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ANCIENT TEXTILE TECHNIQUES IN EGYPT AND SCANDINAVIA

A COMPARATIVE STUDY

BY

MARGRETHE HALD, Copenhagen.

There are two places within the culture area of the Old World where ancient textiles are preserved in fair quantities, these being Scandinavia and Egypt; but there is this peculiarity about the matter, that whereas in the south these perishable substances were saved from destruction by the arid conditions, in our northern latitudes it was the humidity that brought about the proper conditions for preservation.

At first sight there is not much similarity between the materials from the two regions. The Norsemen clad themselves mostly in stuffs of animal origin, wool and skin, and our prehistoric textiles on the whole must be characterized as coarse and dark. In comparison, the Egyptians textiles are fine and elegant; and as the Egyptians had an early knowledge of flax growing, they were able to have light coloured and light weight linens suitable for a hot climate.

Obviously, it would be most interesting if it were possible to demonstrate technical similarities in Scandinavian and Egyptian textiles. The following comprises an attempt at throwing some light on the question, but I may say at once that with the limited material available I do not consider it possible to deal with all the problems it involves. That would crave a much more representative series of analyses, and naturally this is only practicable for those who are associated with the large collections of Egyptian textiles and thus can have the material at their disposal for a very long time.

Thus my investigations must be regarded more as random samples, and in deciding to publish them now I was persuaded by the circumstance that as far

as I can see, authors hitherto have mainly interested themselves in the ornamentation of the Egyptian fabrics and less in the technical details. One understands this, of course, as only the fewest cloths are preserved in such dimensions that the constructive features can be clarified. But just for that reason it would be very important if the uncut and more or less intact Egyptian textiles doubtless existing here and there could be subjected to technical studies; if this paper can do anything towards bringing this about its purpose will have been accomplished.

For the purpose of my investigations I have had at my disposal *a mummy* (Mus. No. 1038) belonging to the National Museum in Copenhagen (Department of Oriental and Classical Antiquities). In addition, however, I have had opportunities of studying at Swedish, English and German museums by means of grants from the Carlsberg Foundation, to which I beg to render my respectful thanks.

In the following the material is dealt with in chronological order out of regard for historical clarity, but showing the museums to which the various specimens belong.

The reader may perhaps feel some surprise that the selection of Egyptian cloths comprises the linens which apparently differ so much from the Scandinavian fabrics. The reason is, however, that these light and relatively open flax textiles have proved to be more accessible for analysis on points that are of consequence in this connexion than the woollens, which are usually rather solid and compact. To avoid unnecessary repetition it may be stated here that all the cloths referred to are woven in plain weave and that in every case the yarn is S-spun in both warp and weft.

I. *Fragments of Linen Fabric.* (1).

Three small pieces of cloth woven from exceedingly fine yarn. Thread counts in two different areas of 10 × 10 cm. give the following results: 550 warp threads and 200 weft threads; 470 warp threads and 200 weft threads. Dated about 2400 B. C.

(1) At the Neues Museum, Berlin. Mus. No. 8057.



Fig. 1. Linen fabric from Gebelen, Upper Egypt. Dated to about 2100 B. C.
Neues Mus., Berlin, No. 13755. Scale 1:1.

II. Linen Fabric from Gebelen (2).

Fig. 1 is a strip of rather coarse linen, dated to about 2100 B. C. One original selvage remains, the other margins having been torn off. The piece measures 50 cm. in width and 230 cm. in length. Examination revealed that in about fifteen cases the weft thread running from the now torn edge was turned. At one or two places there was an accumulation of these weft threads of such a form as to justify the use of the term "weaving wedges" (3); whether they were single or double it is impossible to see, the fabric no longer having its original width. The thread counts in areas of 1×1 cm. are:

warp	weft
21	9
24	9
22	8

At the side where the selvage is preserved the figures were:

warp	weft
30	8
27	8

(2) At the Neues Museum, Berlin. Mus. No. 13755.

(3) By the term "weaving wedge" I mean specially woven parts of the fabric where the weft threads do not run direct from one edge to the other, but are run to and fro within a narrower area where the

web has become uneven. When a weaving wedge lies out at one side and tapers inwards I use the expression *single wedge*, and when it is within the edges and tapers off to both sides I call it a *double wedge*. For further details see page 80-81 and fig. 29.

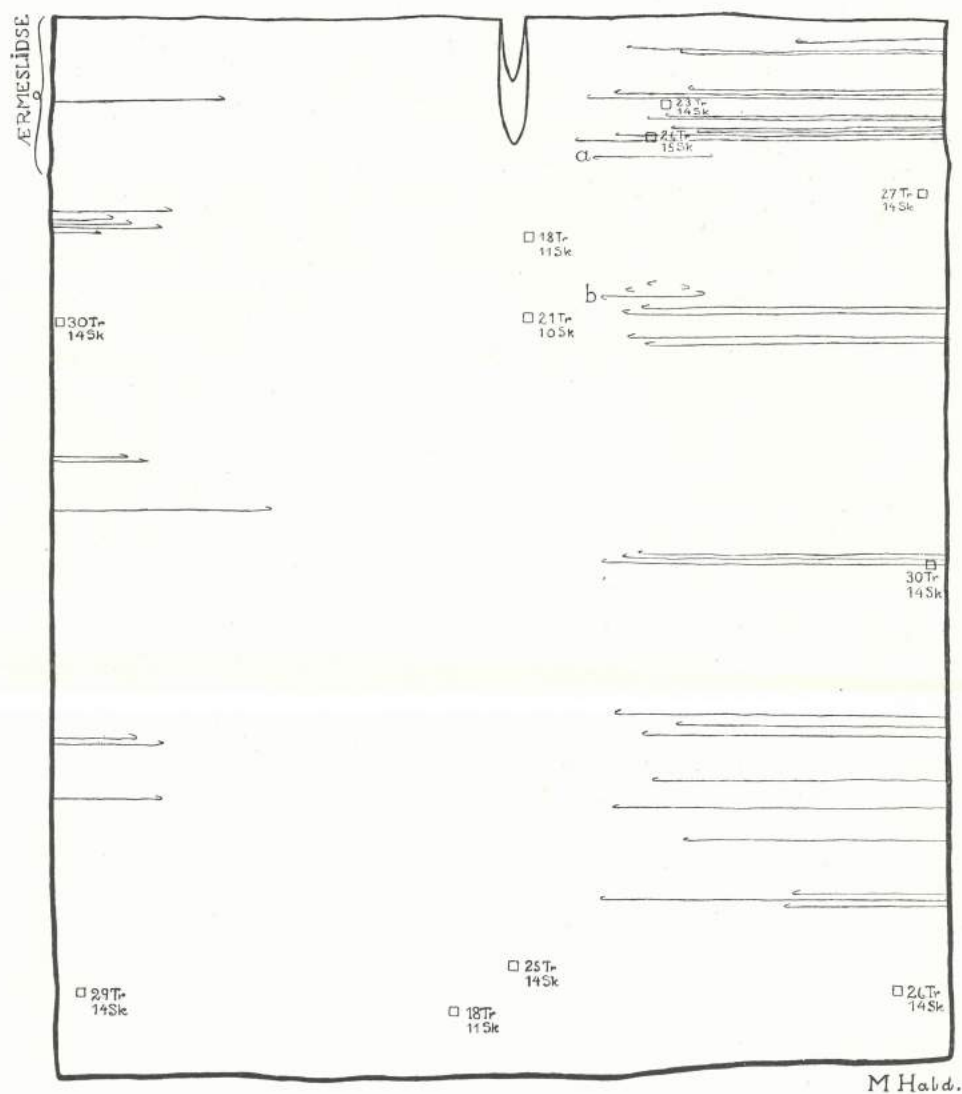


Fig. 2. Sleeveless tunic. Dated to about 1250 B.C. Neues Museum, Berlin, No. 10966. Scale 1 : 10.

The warp is compressed at the edge, for which reason the number of warp threads is highest there. There was no sign of intersecting threads in the weft (4).

(4) Intersections in the shoots are regarded as signs that two or more people

worked on the loom at the same time. See page 82 and figs. 27-28.

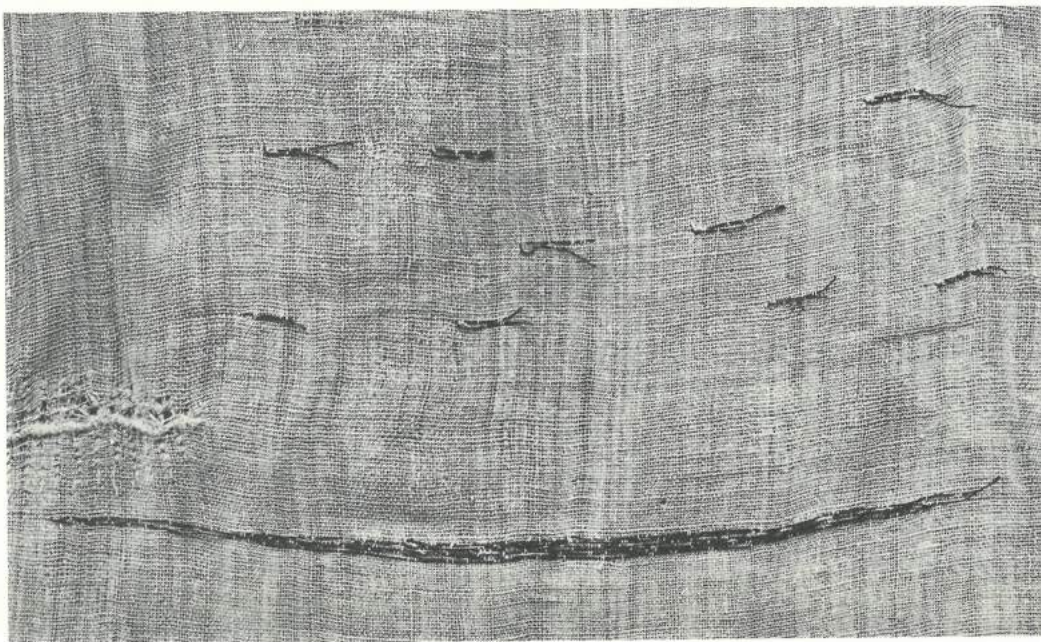


Fig. 3. Detail of tunic No. 10966. Wedge at *a* at Fig. 2.

III. *Linen Fabric* (5).

A rather coarse piece of linen dated to 1300 B. C. It is smoothly woven and very well executed. No intersecting threads are observable in the weft, but at one place the weft thread was turned. The length is 2,25 m., the width 1,10 m.

Thread count in 1 × 1 cm.:

warp	weft
22	9

IV. *Linen Sleeveless Tunic* (6).

This specimen, which is dated to about 1250 B. C., is considered to have been a priest's shirt. It consists of a piece of linen 280 cm. long and ca. 120 cm. wide, neither shaped nor cut anywhere except for a neck opening in the form of a vertical slit, of which the edges are stitched with a rolled seam. The cloth is folded horizontally across the middle

(5) At the Neues Museum, Berlin. Mus. No. 10751.

(6) At the Neues Museum, Berlin. Mus. No. 10966.

and the vertical edges are seamed, except for a short length at the top, thus leaving a slit for the arms.

There are many turned and returning weft-threads, and it will be seen from the drawing fig. 2 that these occur particularly at the right side. At *a* there is a double wedge shown in detail in the photograph fig. 3, where I have marked it off in dark sewing-thread. There is a similar wedge at *b*. Both wedges occur on the same warp side, where a slackening of the threads apparently has caused the weft to run unevenly. The wedges are about 2.5 cm. deep and 18 cm. wide.

