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# Textiles from the Chalcolithic Period, Early and Middle Bronze Age in the Southern Levant

## Introduction

The Chalcolithic period in the southern Levant (4700/4500–3700/3600 BC; Rowan and Lovell 2011, 1) is characterised by rural settlements based on crop and livestock agriculture. Changes and inventions occurred during this period. For the first time, the production of ceramics was enriched by the introduction of the potter's wheel and improved firing techniques. Also for the first time, tools as well as cult vessels were cast in copper. Some of these objects were produced using the "lost-wax technique". Along with this specialised copper manufacture, basalt, bone, shell and ivory industries also flourished, producing items such as bowls, chalices, statues, figurines and pendants. The lands that are today known as Israel, Palestine and Jordan were at the forefront of global human development.

Textiles, basketry and other organic artefacts dating to the late Chalcolithic period have also been found, especially in the c. 400 natural caves in the Judaeen Desert in Israel (for a map see Sebbane, Misch-Brandel and Master 2014, 17). The caves are spread out in the deep canyons and along the high escarpment west of the Dead Sea and the Jordan Valley. They were used for living, burials and refuge. The artefacts are made from a variety of materials and production techniques that reflect the social and economic characteristics of the people who occupied them during various periods. These caves have been key repositories for organic

artefacts for thousands of years. The hills around Jerusalem cast a rain shadow forming a region with both extremely low rainfall and low relative humidity. Such inhospitable conditions meant that the area lacked extensive human occupation in all but a few periods, the Chalcolithic and Roman chief among them. In those rare periods, the caves were used mainly for refuge. We know the specific historical circumstances of Jewish refugees in the Roman period, but in the Chalcolithic it is not clear what state of affairs drove people into the wilderness. In both periods, caches of organic objects have added immeasurably to our understanding of the ancient world.

Without the excavations and surveys of the Judaeen Desert caves our understanding of the organic artefacts and the use of linen textiles in the southern Levant would have been very poor until the Roman period (Shamir 2014, 140).

The Chalcolithic textiles found in the Judaeen Desert offer exceptional insights into early textile production, which entailed a long series of processes from the production of fibres – requiring knowledge of the area's agriculture – to the processing of fibres – involving specialised knowledge of fibre properties and textile production. One of the central questions regarding Chalcolithic textiles concerns their differences and similarities with respect to textiles in neighbouring regions, such as Mesopotamia, Egypt and other contemporaneous cultures (e.g. the Neolithic lake



dwelling settlements of Switzerland, which represent some of the oldest finds of this nature discovered in Europe: Médard 2012, 367).

The most important Chalcolithic sites in the southern Levant that have yielded textiles are the Cave of the Treasure and the Cave of the Warrior, but Chalcolithic textiles have also been found in many other caves, including Nahal Ze'elim southwest of the Dead Sea, the Qarantal Cave (Cave VI/46) (Schick 2002, 234) and the Cave of the Sandal (Cave VIII/28) (Eshel and Zissu 2002, 119), both near Jericho. This article presents a survey of the textiles from the Chalcolithic period in the southern Levant and discusses it in light of contemporary material from other regions. Some of the finds will be reviewed in detail below, while a complete list is presented in Table 1, and will also be discussed in comparison to the early and middle Bronze Age textiles.

#### *Nahal Mishmar: The Cave of the Treasure*

This cave is the only Chalcolithic burial site in the southern Levant with evidence of exceptional quantities of copper and ivory artefacts (Joffe 2003, 57). The hoard, which was wrapped in a mat, included 432 copper, bronze, ivory and stone decorated objects: 240 mace heads, about 100 sceptres, five crowns, powder horns, tools and weapons. Organic materials found at the Cave of the Treasure include textiles, parts of looms, basketry items, ropes and shuttles. Inorganic artefacts connected with spinning and weaving include stone spindle whorls and one perforated fragment of a bowl which may have been used for spinning (Bar-Adon 1980). The Chalcolithic stratigraphy of the Cave of the Treasure had been disturbed by the later Roman occupancy, and the finds were mixed. At first glance, linen textiles of the Chalcolithic and Roman periods are similar: they have the same colour – undyed cream – and the same weaving technique: a simple tabby

