine linen fabrics as items used for dressing the body of a living person, or were they exclusively used for covering in a funerary context? The survival of *twined weaving* and its co-existence with new, much simpler and quicker techniques (simple 1/1 or tabby formats implying the presence of looms with heddles) might point to the latter direction. Of course the dresses of the women in the images that appeared in a splendid floor panel some years ago (Molist, 1998), seemed to be quite brief.

The differences in the thicknesses of the threads and, therefore, in the quality of the fabrics obtained, as observed in our study, raise an important question concerning their purpose. Are they the result of different persons producing them or do they correspond to different uses in the funerary sphere depending on how strong they are? Future observations on the links between different types of textiles and specific graves may be informative on this point.

To conclude, we would like to point out that the survival of twined textiles at Tell Halula has enabled us to reconstruct a continuous and apparently unchanged tradition of textile manufacture of approximately three hundred years. This lack of change stands in stark contrast to the many major cultural innovations that occurred in other aspects of daily life, especially concerning the subsistence economies with the progressive domestication of plants and animals (Molist *et al.*, 2004: 51-54).

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22. This effect was accentuated by the mistake of not using double threads in the "passive elements" in the experimental reconstruction.
23. It has been suggested that the bodies were put in sacks made from this type of cloth: Molist *et al.*, 2009: 34-36; Kuijt *et al.*, 2011: 507 *sq.*
24. This material is the object of a doctoral thesis prepared at the UAB by Buchra Taha. I am grateful to her for giving me her photographs as well as for her inestimable help.
25. In spite of the body being dried beforehand, as has been suggested (Molist *et al.*, 2009: 34). Perhaps. Only an *in situ* study of the fabrics will be able to tell.
26. Sokolowsky (1969) includes several Greek sacred laws that are funerary regulations, such as the famous regulations of Ceos, in the 5th century BC (p. 188-191), Delphos, in 400 BC (p. 152-157), Gambreion, 3rd century BC (Sokolowsky, 1955: 46-50; Alfaro, 1984: 147).

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