It will be seen from the figures shown in the drawing for areas of 1 × 1 cm. that the number of warp-threads is much higher than that of the weft, and also that the warp-threads lie somewhat closer together at the sides of the web than in towards the middle. No intersecting threads were found. It should be observed, however, that the fabric was pinned up on a board, so that only the front was accessible for examination; therefore it is possible that all the weaving peculiarities may not have been observed. I have endeavoured to illustrate the more important and indicate their position.

A COLLECTION OF LINEN CLOTHS BELONGING TO A MUMMY OF ROMAN TIME (7).

In 1878 the Collection of Classical Antiquities of the National Museum, Copenhagen acquired (from Kurnah near Thebes) an anthropomorphous wooden mummy coffin 1.84 m. long). The coffin, with a damaged mummy not originally belonging to it, is very well preserved. The lid is white with blue, brown and green stripes. The inside of the lid, and the inner and outer sides of the bottom are covered with inscriptions; inside on the bottom is also a picture of the goddess Nut. The mummy was opened in July 1878 and a new investigation took place in the autumn of 1941. The mummy was wrapped in linen bandages covered with a highly variegated cartonage. The hair is blue; in front of the face was a remnant of a red mask.

The cloths were all remarkably similar in kind, despite the various uses to

(7) In the National Museum Department of Oriental and Classical Antiquities, Copenhagen. Mus. No. 1038. V. SCHMIDT: *Østerlandske Indskrifter* p. 37 pl. 25,5 n, pl. 24,5 o, pls. 25-25 a-m. — V. SCHMIDT:

Monuments orientaux pl. 7. — V. SCHMIDT: *Levende og Døde* p. 186 Nos. 1030-1034. — A report on the unwrapping of the mummy is being prepared by Mr. Hans Helbæk.

which they had been applied; and a botanical analysis of some samples showed that they were made from flax.

Nevertheless the fabrics fall naturally into three groups. The first group comprises the large pieces of cloth, some of which have not been cut out but are present in the form in which they were taken from the loom. They are of a size which we would consider suitable for rugs. The second group includes bands and bindings, which means long narrow strips of cloth made by tearing pieces lengthwise, usually in widths of 15 to 20 cm. And finally, in the third group, a very considerable number of tunics, garments perhaps describable as a kind of long blouse or jacket, sometimes called a "poncho" by dress-historians (see e. g. fig. 13).

It should be noted, however, that by no means all the mummy cloths were in a state fit for analysis; about half the bandages and several tunics were in such bad condition that they had to be rejected, and several others whose details were merely repetitions were left out.

V. *Large Pieces of Cloth* (8).

Outermost wrapping cloth (No. 1), now 2 m. long and 1.05 m. wide. Two adjoining edges are torn off, so that the measurements are not the original ones in length or width. Along one side at the edge is a blue stripe, 2 cm. wide, interrupted on the inner side by five fine lines in brown. Along the end that remains in its original state is a narrow brown border consisting of 5 threads, as well as a fringe 8 cm. long, which ends in loops, being uncut. As shown in fig. 4, the adjacent warp threads continue into the fringe without knotting of any kind. Near the long side the thread count on an area of 10×10 cm. was: warp 250, weft 145, and in the middle of the cloth: warp 290, weft 145.



Fig. 4. Loops preserved in the fringe points on Rug No. 1.

VI. *Rug* (No. 11).

A regular piece of cloth with all its four original margins. The length is 2.10 m., the width 1.32 m. It has a coloured stripe of about 2.5 cm. along each side. The border is mainly blue, but interrupted inwards by narrow, reddish-brown lines. At each end

(8) In dealing with these textiles I have numbered them to correspond with the

unwrapping report in the Department of Oriental and Classical Antiques.

there is also a narrow, reddish-brown border, and here the warp threads emerge from the edge and form a kind of fringe 6-7 cm. long. The threads are not twisted together or knotted. In one fringe the loops are preserved, and they are formed of adjacent threads as shown in fig. 4. In the other fringe the thread ends seem to have been cut off. At the middle of the cloth two counts gave: warp 315, weft 150 and warp 325, weft 160, and at the outer edges warp 400, weft 170; warp 365, weft 170. All these counts were made within 10×10 cm.

VII. *Piece of a rug (No. 24)*,

cut lengthwise and torn across. The length is 2.24 m., and there is a fringe at one end, about 10 cm. long. The width is now 0.64 m. Down one side is a selvage, and inside it a blue border 1.5 cm. wide. At the middle of the cloth there are 170 warp threads and 155 weft threads in 10×10 cm. At the outer edge the count was 195 and 160. Here and there the fringe-loops remain.

VIII. *Piece of a rug (No. 27)*

of a rug like VII (No. 24) and no doubt belonging to it. The length is 2.36 m. and the width 0.40 m. One side and one end torn off. On the remaining side is a blue border 1.5 cm. wide; on the original end is a fringe about 10 cm. long formed of the emerging warp threads without twisting. Here and there the loops remain. At the middle of the cloth a 10×10 cm. area gave a count of 170 warp and 155 weft threads; at the outer edge 195 warp and 160 weft. The yarn is S-spun, both in warp and in weft; some of the threads seem to be two-stranded, but in many cases they are so fine that it is difficult to decide whether they are single or double threads.

IX. *Piece of cloth (No. 43)*

with both side edges torn off; on one side a single blue thread remains. Some torn-off strips with blue borders, used elsewhere as bandages on the mummy, presumably came from this cloth. The length is 2.80 m. and the width 1.12 m. At both ends are remnants of a fringe, but most is torn off. At one end a few loops remain. The thread count at the middle of the cloth is 225 warp and 145 weft threads in 10×10 cm., at the side 225 warp and 150 weft. The spinning is somewhat difficult to determine. The direction of the twist is left-about in both warp and weft, as is the rule, but a number of threads scattered about seem to be two-stranded. Here and there the cloth has been repaired in ancient time with a "twisted chain stitch" (fig. 10). This darning is not close and compact, for the rows of stitches lie parallel about 1 cm. apart.

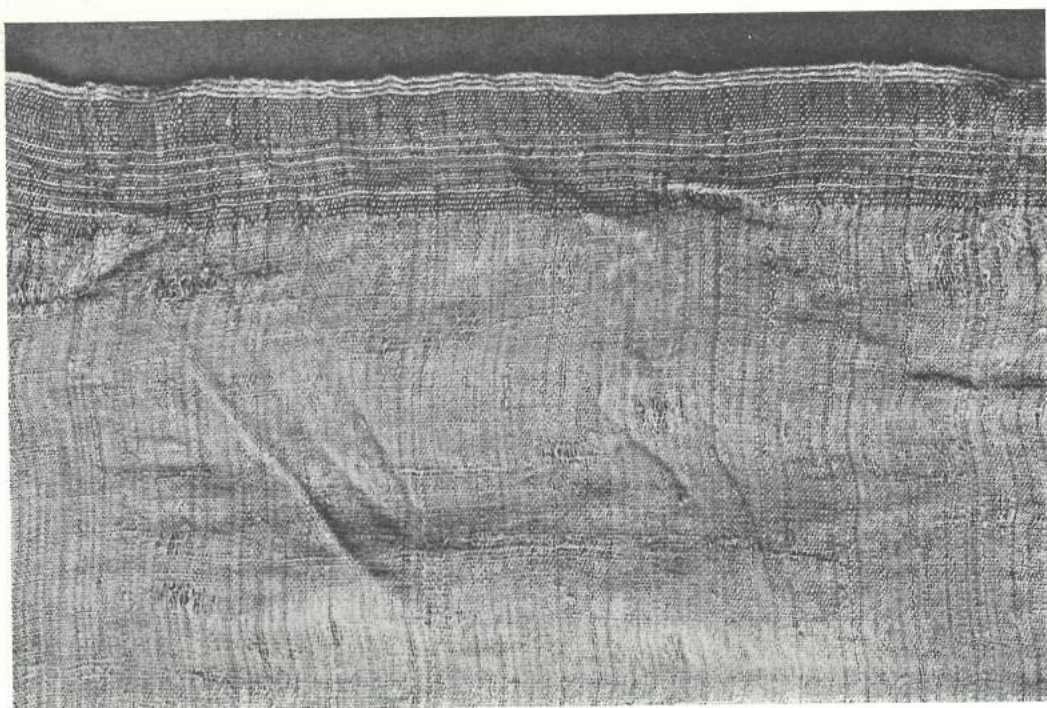


Fig. 5. Starting edge of strip No. 2 etc. belonging to mummy in the National Museum's Department of Oriental and Classical Antiquities, Copenhagen, N. 1038. Colours: red and blue on a light ground. Scale 1 : 1.

BANDAGES OR STRIPS.

It is evident that there is a resemblance between some of the bandages; and the specimens selected for description below are obviously from only four different cloths.

X. *Strips* (Nos. 2, 7, 30, 37, 45 and 65)

are all from one cloth. They all have a closed edge at one end and fringes at the other. Along both ends is a coloured border in red and blue, about 2 cm. wide.

Strip No. 2, the length of which is 5.56 m. and the width 0.17 m. Figs. 5 and 6 show the starting edge, where before ordinary weaving begins the warp-threads are first looped over three bundles of 4 weft threads each. The warp is so close that the fabric has almost the character of warp repp. This is illustrated by the thread count, 420 warp and 185 weft threads to 10×10 cm., an astonishing difference in these numbers. At one edge is a fringe 12 cm. long and considerably destroyed, though at a few places the loops seem to be preserved, as for instance where the black thread is inserted (fig. 7); but unfor-

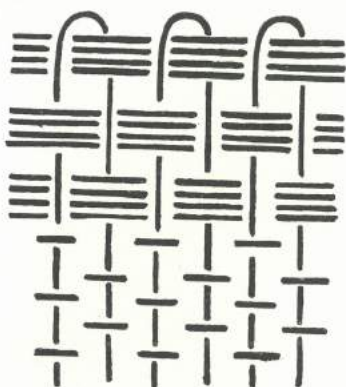


Fig. 6. Analysis of the starting edge of fig. 5.

tunately, the threads are so friable and ravelled that one cannot be certain. The yarn is very fine.

Strip No. 7, length 5.42 m., width 0.13 m. A thread count in 10×10 cm. gives 535 warp and 200 weft threads. One end of this bandage was cut off when the mummy was first unwrapped, but both pieces remain, so that the full size of the cloth can be measured.

Strip No. 30, which was severed at a few places when the mummy was first unwrapped, so that it is uncertain what the length was. The width is 0.14 m. Thread count: 425 warp and 185 weft threads in 10×10 cm.

Strip No. 37, is in two parts, 2.80 and 2.70 m. long, whereas the width is 0.20 m. Thread count: 425 warp

and 195 weft threads per 10×10 cm.

Strip No. 45, length 5.50 m. and width 0.16 m. Thread count: 435 warp and 175 weft threads per 10×10 cm.

Strip No. 65, length indeterminable owing to damage. The width is 0.21 m. Thread count: 455 warp and 160 weft threads in 10×10 cm.

XI. *Strips (Nos. 3, 6 and 10 are from one piece).*

Strip No. 3 consists of a torn-off band with a fringe at both ends. Length 3.40 m., width 0.15 m. The fringes are formed of the emerging warp threads and are neither twisted nor worked in any way. One length of fringe still has the loops; on the other it is impossible to say whether they are present or not. There is a narrow, reddish-brown border at each end. Thread count: 230 warp and 170 weft threads per 10×10 cm.