Site	No. of Chalcolithic Textiles	No. of Other Textiles	Publication
Cave of the Treasure	67	25 Roman	Bar-Adon 1980 (published 46 out of 91)
Northern Judean Desert	47		Schick 2002
Lower Wadi el-Makkukh (3 caves) and Makkukh-Qarantal cliff (1 cave)	80	-	Patrich, Arubas and Agur 1988-89; Schick 1998; Shamir and Schick, forthcoming
Cave of the Warrior	3 (shroud, kilt, sash)		Schick 1998
Christmas Cave	53	71 Roman	Shamir and Sukenik 2011
Wadi Murabba'at	2		Crowfoot and Crowfoot 1961 Pers. obs.
Pool Cave	5	20 Roman	Shamir 2015
Nahal Ze'elim	16		Aharoni 1961, 23; Pers. obs.
Nahal 'Arugot	11	2 Roman 1 Islamic	Pers. obs.
Cave of the Horror	1	5	Aharoni 1962
Nahal Yishai	2	2 Roman 10 Islamic	Pers. obs.
Teleilat Ghassul	carbonised		Crowfoot 1954, 432; 1960, 519, Pers. obs. at the Classics and Archaeology at Loyola Marymount University
Nahal Lahat Cave	5		Schick 2002, 231; Pers. obs.
Sinai, <i>nawamis</i> sites	unpublished		Schick 2002, 231
Yoram Cave	unpublished		Goldman 2014

**Table 1. Summary – Linen textiles from the Chalcolithic period.**

**NB: Textiles dating to the Chalcolithic period were not found at the Cave of Letters (Yadin 1963) or at the Qumran caves (Shamir and Sukenik 2011).**

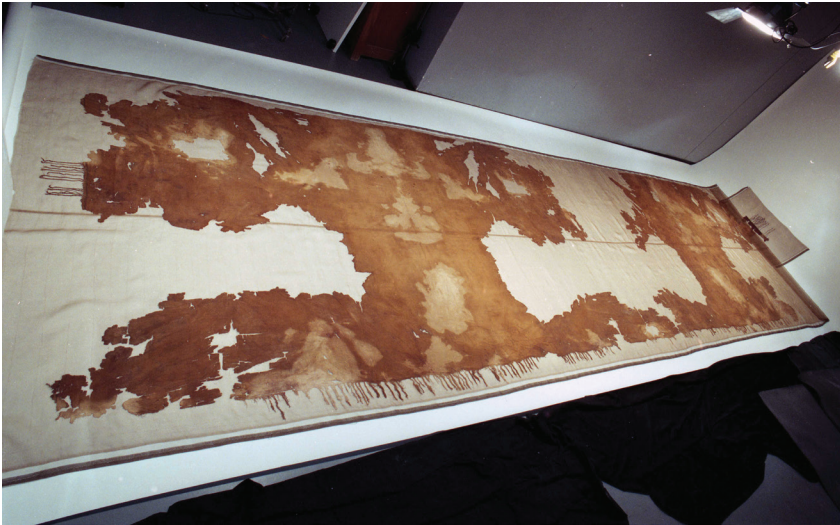


Fig. 1. Cave of the Warrior, linen shroud (Photo: Clara Amit, Israel Antiquities Authority).



Fig. 2. Cave of the Warrior, 'package' of cloth (Photo: Clara Amit, IAA).

weave. As a result, the first publication of textiles from the Cave of the Treasure did not distinguish textiles dating to the Chalcolithic period from those from the Roman period (Bar-Adon 1980). Some scholars used this information to infer that animal fibre was used to make textiles during the Chalcolithic, *e.g.* Frangipane *et. al.* (2009, 27) who wrote that "the only other very early example of a textile made from animal fibers, from the Nahal Mishmar Cave, Israel, is dated to the middle of the 4<sup>th</sup> millennium". However, we know this is not the case.

The research of Tamar Schick concerning the Cave of the Warrior (Schick 1998) enabled us to distinguish between the textiles from these periods. In this work the textiles from the Cave of the Treasure (including

those which were not published) were partly sorted first by Tamar Schick and then by the present author. We sorted and catalogued 87 Chalcolithic linen textiles and 35 Roman-period wool and linen textiles. It is important to note that, in Bar-Adon's publication, s-spun refers to the textiles from the Roman period, while ss-spun refers to the textiles that are from the Chalcolithic period, although he did not know this distinction when he published this material. The Chalcolithic textiles have the characteristic mixture of s-spun and S-plied threads and indicate splicing.