Strip No. 6 with a narrow, reddish-brown border and simple fringe at both ends. The length is 3.31 m. and the width 0.17 m. On one fringe the loops remain, but on the other it could not be seen whether the warp threads turn or not. Thread count: 280 warp and 150 weft threads per 10×10 cm.

Strip No. 10. Length 3.32 m., width 0.11 m. There is a narrow, reddish-brown border and at each end a simple fringe. Loops were observed in the points of one fringe, but not in the other. Thread count: 270 warp and 150 weft threads per 10×10 cm.

XII. *Strips (Nos. 4, 5 and 8 are from one piece).*

Strips Nos. 4 and 5 were originally one piece 4 m. long and 0.16 m. wide. They have a starting edge without fringe and formed in the same manner as shown in the drawing

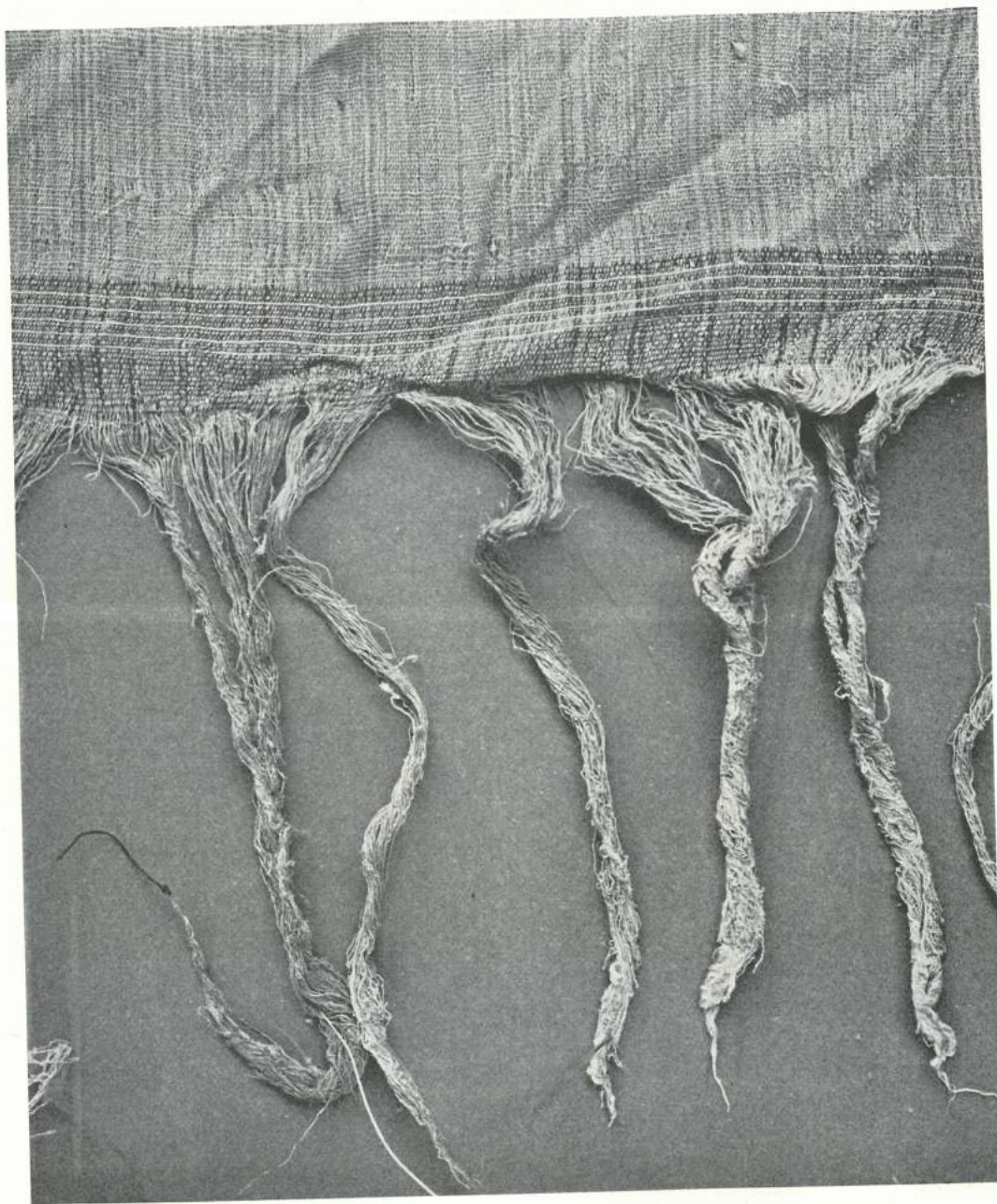


Fig. 7. Finishing edge on mummy wrapping No. 2, belonging to fig. 5. Scale 1 : 1.

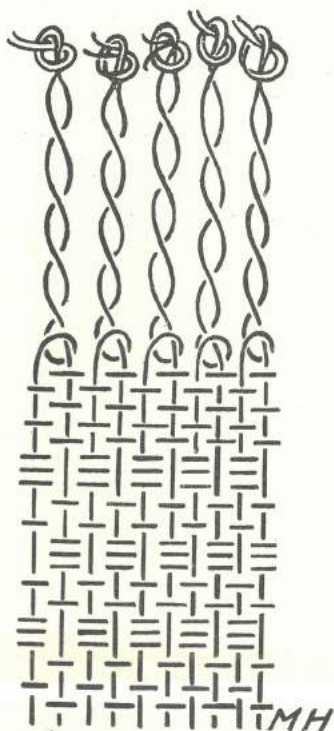


Fig. 8. Analysis of fringe and edge of Strips No. 4, 5 and 8.

fig. 6. Here the warp-threads turn round over the outer group of weft threads. The opposite end terminates in a fringe as shown by drawing fig. 8. Thread count: 230 warp and 185 weft threads per 10×10 cm.

Strip No. 8. This strip has a length of 4 m. and a width of 0.14 m. The thread count is 230 warp and 210 weft threads per 10×10 cm.

XIII. Strips Nos. 9, 17, 18, 29, 31 and 46

have a blue border and a fringe at each end and otherwise match in all their features; evidently they were once all one piece of cloth. (See fig. 9).

Strip No. 9. Length 3.52 m., width 0.15 m. The fringes are from 4 to 10 cm. long. They are in rather bad condition and it cannot be ascertained whether or not the points have ended in loops. At one end is a narrow, inwoven border of pale blue weft-threads alternating with yarn in natural colour; at the other end is a narrow, embroidered border in the same colours. The stitching is as shown in the drawing fig. 10, with so-called twisted chain stitches. The same stitch is used in darnings in

many other cases where there are mends in the mummy's wrappings. The yarn is very fine, and the warp is much thinner than the weft. The thread count is 570 warp and 235 weft threads per 10×10 cm.

Strip No. 17. Length 3.58 m. and width 0.15 m. To 10×10 cm. there are 475 warp and 220 weft threads. Here and there it is worn out and has been darned with twisted chain stitches of the kind shown in fig. 10.

Strip No. 18. This piece has been torn across and now has a length of 3.20 m. and a width of 0.22 m. It has darnings like those shown in fig. 10. Thread count: 435 warp and 240 weft threads in 10×10 cm.

Strip No. 29. Length 3.52 m. and width 0.15 m. Thread count: 485 warp and 255 weft threads per 10×10 cm. Places darned in the manner shown in fig. 10.

Strip No. 31. Length 3.50 m., width 0.23 m. Thread count: 485 warp, 255 weft threads per 10×10 cm.

Strip No. 46. Cut through several times when the mummy was first unwrapped, but the full length, about 3.50 m., is present. The width is 0.18 m. Thread count: 480 warp, 235 weft threads per 10×10 cm.

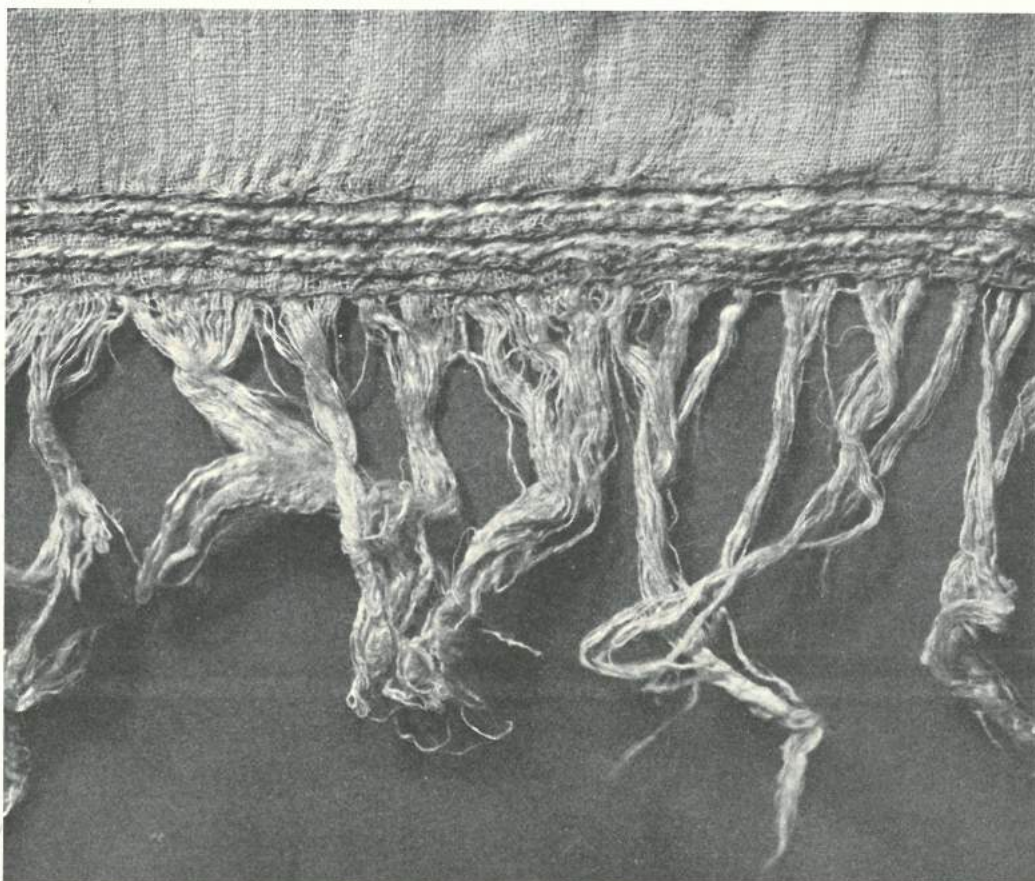


Fig. 9. Border on strips No. 9, 17 etc. belonging to mummy No. 1038. The sewing is in twisted chain stitches in blue and natural colours. Scale 1 : 1.

TUNICS.

There were eight tunics in a condition fit for analysis. Some were preserved in their original form, others had been divided down the middle. They are all made out of a rectangular piece of cloth folded across the middle and sewn at the sides. The only alteration made to the fabric itself is an opening cut for the head. The pattern shown in the drawing fig. 13 applies in principle to them all. The measurements are given when describing each garment (9).

(9) The Egyptiska Museet, Stockholm, has the half of a tunic corresponding exactly to those dealt with here. Darnings in the

same manner as show Fig. 10. It had no number.



Fig. 10. Analysis of darning on Strip No. 8. Twisted chain stitches.



Fig. 11. Analysis of sewing on neck opening and sleeve edge on the tunics.



Fig. 12. Tassel of fringe on tunic fig. 13.

XIV. *Tunic (No. 13 a and b).*

This garment is in two pieces, having been divided down the middle; moreover, one edge has been torn off. The whole length of the fabric used in this garment is 2.07 m., not counting the fringes. The width was originally 1.32 m. On the intact side is a selvage and a coloured border, about 2 cm. wide, mostly blue but interrupted with narrow, brownish stripes. The side seams are held by rather coarse overcast stitches, but at the height of the shoulders a slit about 20 cm. long is left open for the arm, and here the margin of the cloth is decorated with a handsome edging sewn in the manner exhibited by the drawing fig. 11. The stitches vary in colour every two or three mm. There is a similar edging sewn round the neck opening. Along the lower edge of the tunic is a fringe, 10 to 15 cm. long and as a rule formed of four threads. As the yarn is S-spun in both warp and weft, two and two threads in the fringe consequently turn to the right, while the last twist, comprising the four threads, again turns to the left. Where the warp threads emerge from the edge they are knotted, and here and there are other knots farther out on the fringe, placed according to the principle shown in

figs. 12 and 15. I was unable to find any loops in this fringe. Two thread counts gave: 210 warp and 110 weft, and 225 warp and 115 weft threads per 10×10 cm. On both pieces there are darns made with twisted chain stitches.

XV. *Tunic* (No. 20).

This was badly cut about when the mummy was first unwrapped, but all its parts are present. The whole length of the fabric measures 1.90 m., while the width had been 1.40 m. The side seams are now partly torn open, and the sleeve openings, which seem to have been about 16 cm. long, are not edged. It has the very same blue side border at the selvage, the same cut and the same edging at the neck as Tunic No. 13. The fringe along the lower edge of the garment is about 8 cm. long and provided with knots as shown in figs. 12 and 15. The thread count gives 280 warp and 160 weft threads per 10×10 cm. Here and there are darns made with the same kind of stitch as the borders at the ends of the fabric of fig. 9, the stitches lying in parallel rows at intervals of about 0.5 cm. over the worn places that were repaired.

XVI. *Tunic* (Nos. 21-22).

This garment was divided lengthwise into two pieces in antiquity, and moreover badly cut up when the mummy was first unwrapped. The length of the fabric is 1.86 m., and the woven width 1.30 m. Running along the sides are blue borders, on the inner side interrupted with reddish stripes; the arm-holes are about 20 cm. long and unedged, whereas the side-seams are held together by coarse whipping stitches. The shape of the neck opening is the same as that shown by the drawing fig. 13, and its edge is over-stitched as in the analysis fig. 11. The fabric had been much worn in antiquity and had been darned with stitches of the type shown in fig. 10. A faint brownish line can be seen along the lower edge, and the warp threads emerging from it are knotted and formed as shown in fig. 15, though no loops could be observed. Thread count: 240 warp and 155 weft threads in 10×10 cm.

XVII. *Tunic* (No. 23),

shown in fig. 13, is well preserved on the whole. The fabric is 1.70 m. long, the woven width being 1.28 m. Along both sides there is a 2 cm. blue border, and along the lower edge a very narrow, blue line. The side seams are joined with rather coarse overcast stitches, and at the top in the shoulder line an opening of 0.12 m. is left for the arms. This opening is not edged, whereas the neck opening has a handsome edging in blue

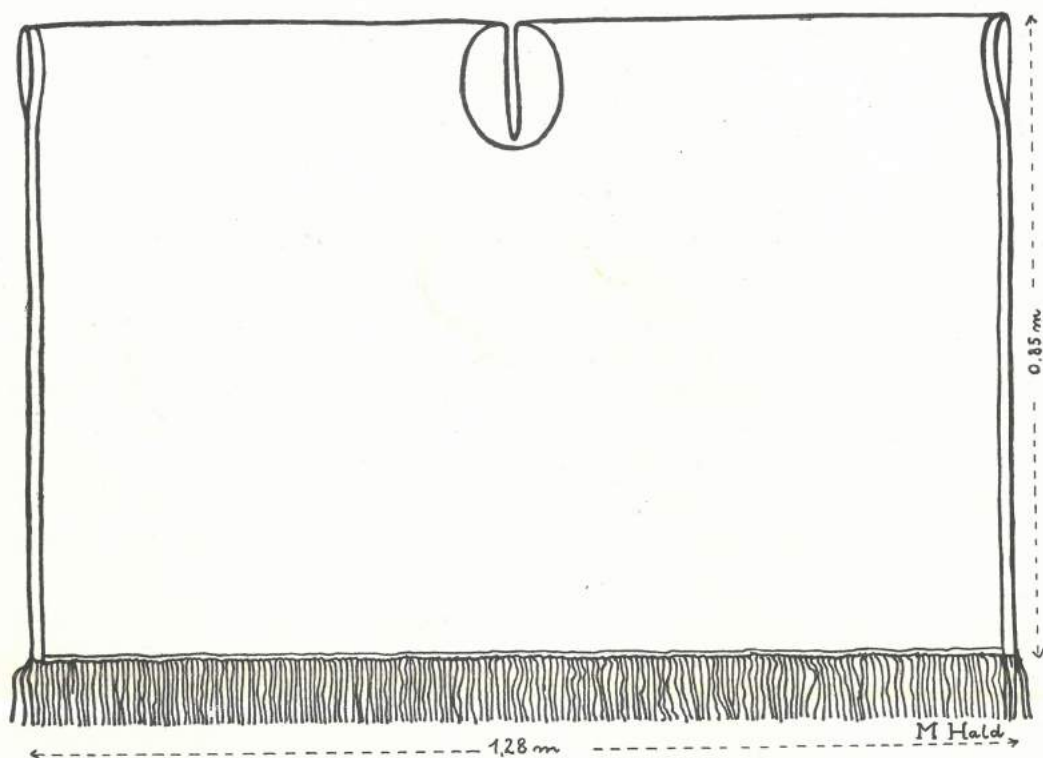


Fig. 13. Plan of tunic No. 23. Scale 1 : 20.

and natural colour yarns (see fig. 11). The ends of the fabric are finished off with fringes consisting of four warp threads knotted over the outermost weft thread, while again farther along the fringe there is a knot here and there (see figs. 12 and 15). I was unable to see any loops at the end of the fringe, which is considerably worn and damaged. Thread count: 310 warp and 155 weft threads in 10×10 cm. There are a few places darned with parallel rows of twisted chain stitch, (fig. 10).

XVIII. *Tunic (Nos. 25-26),*

divided down the middle and present in two parts. The length of the fabric is 1.60 m. and the original width was about 120 cm. Along the sides are blue borders 2.5 cm. wide. The side seams are formed of simple overcast stitches, whereas the 12 cm. slits left open at the top for the arms are edged with borders like those shown in the drawing fig. 11. There is a similar edging round the neck, which is cut in the same manner as on the tunic fig. 13. Below, the garment ends in a fringe about 10 cm. long and formed as shown



Fig. 14. Detail of tunic No. 39. The painted mark is the sign of life.
Scale 1 : 1.



Fig. 15.
Tassel of
fringe on
tunic
No. 41.

in the drawings figs. 12 and 15. No loops were observed at the end of the fringe. Thread count: 280 warp and 120 weft threads in 10×10 cm.

XIX. *Tunic* (No. 38),

damaged when the mummy was first unwrapped, but otherwise present. The length is 2.10 m., whereas the width is 1.29 m. At each side there is a blue stripe. The arm slits are about 12 cm. long. The neck opening is shaped like that on tunic fig. 13, and both here and round the arm holes the edges are sewn with the kind of stitch shown on the drawing fig. 11. There are several threadbare places which have been darned in antiquity, the same stitches being used as those shown in fig. 10. Along the lower edge is a narrow, pale blue border, and the depending warp threads form a fringe which is knotted in the manner illustrated in figs. 12 and 15, but I was unable to find any loops at the end of the fringe. Thread count: 220 warp and 120 weft threads in 10×10 cm.

XX. *Tunic* (Nos. 39-40),

divided down the middle. The length of the fabric is 2.04 m. and the width is 1.40 m. Along each side is a blue border about 2 cm. in width and interrupted inwards by stripes of the ground colour. The arm slits are 0.17 m. long and unstitched, whereas the neck opening is edged with stitching of the kind shown in fig. 11. The fabric is rather fine, but somewhat worn and darned in antiquity with twisted chain stitches, see fig. 10. At the lower edge the warp thread is knotted and forms a fringe (fig. 14) in the manner shown in figs. 12 and 15. There are no loops to be seen at the ends. Thread count: 275 warp and 155 weft threads in 10×10 cm.

XXI. *Tunic* (Nos. 41-42),

which also is in two parts, having been divided down the middle. The side edges are torn off. The length of the fabric is 2.04 m., and in its present state the width is 1.30 m. The cut and edging of the neck opening are the same as on the other specimens of the kind, see figs. 11 and 13, though in this case the stitching is in three colours, blue, brown and natural. Woven in along the lower edge is a narrow brown stripe, from which the warp emerges to form a fringe about 10—15 cm. long. It is knotted over the edge and otherwise formed as shown in fig. 15. One fringe still has its loops, whereas the other margin is unclear. Thread count: 210 warp and 105 weft threads in 10×10 cm.

XXII. *The Mummy Case.*

Samples taken from the mummy case are of a coarser fabric than the other cloths. The thread count is 250 and 85 in 10×10 cm. The higher figure presumably represents the warp density and the low one the weft.

TUNICS WITH SLEEVES.

I shall now turn to an examination of a number of tunics dating from the 3rd to the 6th century A. D.

As garments they differ from those described in the foregoing in that they have sleeves and that the neck opening consists of a horizontal slit that was not cut out but formed in the weaving. What is more, they are usually richly decorated with tapestry-woven borders or ornaments standing out in splendid colours in wool against the pale linen ground. I shall not discuss the ornamentation here, because if we are to find points of resemblance to the simple Scandinavian cloths of prehistoric times we must concentrate our attention upon the ground fabric.

It is an oft-recurring feature of these tunics that the width of the fabric forms the length of the finished garment, which means that the weft threads lie lengthwise and the warp across. As a general rule these tunics are of one piece of cloth, so that it must have been of considerable width, as indeed is the case. From their shape they have occasionally been called cruciform tunics.

We may now take one specimen that is a typical example of its kind.

XXIII. *Tunic from Akhmim.*

This garment (10), which is dated to the 3rd century A. D. (11), measures 230 cm. in width and 134 cm. in the original height. Fig. 16 gives an outline of its shape and shows the position in which the fabric was placed in the loom.

In weaving this tunic, a narrow section was first woven at the middle of the warp, thus producing one sleeve. Thereupon the weft was taken to the full width of the loom until there was sufficient for the piece of cloth required for the body of the garment.

(10) At the Kulturhistoriska Museet, Lund. Mus. No.: K.M. 27384.

(11) M. DIMAND: *Die Ornamentik der ägyptischen Wollwirkereien*, Lpz. 1924 pl. 1. Fig. 1.