#### *The Cave of the Warrior*

The Cave of the Warrior is located near Jericho. A male skeleton (the so-called 'warrior') was found in flexed

**Fig. 3. Cave of the Warrior, selvage elaboration and weft fringes (Photo: Clara Amit, IAA).**



**Fig. 4. Cave of the Warrior, the deceased was lying on a large plaited reed mat accompanied by a wooden bowl, sandals and basket (Photo: Clara Amit, IAA).**



position, wrapped in a linen shroud (Fig. 1). He was buried according to the method of primary burial, in which the body is interred, intact, shortly after death. Interestingly, this method was not the norm in the Chalcolithic period. Most burials discovered from that time were secondary burials in which the bones were collected and deposited in ossuaries. In addition, it is important to note that it is a single burial, as opposed to the multiple burials in ossuaries. The height of the skeleton is approximately 168 cm, and the age at death was estimated at about 45-50 years.

The 'package' of cloth (Fig. 2) was opened at the Conservation Laboratory of the Israel Antiquities Authority by the conservator, Olga Nagnvishki. It was a tangled mass of folded, creased cloth in a fragile

condition, covered – like the other objects found in the cave – in a layer of red ochre, which had possibly been sprinkled onto the textile as part of the burial ritual. At first it was impossible to determine what lay within the bundle.

The shroud is a large rectangular linen cloth, 7 m long and 2 m wide, designed and manufactured as a single sheet, and is the largest Chalcolithic textile ever discovered thus far. It is decorated with painted or smeared black asphalt bands and undyed fringes 18 cm in length and secured by knots at their ends. A kilt, smaller than the shroud, was found crumpled inside the latter. One edge of the kilt terminated in a fringe, beautifully formed by 54 cm-long, evenly-spaced tassels. Only the textiles from this cave show

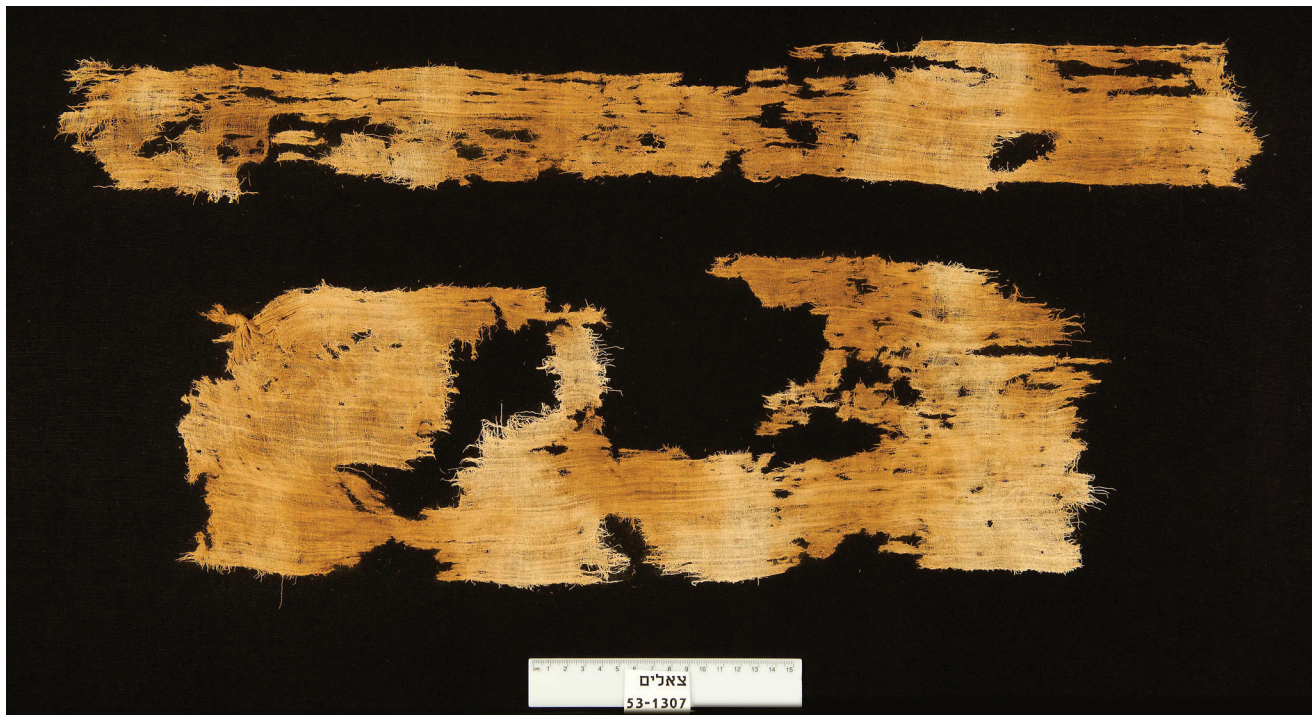


Fig. 5. Nahal Ze'elim, two separate linen textiles wrapped a treasure of c. 12,000 beads, IAA No. 53-1305 (Photo: Clara Amit, IAA).

selvage elaboration and weft fringes (Fig. 3). The deceased was lying on a large, plaited reed mat. He was accompanied by additional objects, including a flint knife, a bow, arrows, a wooden bowl, sandals and a walking stick (Fig. 4) (Schick 1998).