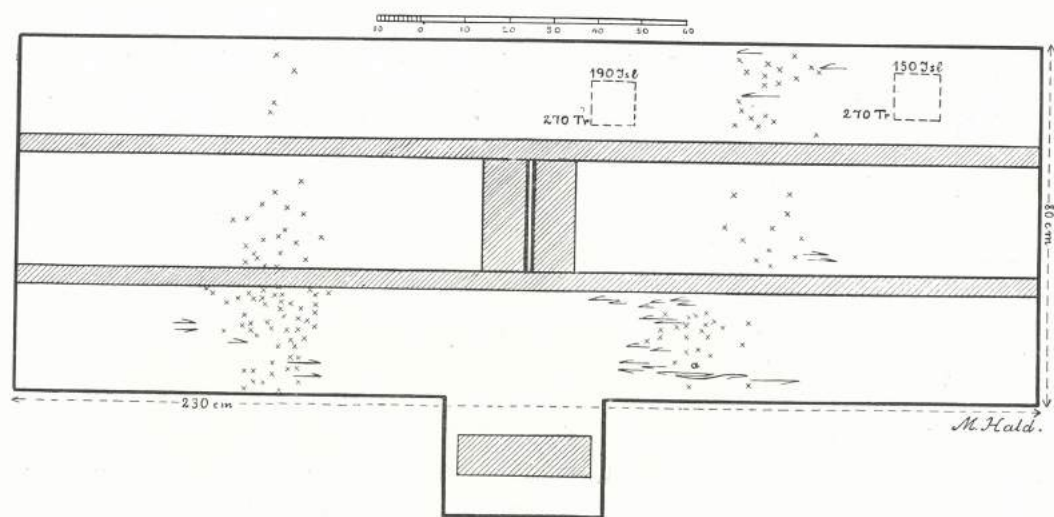


Fig. 16. Plan of tunic from Akhmim. Kulturhistoriska Museum, Lund.
Mus. No. K. M. 27384.

The selvage on the long side of the fabric forms the lower edge both back and front of the finished tunic, and the neck-opening is formed as a vertical slot with closed edges in the process of weaving, the weft threads being turned back at the middle of the warp and returning to the outer edges. Finally, when the second sleeve was to be woven, the weaving width was again diminished to measurements corresponding to those of the first sleeve. It can still be seen from several tunics of this kind that the selvage is in the seams along the under-sides of the sleeves. When the weaving was completed there were only two seams to sew, up along the sides and out under the arms. On the drawing fig. 16 one sleeve is omitted, because it had been torn off the tunic; the other measures 27 cm. in length and 34 cm. in width.

Regarding the shooting of the weft this tunic has certain peculiarities. For example, in various places the weft is turned back. At one place, *a* for instance, there is a group of such turned wefts and they seemed to have formed a double wedge. Furthermore, on the drawing are marked a number of crosses signifying points of intersection of weft threads meeting in the same shed and continuing in the next. These intersections, which look like fine little cross-stitches in the surface of the fabric, occur so often that it is impossible to mark them all off in the plan, but they are assembled in groups situated approximately as shown. Presumably they are to be interpreted as signs that several weavers — in this case three — worked together at the same loom, a theory that is quite credible having regard to the fact that the weaving width is 230 cm., a distance which of course exceeds what one weaver could reach and requires that one person either must

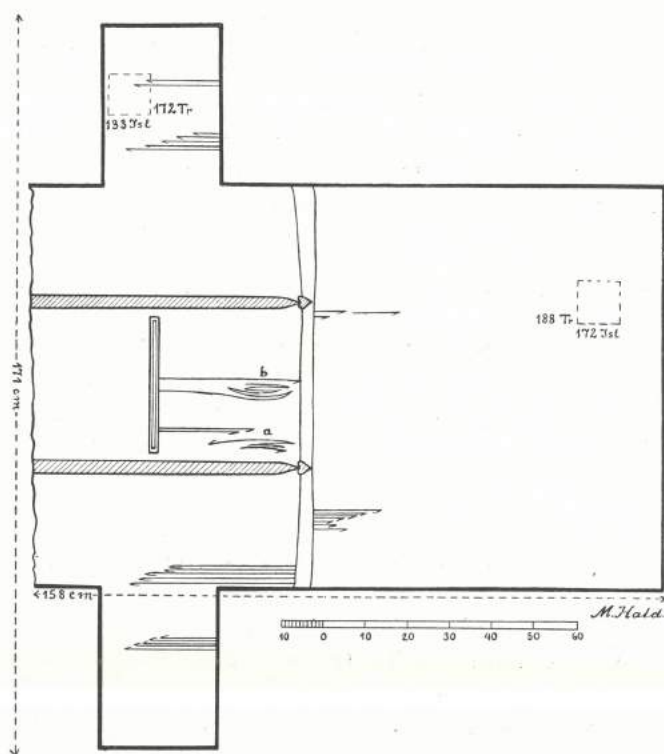


Fig. 17. Plan of tunic from Akhmim. Kulturhistoriska Museum, Lund.
Mus. No. K. M. 27381.

move along from side to side or have assistance from others. The thread counts will be seen from the plan, where the placing of the handsome bluish grey borders with animal and plant ornamentation is indicated by hatching.

XXIV. *Tunic from Akhmim* (12).

There is no dating for this tunic (fig. 17). In the records of the Kulturhistoriska Museet it is referred to in one place as a priest's garment of the time before the present era, whereas in another it is a woman's dress from Akhmim. It differs from the foregoing tunic in that the neck hole has a stitched and turned-over edge. And none of the weft threads are crossed. But there are rather many turned and returning shoots, and from the drawing it will be seen that in several places these lie in groups. At a and b they have almost the character of double wedges.

(12) At the Kulturhistoriska Museet, Lund. Mus. No. K.M. 27381.

At almost waist height there is a fold in the fabric which shortens the length of the weft by about 8 cm. At the right side the original edge is damaged, but at one place the turn of the weft is preserved and the cloth here has retained almost its full width. Part of the left side is omitted from the plan. Unfortunately, the starting and finishing edges are in a state unfit for analysis. The sleeve length is about 40 cm. and the width of the shoulders about 91 cm.

XXV. *Fragment of Woven Fabric from Panopolis* (13).

This piece measures 63×24 cm. and gives the impression of being part of a tunic like the two foregoing ones. Lengthwise there is a dark border in tapestry-like weaving, and at one place in the linen ground there are turned and returning shoots. In an area lying at about the middle of the cloth is an assembly of intersected weft threads.

XXVI. *Tunic from Akhmim* (14).

This garment, shown in the photograph fig. 18, is dated by the ornamentation in purple wool to the 4th-5th century A. D. In its plain-woven ground some stripes are formed by the insertion of double threads, and the ornaments are placed in line with them. The outlined areas marked c and d on the drawing fig. 19 show the situation of the ornaments. In this case they are applied, perhaps transferred from another tunic which was worn out. It may possibly be thought less well chosen to present a specimen of which ornament and ground fabric are not organically related, as there can thus be no complete certainty that both elements came from the same kind of implement; but there are so many other examples of a similar kind, where the decorations are woven direct in the linen fabric, and where the same weaving peculiarities are present, that there can be no doubt as to the correctness of the combination.

This tunic was fabricated along exactly the same lines as that on fig. 16. The sleeves are not drawn on the plan fig. 19, but their situation is indicated by the letters a and b. The left margin of the fabric is now torn off, but it is probable that the part of the garment to the left of b-j originally corresponded to the piece between b and i, in which case the total width of the shoot was about 260 cm.

(13) At the Kulturhistoriska Museet, Lund. Mus. No. K.M. 27408. Said to have been purchased at Munich of G. Kitzinger.

(14) At the Kaiser Friederich Museum, Berlin. Mus. No. 9918. Publ. by WULFF und

VOLBACH: *Spätantike und koptische Stoffe aus ägyptischen Grabfunden*, Berl. 1926, Cat. No. 10829. Pl. 70. Text p. 44. Here the fabric is described as "späthellenistisch".

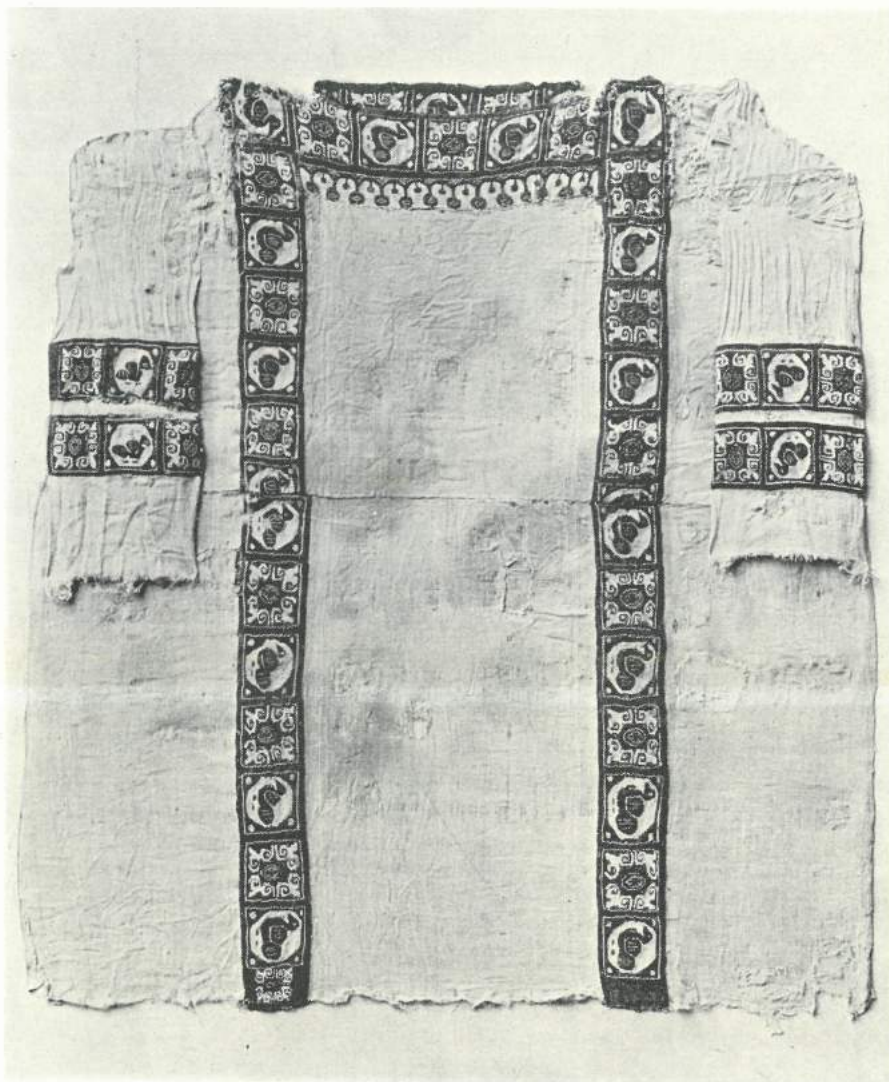


Fig. 21. Coptic tunic. Kaiser Friedrich Museum, Berlin. Mus. No. 9692.

at the vertical margins, 25 in 1×1 cm. at the right edge and 23 near the neck opening, which must also be regarded as a kind of margin, being a selvage. In the area between the count is lower.

The fabric is rather uneven; at places the warp is fairly open, whereas at others it seems to have been compressed into stripes.

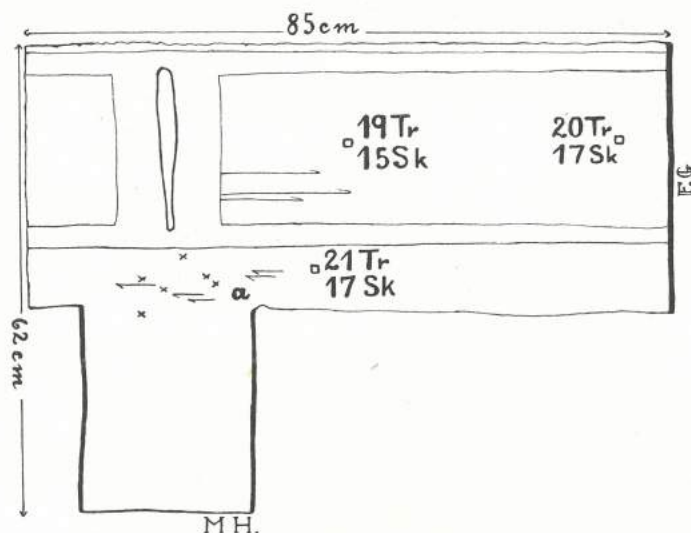


Fig. 22. Fragment of tunic, Kaiser Friedrich Museum, Berlin.
Mus. No. 9104.

XXVII. *Coptic Tunic* (15).

The dates ascribed to the tunic on fig. 21 do not agree. According to a communication from the Kaiser Friedrich Museum the specimen, which was purchased at Akhmim, is from the 4th-5th century, but Wulff-Volbach places it to the 6th-7th century (16).

It has purple borders and is of the cruciform type. The length from the lower edge to the shoulder line is now about 80 cm., though this measurement does not represent half of the width of the shoot, as the original side edge, which should now form the lower edge of the garment, is torn off. Across the front of the tunic in an area below the neck opening are numerous turned shoots, and outside the border (on the left in the picture) there are turns in both directions. At the same side, about 18-28 cm. from the torn edge, is a weaving wedge. On the right side of the picture there are shoot intersections at three places (between the vertical border and the border on the sleeve, which is folded inwards). This section must represent the limit between the widths woven by the different weavers, and doubtless there are other intersections elsewhere; the fabric was unsuitable for thorough examination, however, being sewn on to a backing, for which reason the back of the garment was not analyzed at all.

Thread count: 21 warp, 17 weft threads in 1×1 cm.

The garment is about 73 cm. wide.

(15) At the Kaiser Friedrich Museum, Berlin. Mus. No. 9692, No. 17524.

(16) According to WULFF-VOLBACH: *Spätantike und koptische Stoffe* p. 62 pl. 83.

XXVIII. *Fragment of Coptic Child's Tunic* (17).

This is a fragment of a tunic woven in a similar manner. Judging from the position of the intersected shoots (see fig. 22) the total width of the shoot was about 140 cm. As the drawing shows, there were also a number of turned shoots. The selvage is preserved in the edges of the sleeves and on the right side of the fabric. It is probably a child's tunic. The length of the sleeve is about 26 cm. and its width 23 cm.

The ground fabric is of flax and the ornaments of red and green wool.

XIX. *Fragment of Tunic* (18).

This is only a part of the garment, consisting of one sleeve and the portion around the neck opening. The drawing fig. 23 shows how much is left. Between a and b, h and g the margins are selvage, and the sewing together of these selvages forms the sleeve, which is 32 cm. long and 27 cm. wide. The neck opening is marked with k, and from i and j run two woven motives in red wool.

It is evident from this tunic that the cloth cannot have been woven in one piece, because in the line between c and d there is a selvage to which another piece of cloth must have been sewn; the margin e-f is torn off. Consequently it is impossible to determine the original width of the shoot.

There are large numbers of turned and returning shoots in the fabric. On the photograph 1 r. 24, which gives a detail in enlargement, are extraneous threads which I have inserted in the area at l on the plan for the purpose of visualizing the lie of the threads. Here the Δ is the point of a wedge. I was unable to find any intersections on the weft threads, however. As a matter of fact, the width of the fabric being only about 52 cm. there was no reason to expect to find any. If there were any originally, they

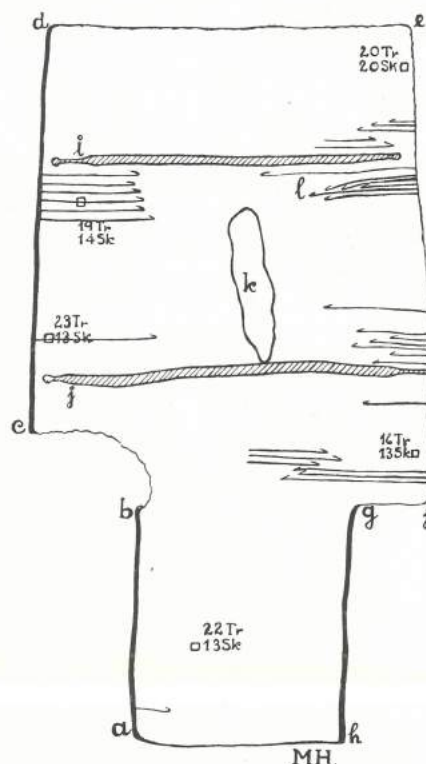


Fig. 23. Fragment of Coptic tunic, Kaiser Friedrich Museum, Berlin. Mus. No. 9985.

(17) At the Kaiser Friedrich Museum, Berlin. Mus. No. 9104. WULFF-VOLBACH l. c. p. 113, pl. 114. Dated to 5th-6th cent. A. D.

(18) At the Kaiser Friedrich Mus., Berl. Mus. No. 9985. From the Bock Collection.

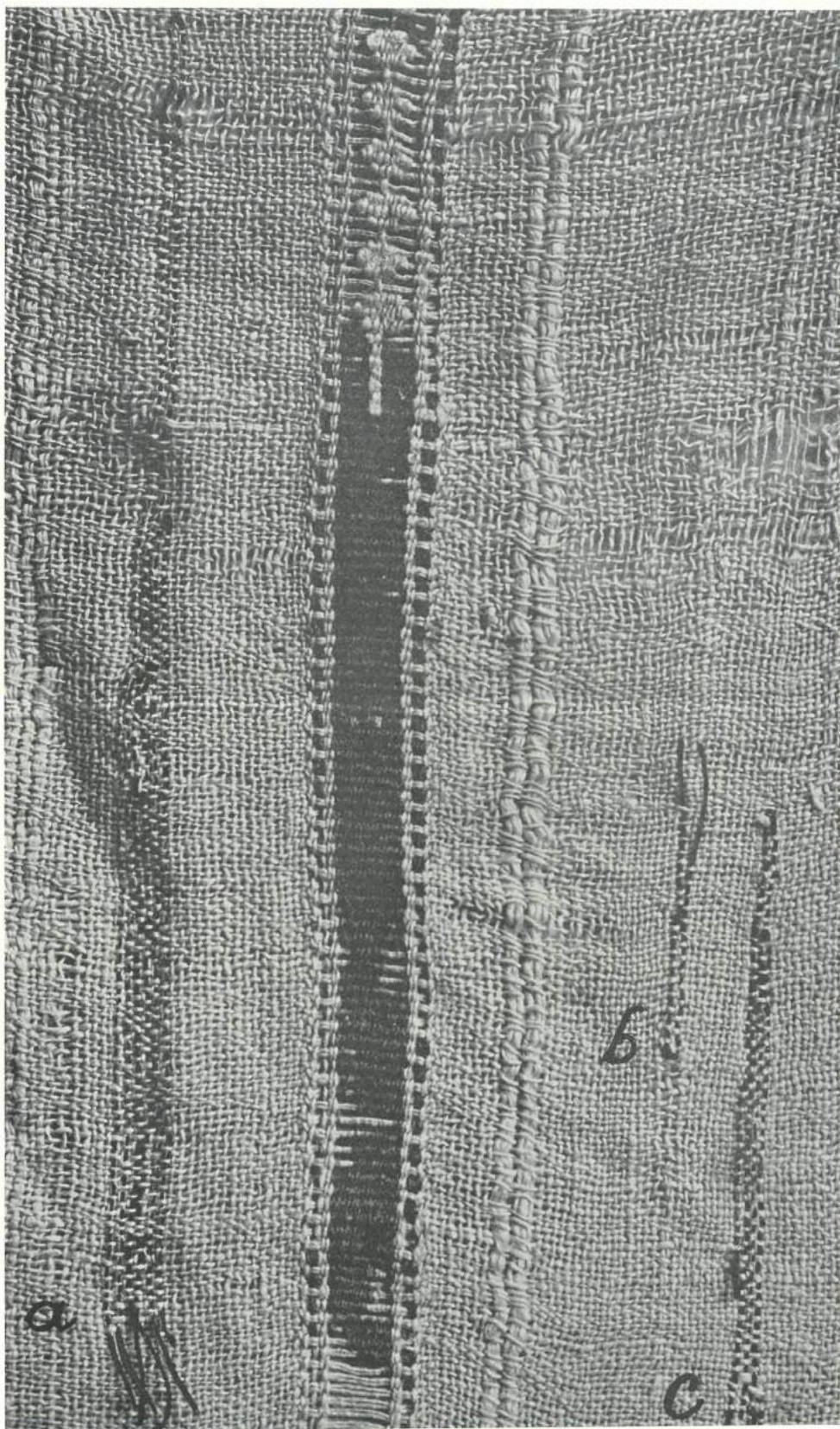


Fig. 24. Detail with weaving wedges, enlarged. Tunic No. 9985. The area at l. See fig. 23.



Fig. 25. Tunic from Antinoë. Kaiser Friedrich Museum, Berlin.
Mus. N. 9935.

would presumably have been on the right of the torn edge. The sleeve length is 32 cm., the sleeve width 27 cm.

The material of the ground fabric is flax, whereas the pattern is woven with red wool. The fragment is stated to be Coptic, but no more exact dating is given.

XXX. *Child's Tunic with Sewn-On Sleeves* (19).

Considered as a type, this garment fig. 25 is very different from the foregoing tunics, for the material was cut to shape, with the consequence that there are no natural weaving edges. The cloth was cut with the warp threads running longitudinally. Gores are inserted in the sides and increase the width considerably. Although the fabric is very closely woven from a firmly spun linen thread, it can be seen that there are both turned shoots and intersected weft threads. At about the middle of the fabric a thread count gave 23 warp and 16 weft threads in 1×1 cm.

This tunic, which is ornamented with tablet-woven bands with a slender pattern, is said to be Coptic; it is believed to have come from Antinoë and from the style is considered to betray Persian influence. There is uncertainty about the dating, but the garment is believed to be rather early.

XXXI. *Tunic from Antinoë* (20).

Dated to the 6th-7th century, this garment is rather like the foregoing, for it has long gores in the sides, as well as tablet-woven borders at the neck and down the front as well as at the ends of the sleeves. The borders were not woven together with the fabric, but applied.

It is now in bad condition, but intersected weft threads can be seen here and there.

DANISH EARLY BRONZE AGE CLOAK

After this examination of Egyptian textiles of various periods, the natural course would seem to be to do the same with a selection of prehistoric Danish cloths for comparison. This would be superfluous, however, as any reader interested in all the details of Danish Bronze Age weaving will find full descriptions of it in "Costumes of the Bronze Age in Denmark" (21). In the present paper I will confine myself to the presentation of a single piece of

(19) At the Kaiser Friedrich Mus., Berl. Mus. No. 9935. Bock Collection 1887. Figured Bildwerke d. christl. Epochen.

(20) At the Kaiser Friedrich Mus., Berl., Egyptian Dept. Nos. 14232 and 9922.

WULFF-VOLBACH, l. c. p. 136 pl. 123. Referred to there as Coptic.