The good physical state of the skeleton, the heavily worn teeth, the V-shaped wooden bowl, the dung on one sandal, the absence of pottery, and the burial in a marginal area all indicate that the deceased was a pastoral nomad (Ashkenazi and Goren 2010)<sup>1</sup>.

#### *Nahal Ze'elim*

A treasure of about 12,000 white and blue steatite beads (Bar-Yosef Mayer and Porat 2010) and brownish-red carnelian beads, wrapped in two separate and delicate linen textiles (Fig. 5), was found at Nahal Ze'elim in 1960 (Aharoni 1961).

Another important discovery from Nahal Ze'elim is a small bag made of white and blue steatite beads in a geometric-diagonal pattern, using linen threads and leather thongs. The handles, decorated with beads, were also preserved (Shamir 2014).

#### *The Cave of the Sandal*

In the Cave of the Sandal, burials of seven adults were discovered together with Chalcolithic artefacts such as copper tools and pottery (Eshel and Zissu 2002, 119;

Khalaily 2002, 129) alongside a cut and knotted textile (Fig. 12) decorated with fringes and double 'hollow bands'.

#### **Chalcolithic textile production**

##### *Flax and linen*

The raw material used in all Chalcolithic textiles is flax (*Linum usitatissimum*), which was a principal oil and fibre source in the ancient world and probably the earliest domesticated plant used for textiles (Weiss and Zohary 2011, 249; Zohary, Hopf and Weiss 2012, 1-2). It is considered to be the first fibre and oil crop used in Neolithic Near Eastern agriculture and is often mentioned in the context of the Near Eastern Neolithic 'founder crops' assemblage (Abbo *et. al.* 2014, 52). The Neolithic domestication of flax was an essential prerequisite for Chalcolithic textiles as experimental fibre extraction of wild flax in Israel proved that these plants had surfaces which were too heavily textured to allow for the creation of threads suitable for textiles (Abbo *et. al.* 2014, 59).

Flax was the sole material used for the manufacture of textiles in the southern Levant until the middle Bronze Age (Shamir 2002, 21\* and see Rast-Eicher 2005). Linen threads are known to have been present there 10,000 years ago, as they were discovered attached to a comb in the Murabba'at caves (Schick 1995; Shimoy 1995).



Linen fabrics from the Pre-Pottery Neolithic period were preserved only at the cave deposits of Nahal Hemar (Schick 1988; Shimoy and Jucha 1988). They were not woven, but made in a variety of techniques such as looping and knotted netting (Schick 1988; Barber 1997, 191); that is, without the use of a loom. These techniques – looping and knotted netting – disappear in the southern Levant by the Chalcolithic period. The first loom in the southern Levant appeared in the Chalcolithic period and was a horizontal ground loom.

Although sheep were already domesticated at this time, their fleece was kempier and less pliable than wool in the later periods. That appears to explain why wool was not yet a favoured fibre (Schick 2002, 238). Possibly the oldest example of woollen textile is from the North Caucasus dating to 3700-3200 BC (Shishlina *et al.* 2003, 331; 339), but wool with continuous growth appears later: not before the 2<sup>nd</sup> millennium BC or the end of the Bronze Age (Breniquet 2010, 55).

### *Spinning and splicing*

The Chalcolithic linen threads from this region are s-spun, coinciding with the natural spin direction of flax fibres. The textiles have the characteristic mixture of s-spun and S-plied threads. Plied threads are considered characteristic of early textiles (Schick 2002, 238) until the middle Bronze Age in the southern Levant, and indicate splicing (Fig. 6). Late Bronze Age textiles are already s-spun (*e.g.* Shamir and Baginski 1993).

The term ‘splicing’ is used to describe the addition of fibre bundles (strips) to produce a continuous thread. Flax fibre was removed from the stem of the flax plant by stripping. The flat strips consist of distinct bundles of fibres lying side by side.