(21) H. C. BROHOLM and MARGRETHE HALD: *Costumes of the Bronze Age in Denmark*, Copenhagen & London. 1940.

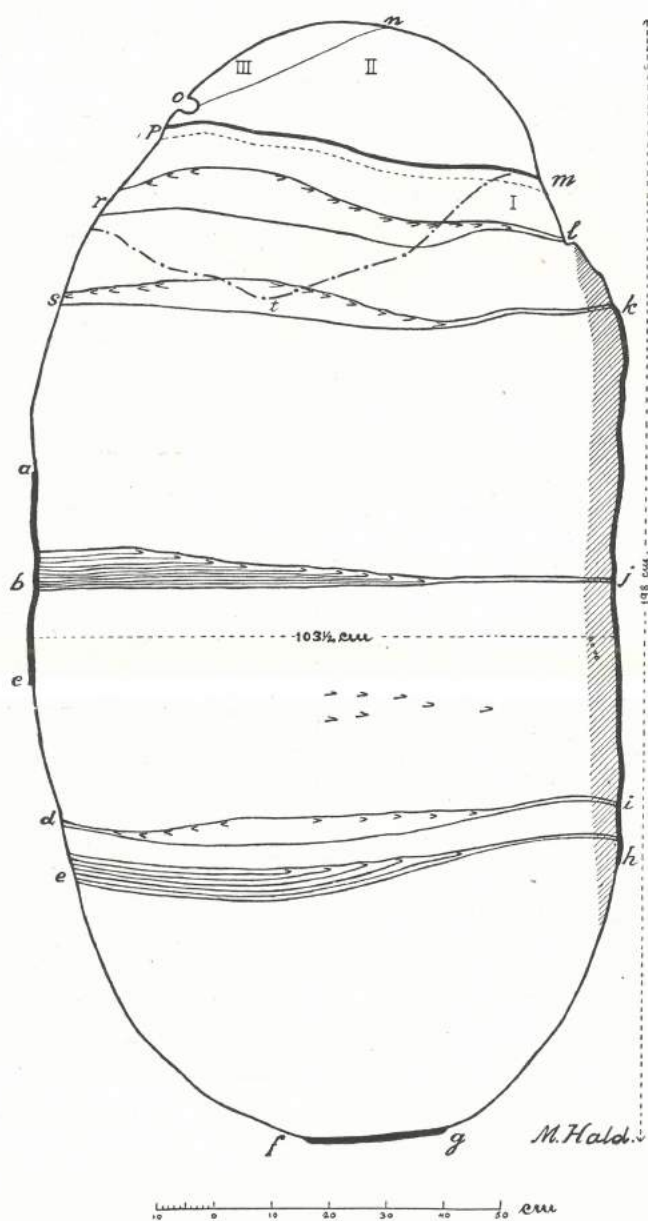


Fig. 26. Plan of man's cape from Borum Eshøj, Jutland.
Early Bronze Age. National Museum, Copenhagen.

fabric from our antique material, which has the very peculiarities to which our attention has been devoted here.

It is a man's cloak, found in Borum Eshøj near Aarhus and dated to about 1400 B. C. The drawing fig. 26 shows its shape and measurements. The material is dark brown undyed wool. The yarn in both warp and weft is spun to the left, and the fabric is in plain weave. The thread density varies a good deal. In one square centimetre there were:

- | | |
|--|------------------|
| 1) At the rounded part near f | 30 warp, 35 weft |
| 2) Where the rounded part ends at c (left edge) | 43 „ 26 „ |
| 3) Where the rounded part ends at h (right edge) | 43 „ 25 „ |
| 4) Where the rounded part begins at a (left edge) | 42 „ 26 „ |
| 5) About the middle opposite a | 32 „ 23 „ |
| 6) A little distance from the round part at l (right edge) | 41 „ 21 „ |
| 7) Near the needle holes (right edge) | 45 „ 23 „ |
| 8) In the largest of the sewn-on pieces (II) | 33 „ 33 „ |

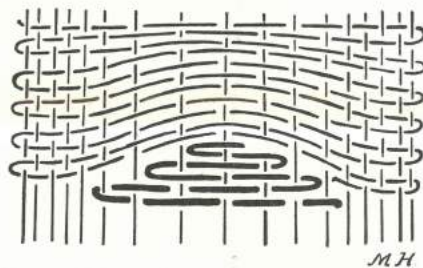


Fig. 27. Schematic rendering of double wedge.

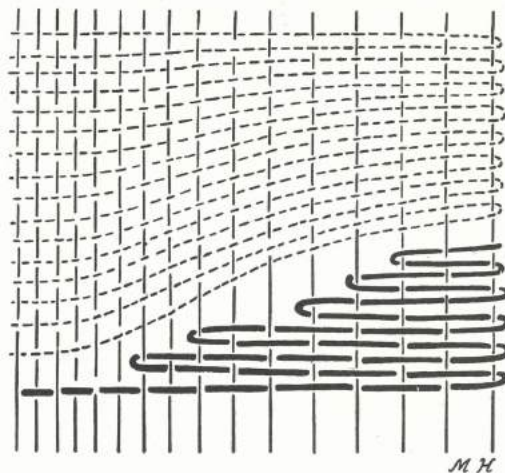


Fig. 28. Schematic rendering of single wedge.

Thus the tendency is for the warp threads to be closest at the outer margins of the cloak and more open in the middle; also, where the warp is closest the weft density is usually least. The importance of this must not be overlooked, for presumably this is the explanation of the weaving wedges whose situation is shown on the drawing. These phenomena call for some further discussion, although they are mentioned briefly page 51.

In Danish prehistoric fabrics we thus often observe weft threads which do not extend the full width of the cloth, but bend round some distance into it and run back to the side from which they start. At times such threads are sporadic, but frequently they are in groups and form wedge-shaped areas. When they lie in the surface of the fabric and taper out to both sides I have called them *double wedges*. Examples will be seen on the plan fig. 26 between d-i, s-k and r-l. But when they begin at the edge of the fa-

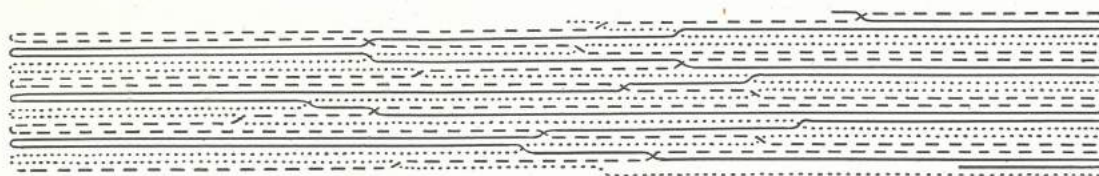


Fig. 29. Schema of intersections in weft. After *Costumes of the Bronze Age in Denmark*.

bric and taper off inwards, I call them *single wedges*, of which examples will be seen between e-h and b-j. The small wedge-shapes marked are intended to show where the weft threads turn back. The explanation of the presence of these weaving wedges is as follows: It is a common experience in weaving generally that when ample room is provided between the warp threads there is so much space for the weft that it is easy to beat up; and conversely, we see that it is difficult to get the shoot to close up firmly when the warp threads are close together. Now if the weaver has been unlucky enough to lay his warp unevenly, the weft will, gradually as the work proceeds, pack itself more and more unevenly and will form a bent or perhaps even a wavy line. In the end the work cannot go on; something must be done to even it out. The natural course will be to try to fill up the "trough of the wave", and so one weaves in the trough until the weft line is straight again and the work can continue in the ordinary manner. See the diagrams on figs. 27 and 28. I should add, however, that uneven warp tension will have the same consequence.

In the cloak from Borum Eshøj we find another peculiarity already observed in the Egyptian tunics, i. e. the intersections on the weft threads which look rather like small cross-stitches. These are not drawn on the plan, but they lie predilectively at about the middle of the cloak in the median line, so that they signify a division of the weaving area. This occurs very frequently in our Bronze Age weaving and also in the fabrics from our bog finds, which presumably date from the subsequent period.

It is possible to demonstrate a varying number of intersections per shoot; it is true that there is only one as a rule, as in the present fabric, but cases of three or four are not unknown. It is natural to interpret this as being the result of two or more people having worked together at the loom. We must assume that the loom was primitive and the accessories few. No doubt the shoot had to be inserted slowly in between the warp threads by hand alone, or perhaps with the aid of a stick or the like. It would thus be reasonable to share the work among several people,

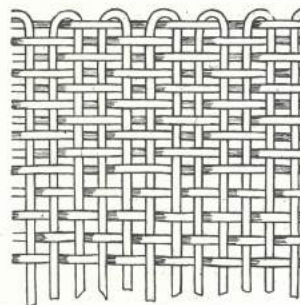


Fig. 30. Starting edge of the Early Bronze Age cape from Borum Eshøj, Jutland.

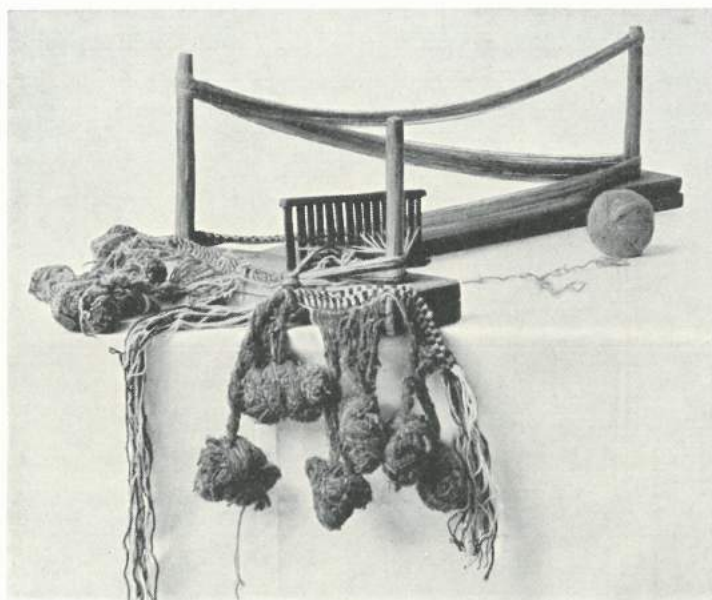


Fig. 31. Warping apparatus used by the Lapps in Northern Scandinavia.
After E. von Walterstorff.

but the advantage would be small if the one had to wait to receive the shoot from his neighbour. Accordingly the field of operations had to be divided up into sections, one for each weaver, and each one has shot his thread as far as the limit of his neighbour's section; they then exchanged threads and continued in another shed. This caused the "cross-stitches", and from their number in the same shed one can decide how many people worked on the loom at the same time. Sometimes one can even see that there is a varying number of intersections in the shed in various parts of the fabric, which must mean that the number of weavers varied according to time and opportunity. See fig. 29.

At the lower margin between f and g on fig. 26 there is a starting edge, i. e. a separate length of narrow weaving in which the warp threads are woven in before weaving proper commenced. In other words, this edge signifies a constructive member of the fabric. The analysis is shown on fig. 30.

Starting edges are to be found on a group of Scandinavian fabrics, and the manner of their fabrication seems to have been made quite clear by means of a warping apparatus (22) found in use among the Lapps in our own time in conjunction with the vertical loom, the use of which in Scandinavia has been proved at any rate in the

(22) EMELIE V. WALTERSTORFF: *En Vävstol och en Varpa. Fataburen* 1928, p. 143.