The ends of individual fibres or fibre bundles were overlapped and twisted or spliced together by rolling the ends between the thumb and index finger, secured by the adhesive properties of the plant’s natural pectin (Barber 1991, 47; Granger-Taylor 1998, 103; Leuzinger and Rast-Eicher 2011, 537; Gleba and Mannering 2012, 10; Wild and Wild 2014, 73). As in Europe, the change from splicing to spinning occurred during the Bronze Age, when combing was introduced as a further processing stage to produce fine, separated fibres. This method meant that a single yarn could be spun continuously instead of splicing it (Leuzinger and Rast-Eicher 2011, 540; Rast-Eicher 2012, 381).

Although the production of spliced thread is possible without a spindle, the process appears to be difficult without rotation, as the spliced flax thread requires quite a lot of spinning (Leuzinger and Rast-Eicher 2011, 540). Scenes of splicing are depicted on wall



**Fig. 6. Cave of the Treasure, splicing, IAA No. 2002-9206 (Photo: Clara Amit, IAA).**

paintings in Egypt from the Middle Kingdom (Barber 1991, 44-48; 53, Figs. 2.5. 2.6; Barber 1997, 192). The earliest Egyptian textile is a piece of linen from the Fayyum, dated to the early 5<sup>th</sup> millennium BC (Caton-Thompson and Gardner 1934, 46; Hall 1986, 11; Vogelsang-Eastwood 2000, 268), and shows clear evidence of splicing. This textile is crude, the weave is plain weave, but rather loose and uneven, and the thread is coarse. Moreover, it is z-spun, S-plied, unlike other textiles found in Egypt, as though the strong later tradition had not yet been settled upon (Barber 1991, 48; 145). Splicing was the standard method in Egypt until Ptolemaic times and in Lower Nubia until the Middle Ages (Wild and Wild 2014, 73-74). Splicing is also known in Europe, for example at Neolithic (second half of the 5<sup>th</sup> millennium BC) pile-dwelling settlements in eastern Switzerland (Leuzinger and Rast-Eicher 2011). It appears to have been one of the earliest yarn-making technologies used by the prehistoric inhabitants of Europe (Gleba and Mannering 2012, 10), the southern Levant and Egypt. A few of the Judaeian Desert Chalcolithic textiles have threads of varied thickness in the same cloth. The spinning tightness or the angle of spinning is between 45° and 20° (Emery 1966, 11-12). In contrast to later periods, during the Chalcolithic period there are usually no differences between the warp and the weft with regard to spinning characteristics.

### *Spindles, whorls and spinning bowls*

In the southern Levant a suspended spindle has been used for thousands of years from the Neolithic period;



**Fig. 7. Cave of the Treasure, remains of the horizontal ground loom, IAA Nos. 1961-1172, 1961-1174 (Photo: Clara Amit, IAA).**

it is still in use by the Bedouins today (Shamir 1996, 149). Hundreds of spindle whorls were found in the Beer Sheva Valley Chalcolithic settlement sites. They were discussed by Levy and Gilead who stated that flax was grown in the Jordan Valley and spun in the Beer Sheva Valley (Levy and Gilead 2013a; 2013b). Very few whorls were found in the caves: four spindle whorls made of stone (two chalk, one basalt and one unidentified stone) and four made of reused ceramics were discovered at the Cave of the Treasure (Bar-Adon 1980, 183-185) and are typical of this period.

Spinning bowls with interior handles (1-4) were used to stop the ball of rove rolling away, for plying and for holding water because dampness is helpful to the spinning of linen yarn. They are depicted in Egyptian wall paintings and models and actual spinning bowls have been found on excavations such as at Neve Ur and Bires-Safadi (Dothan 1963; Perrot *et. al.* 1967, 223; Barber 1991, 48; 77-78; Levy and Gilead 2013a, 32). The use of spinning bowls is likely to have been very limited in the southern Levant compared to Egypt, and the suspended spindle with a spindle whorl was used here usually without the bowl.

**Horizontal ground loom**

Remains of wooden beams from a horizontal ground loom (Fig. 7) were found only at the Cave of the Treasure (Bar-Adon 1980, 178-182). This equipment was ideal for producing narrow textile strips like the bandage found in the Cave of the Warrior. The bandage was not just a strip of a larger piece of fabric but was a cloth with finished selvages (Schick 1998, 17). This type of loom is also known from Egypt (Roth 1951, 3; 8; Forbes 1956, 192; 195; Broudy 1979, 38-44). The earliest depiction is on a bowl from 5000 BC found in Egypt (Vogelsang-Eastwood 2000, 276). This kind of loom was used by many cultures of the ancient Near East and is still in use today, for example in Turkey and amongst the Bedouins. Because of its size and the shape of the small beams, Breniquet (2010, 52) suggested that the loom from the Cave of the Treasure was a backstrap loom (with one bar attached to a fixed object and the other to the weaver, usually by means of a strap around the back), but there are no indications for the use of this loom in the southern Levant. It was and still is predominantly used in Central and South America.

No. of threads per cm (warp/weft)	Site
9-45/7-30	The Cave of the Treasure
11-14/8-11	The Pool Cave
7-28/7-22	Judaeen Desert caves: Lower Wadi el-Makkukh
11-32/10-22	Northern Judaeen Desert: Cave VIII/9
11-46/9-26	Cave VI/46
14-16/7-8	Cave X/31
10-20/10-14	Cave III/3
9-28/9-20	Cave III/7
15-20/11-13	The Cave of the Warrior
12-13/13-14	Teleilat Ghassul

**Table 2. Thread counts in Chalcolithic textiles.**



**Fig. 8. Cave of the Treasure, very delicate linen textile, 60-151-d, IAA No.1961-1269 (Photo: Clara Amit, IAA).**



Although Bar-Adon (1980, 182-183) thought that elongated perforated stones found at the Cave of the Treasure might be loom weights, there is no evidence for loom weights in Israel until the Middle Bronze Age I period (Shamir 1996, 139). Uri Davidovich, who examined all the stones from the Treasure Cave, did not find such stones. However, bone shuttles were found there, one of them bearing a thread in the hole (Bar-Adon 1980, 177).

The horizontal ground loom was replaced by the warp-weighted loom during the Middle Bronze Age II period (Shamir 1996, 139) (and not before) in the southern Levant. It had already been in use in Anatolia in the Neolithic period (Çatal Hüyük: Barber 1991, 129-132; 166).

### *Weaving*

The predominant weaves found in the Chalcolithic southern Levant are various types of plain weave (tabby). Some are executed using a balanced tabby weave, in which the number of threads per cm in the warp equals that in the weft. A few textiles are warp-faced tabbies, in which the number of warp threads per cm is significantly higher than the number of wefts. The weaves range in density from very loose to very dense, the majority being of a medium density. At the Cave of the Treasure, the number of threads per cm ranges between 9 and 45 in the warp, and 7 and 30 in the weft. One specimen (60-151-d, IAA No.1961-1269, Fig. 8) is very delicate, even transparent, with 44-45 warp threads per cm and 30 weft threads per cm (Bar-Adon 1980, 173, Fig. 1).

### *Edges*

Hems and selvages were noticed at the Cave of the Treasure. Hems are the edges of fabrics which were cut along the warps, folded two or more times



**Fig. 9. Cave of the Treasure, textile decorated with single weft blue thread, IAA No. 2012-9003 (Photo: Clara Amit, IAA).**



**Fig. 10. Nahal Mishmar, undyed cream warp threads and dark brown weft threads, IAA No. 2012-9006 (Photo: Clara Amit, IAA).**



Fig. 11. Cave of the Treasure, linen undyed and undecorated, IAA 2002-9221 (Photo: Clara Amit, IAA).

and sewn, which means that they were cut from an originally larger piece. Plain and reinforced selvages were found among the Chalcolithic textiles. A complex treatment of the edge is discerned at northern Judean Desert caves (Schick 2002, 231; 234): the decorative lines were woven in a soumak trapping technique and the warps were braided and twisted, becoming strands in a fringe. Only the textiles from the Cave of the Warrior show selvedge elaboration, a weft fringe, terminal decorative bands in basket and half basket weave, warp tassels and a narrow warp stripe of yarn with concentrated tannins (Schick 1998, 6-22).

#### *Colour and decoration*

Painted or decorated textiles from the Chalcolithic period are rare and dyed textiles were not found. Most of the Chalcolithic textiles in this region are undyed, ranging from off-white through to cream and beige. The lack of decoration on most of the textiles is understandable due to the fact that linen does not easily absorb dye, with the exception of blue dye (Shamir and Sukenik 2011, 216). A few of the textiles are bleached. Bleaching was a long process intended to whiten linen textiles, which are naturally of a grey-brown colour. The textiles were soaked in cleaning and whitening chemicals and then exposed to the sun for weeks, during which time they became white (Forbes 1956, 95).

As noted above, coloured (but not dyed) textiles were found at the Cave of the Warrior with black bands of paint or smeared asphalt. In addition, reddish spots on the shroud of the male burial have been identified as ochre, possibly sprinkled onto the textile as part of the burial ritual (Koren 1998, 101). The shroud is



Fig. 12. Northern Judean Desert, textile decorated with fringes and 'hollow bands' (Photo: Clara Amit, IAA).

decorated with fringes at the warp (54 cm long) and the weft. One of the textiles from the Cave of the Treasure (IAA 2012-9003, Fig. 9) is decorated with a single blue weft thread. A textile from Nahal Mishmar (IAA 2012-9006 Fig. 10) has undyed cream warp threads and dark brown weft threads. Nahal Ze'elim textile No. 2006-9025 is a linen strip with two preserved selvages, decorated with a running stitch in a brown colour. The others are not decorated or dyed, not even No. 61-29/7-a (IAA2002-9221, Fig. 11) which Bar-Adon (1980, 162) claimed was decorated with selfbands.

A textile from the northern Judean Desert from Qarantal Cliff (cave VI/46) is decorated with fringes and double 'hollow bands'. The missing threads suggest that colour threads, now disintegrated, might have decorated this textile (Fig. 12; Schick 2002, 234). The undulating surface of textiles that looks as if the cloth had been intentionally pleated was noticed at Cave VIII/9 in the northern Judean Desert (Schick 2002, 236, Figs. 26-27), as sometimes seen in Egyptian funerary dress (Landi and Hall 1979). At Lower Wadi el-Makkukh and the adjacent area (Shamir and Schick forthcoming), one textile has the warp made of undyed cream and different shades of brown and is decorated with a somewhat darker brownish band. The weft is made of different shades of brown and red. The red colour was probably obtained from ochre.

#### *Quality*

The labour required to produce flax threads, from the initial state of growth to the last stage of spinning, includes multiple steps of processing and implies both a high level of skill and a great deal of labour. The quality of the Chalcolithic textiles is generally high, flax



fibre processing having been based on thousands of years of experience of using tree bast fibres (Leuzinger and Rast-Eicher 2011, 535). Weaving faults are rare, indicating a long tradition, although a few faults were observed at the northern Judaeen Desert caves (Schick 2002, 224; 231; 235).

### *Use*

It is impossible to identify the use of the textiles at the Cave of the Treasure because they are all small and usually without edges or sewing. A scrap of fabric was found inside a mace head in the treasure. Cave 2 nearby the Cave of the Treasure yielded clothing remains found on a skeleton (Bar-Adon 1980, 153). The shroud at the Cave of the Warrior was made especially for that purpose. Garments, including a kilt and a sash inside the shroud, were also found at the Cave of the Warrior (Schick 1998).

At Ze'elim thousands of beads were found wrapped in two linen textiles, but it is difficult to determine whether that textile was in secondary use. It is worth mentioning that among the fragments in the Judaeen Desert caves there are narrow, cut, band-like items, probably in secondary use for tying or bandages. In general, the fragments may have originated from garments. But one from the Cave of the Treasure is in primary use, its width is 7 cm and both selvages are preserved with a length of 25 cm (Fig. 8) (Bar-Adon 1980, 173).

### *Origin*

The textiles considered here probably originated from southern Levant sites. Flax could be grown in the Jordan Valley at sites such as 'En Gedi (Bar-Adon 1980, 185), Jericho or the Beth She'an Valley (Schick 2002, 238). These sites are suitable for flax cultivation as the plant needs plenty of water and a hot climate. Thousands of years later, during the Roman period but also during the Iron Age, these areas were famous for their linen products (Diocletian's Price Edict section 26; Pausanias 5.5.2; Shamir 1996; 142; Shamir 2007).

Bar-Adon assumed that some of the textiles found at the Cave of the Treasure were produced there. However, almost no fibres or threads have been found that were ready for use except a ball of fine linen thread wound around a small stone (Bar-Adon 1980, 211), and only a few artefacts related to spinning and weaving were found in the cave. Schick concluded that the textiles found in the northern Judaeen Desert caves were most likely not woven there (Schick 2002). The spinning and weaving of these textiles may have been done in semi-arid zone sites which have yielded many spindle whorls, such as at Bir es-Safadi, Teleilat Ghassul and Gilat (Levy and Gilead 2013a, 26-27; 41).



**Fig. 13. SEM photo of early Bronze Age plain weave from Ramon I rock shelter (Photo: Einat Nativ Roth and Janet Levy of the Archaeological Division, Ben Gurion University of the Negev).**



**Fig. 14. Rishon le-Zion. A linen textile and threads (IAA No. 1996-9304). Middle Bronze Age II. (Photo: Clara Amit, IAA).**

In any case, these textiles did not originate in Egypt, as they are completely different from the textiles from the Fayyum. According to Barber (1991, 145) "one has to suspect from this mixture of details that one is looking at the very beginning of the art in Egypt, and that the technology of textiles had only fairly recently spread southwest from Palestine".

Flax that was cultivated in the Near East was not grown in Egypt as a wild plant. Flax is not native to Egypt and it is possible that it was imported into Egypt from the Levant (Vogelsang-Eastwood 2000, 269).



### Early and middle Bronze Age textiles

The abundance of Chalcolithic textiles is impressive in comparison to the rarity of such remains from the early Bronze Age. Up until today, with the exception of the linen textile from Bareqet (Shamir 2005), a few textiles from the Rock Shelter in the Makhtesh Ramon (Fig. 13; Shamir and Rosen 2015) and threads adhering to metal from Hurvat Gilan (excavated by Y. Cohen) and Gesher (excavated by S. Cohen; pers. obs.), almost no early Bronze Age textiles have been found.

Middle Bronze II textiles and threads were found at Rishon le-Zion (Fig. 14) indicating that splicing still existed in this period (Shamir, forthcoming).

All the fabrics in Israel from the Neolithic until the early Bronze Age were made of linen. Wool textiles are found for the first time at Jericho in the middle Bronze Age (Crowfoot 1960, 521; Shamir, pers. obs., University College London).

### Conclusion

Nahal Hemar yielded fabrics which were not made on a loom. Neolithic textiles have been found in Asia Minor (Çatal Hüyük and Çayönü in south-eastern Turkey: McCorriston 1997, 519) and in Mesopotamia, where textiles rarely survive (Breniquet 2010, 52), but tabby textile imprints on clay and bitumen from Jarmo (northern Iraq) dating to 7000 BC suggest the use of a loom (Adovasio 1977). A cylinder seal from Susa dating to the fourth millennium BC shows a ground loom, weavers and the preparation of a warp (Breniquet 2010, 53; 62), and, as noted, the earliest depiction is on a bowl from Egypt dated to 5000 BC (Vogelsang-Eastwood 2000, 276).

The first woven textile assemblages are the Judaeen Desert Chalcolithic textiles and other organic items; these have almost no parallel outside the Judaeen Desert due to differences in terms of preservation (Davidovich 2008). Textile production during this period was carried out on a large scale as indicated by sites with a sudden and dramatic profusion of spindle whorls such as at Bir es-Safadi, Teleilat Ghassul and Gilat – evidence of the intensification of spinning (Levy and Gilead 2013a, 26-27, 41), as also found in the Chalcolithic culture of the Golan Heights (Epstein 1998, Fig. 21).

According to Davidovich (2008), the caves were used mainly for refuge. This is further demonstrated by the analysis of the material culture assemblages, including pottery, stone and ivory, the manufacture of copper artefacts, and the use of the potter's wheel, as well as by comparing the pattern of cave use in the late Chalcolithic with that of other historical case studies, such as those of the Bar Kokhba period (132–135 AD).

In both periods the nearly inaccessible caves were used for refuge and not as dwellings.

Textiles dating to the Chalcolithic period are the earliest examples of loom-woven fabrics found in Israel, and provide exceptional insight into early textile production. This serves to confirm not only that the production techniques of textile crafts were already well advanced during the 5<sup>th</sup> and 4<sup>th</sup> millennia BC, but also that cloth production during the Chalcolithic period in the southern Levant was limited in its variety.

### Note

1. The artefacts from the Cave of the Warrior were exhibited in the Natural Museum in New York in 1998, at the Institute for the Study of the Ancient World in New York and in San Francisco in 2014 at the exhibition *Masters of Fire: Copper Age Art from Israel* (Sebbane, Misch-Brandel and Master 2014; Shamir 2014).

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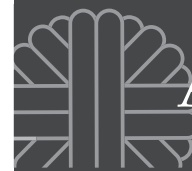
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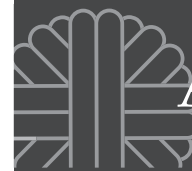
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