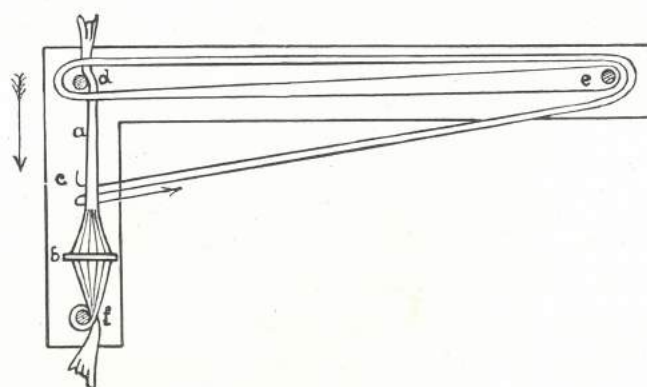


Fig. 32. Diagram of the course of the threads in the warping apparatus of the Laplanders. a: Warp of the braid. — f, d, e: pegs. — c: shoot. — b: heddle frame. — After *Costumes of the Bronze Age in Denmark*.

Late Roman Iron Age by the finding of loom weights in archaeological excavations (23). The picture fig. 31 shows the apparatus. Laid between the two pegs on the short side is a collection of threads forming the warp in band weaving, which is carried out with a heddle frame. The weft threads are turned in the usual manner on the outer side of the band, but on the inner side they continue in long loops which run round the pegs. When the band is as long as the woven fabric is to be wide, the entire warp arrangement is transferred to the loom, where it is placed along a beam at the top of the loom so that the long threads hang down. This concludes the preparatory work, and weaving can begin.

COMPARISON.

One outstanding feature of the Egyptian fabrics described in the foregoing is that from a handicraft point of view they are very skilful products, and the homogeneity which stamps them all indicates firmly established, old traditions. The expertness of the spinning of which they bear witness is in itself quite impressive; to take one example alone: the very earliest of the fabrics mentioned (about 2400 B. C.) is so fine that in some areas it has 550 warp threads in 10 cm. Nevertheless, this is scarcely the point on which Egyptian textile art is par-

(23) GUDMUND HATT: *Jernalderbopladsen ved Ginderup i Thy. Fra Nationalmuseets Arbejdsmark* 1935, pp. 41 and 50, fig. 11. —

Jernalderhus paa Mors. Aarbøger f. nord. Oldk. og Hist. 1930 pp. 103-108, fig. 24-25.

ticularly superior to the Scandinavian; for although our Bronze Age cloth must be characterized as thick and coarse, woven of very uneven yarns, the fine threads in the plush surface on some men's caps provide the evidence that in Denmark the art of spinning was mastered to perfection in the Early Bronze Age (24). The fact that our fabrics were not made from thin yarn may presumably be put down to other circumstances, for example that what was wanted in a cold climate was just this thick, warm cloth. On the other hand, it may also be that the skill of the weavers was not a match for the dexterity of the spinners, and that the weaving implement or implements with which they had to work were too primitive for producing any finer cloth.

There is another point, however, on which the Egyptian fabrics differ from the Scandinavian. This is the ratio between warp and weft densities, a feature which seems to be constant. For example, the earliest of the Egyptian fabrics described has a warp count of 550, whereas the weft count is 200 in 10×10 cm., and Strip No. 17 has 570 warp threads and 235 weft threads in the same area, or between two and three times as many warp threads as weft threads in a square. In the Danish Bronze Age fabrics the warp threads are in the majority too, but not nearly to the same extent. An instance may be quoted of the fabrics in the Skrydstrup find, in which we have the following figures: 44 warp and 32 weft; 47 and 30, both in 10×10 cm., but there are also examples of 41 and 40, and of 37 and 36 (25). Here the mutual proportions are almost equal.

The only piece of cloth in Danish finds that agrees with Egyptian weaving on this point came from a grave at Lousgaard, on the island of Bornholm. It has 500 and 220 threads in 10×10 cm., but the specimen is a very late one, dating from 7-800 B. C.; and as moreover it was probably imported, it is not exactly suitable for comparison.

The disproportionately greater warp density may have been due to the absence of a reed for keeping the threads apart. This is suggested by still

(24) H. C. BROHOLM and MARGRETHE HALD: *Costumes of the Bronze Age*, p. 18.

(25) Compare all the diagrams of thread density in the Bronze Age fabrics in *Costumes*

of the Bronze Age in Denmark pp. 160-163. See also the table of counts in the cloak, fig. 26 p. 80.

another feature, i. e. the varying densities in various parts of the warp. Here and there it can be seen that the warp threads over a certain area are very close, followed by an area where they are more open; this would scarcely have occurred had the loom been provided with a reed to keep the warp threads regularly distributed.

How large a piece of cloth the Egyptians were able to weave is a question only partly answered by our material; because it is only when both selvages of a fabric are present and the warp threads have closed loops that we can be certain that a piece of cloth is whole. Neither the rugs nor the tunics provide evidence of this, and as far as I can see, there is nothing to show that these fabrics were not woven in series on a common warp. In this respect we are best served by the long strips which did duty as bandages for Mummy No. 1038, on one of which (that shown on fig. 7) I believe there are warp loops at the terminal border. Unfortunately, this observation is not quite definite, as the threads are stuck together so much that we must reckon with an element of uncertainty. Still, there is this to be said about the lengths of these bandages, that they are fairly constant between over 3 and over 5 metres, which presumably gives us a kind of standard measure. There seems to be no practical reason for choosing to use just these lengths for the purpose, having regard to the enormous number of metres of bandaging on every mummy, and many single lengths would have to be used in any case. More likely the limit was determined by the length it was possible to have on the loom at once.

Our material gives us no reason for assuming that the Egyptians laid their warps in a manner corresponding to the method described on page 82. But it does include a few examples of starting edges in which the warp turns lay immediately over the first weft threads; what is more, these edges also have the character of borders, as they are generally marked by a different colour. Nevertheless it is not possible to decide if they were made separately during the warping; but at any rate the weaver aimed at strengthening the margin of the fabric by laying several threads side by side in the same shed at the commencement, and then proceeding with the use of a single thread. See figs. 5 and 6.

Among Egyptian mural paintings and miniature models depicting textile

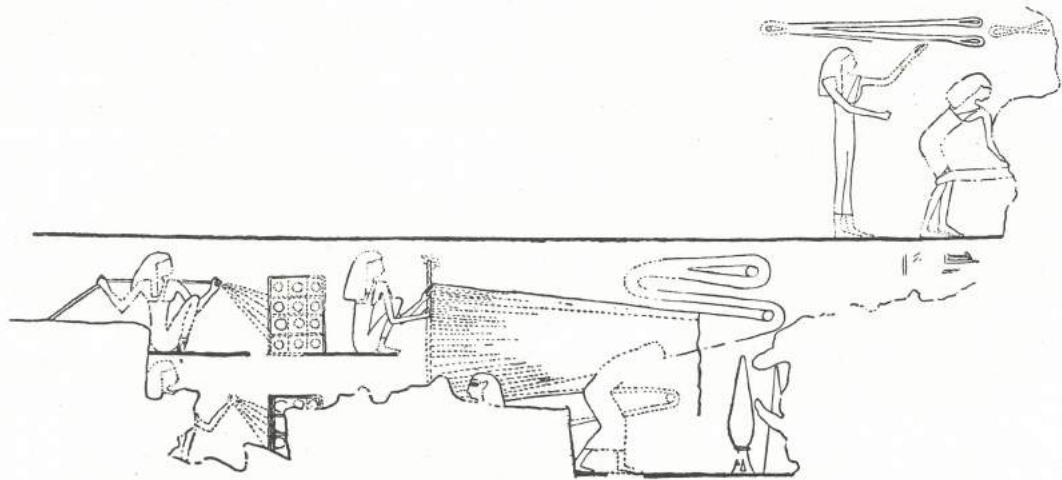


Fig. 33. Laying the warp, shown on a wall painting in the tomb of Tehuti-hotep, 12th Dynasty.

work are some representing warp laying. From these we can see that sometimes the weaver simply laid warp threads about three pegs (see top right on the picture from the tomb of Tehuti-hotep (26), fig. 33); in addition, however, the same mural painting seems to indicate two methods of laying the warp, for its lower part shows the warp being laid over a rod at one end and over three pegs at the other. The rod was presumably intended to do the work of a beam on a loom, or perhaps — if it is slender — to be laid along a beam and lashed to it. The warp loops are present at both transversal margins, but it is another question whether they were cut or retained during the work in the loom. If the former were the case the original length of a piece of cloth could not be determined, for it would then be impossible to see whether the cutting might not just as well have been secondary to divide the finished fabric. On Rug No. 11 (see page 55) the warp loops are present in the ends of one fringe, which is 6-7 cm. long. It is quite imaginable that thread loops of this length lay around a beam on the loom, but here again this unfortunately tells us nothing of the original length of the fabric.

(26) Tomb of Tehuti-hotep (dated 12th Dyn.). The illustrations here reproduced from C. H. JOHL: *Alt-ägyptische Webestühle*, Leipzig 1924, pp. 15 and 16.

H. LING-ROTH: *Ancient Egyptian and Greek*

Looms. Bankfield Museum Notes. Second Series. No. 2, 1913, p. 12. PERCY E. NEWBERRY: *El Bersheh I* pl. 26. *Archaeological Survey of Egypt III*, London 1895.

Among prehistoric Scandinavian fabrics a composite piece of cloth which was laid about the body in the Skrydstrup grave as a skirt or shroud has the longest woven length we know, i. e. almost 4 metres. Here again, however, the warp threads are cut at one end and it is impossible to say whether the full length is present or not.

As a rule the material provides better information as to the width of the fabrics. The Egyptian garment shown in fig. 2 is 1.20 m. wide, and the rugs and tunics of Mummy No. 1038 are up to 1.40 m. wide. Actually it is only when we get up to the 3rd century and afterwards and find tunics with body and sleeves in one piece that we see woven widths so considerable as 2.30 and 2.60 m. It is obvious that one person cannot reach from edge to edge of a fabric of this width, so it is understandable if several people worked together. I have already said that where there are intersections on the weft threads, these must be taken as evidence that this was the method employed. So far the only fabrics on which I have observed intersected weft threads were the sleeved tunics dated from the 3rd to 7th century A. D., which seems to suggest that the phenomenon was late in occurring in Egypt. It may be purely accidental that no really wide fabrics of the earlier periods were available for my investigation; the occurrence of an intersection, on the other hand, is not pre-conditioned by particularly wide fabrics, for we find it in Danish fabrics dating from the Bronze Age of widths right down to about one metre; for instance, as already pointed out the cloak on fig. 26 has intersections on the weft threads. Two people worked together on this cloth, perhaps not of necessity but because it happened to be the custom, and the method was pursued as a matter of habit. These intersections, however, are more than numerous in our widest fabric, a rug from Muldbjerg (27), which measures 2.11 m. The probability is that at least three or four people worked on this cloth in the loom at the same time. As it bears obvious traces of fulling, we must reckon with a certain shrinkage in that process, so that in all probability it measured about 3 metres in width on the loom.

There is still another peculiarity in the shooting of the weft in Danish

(27) *Danske Bronzealderdragter* p. 228, and
Costumes of the Bronze Age in Denmark, pp. 22

fig. 18. See also the blanket from Egtved.
Costumes p. 77, Fig. 97.

material which we find again in the Egyptian fabrics. Occasionally we encounter weft threads which do not pass through the full width, but turn back here and there and reach the edge from which they started. There is already an instance of this in a linen fabric that is dated to about 2100 B. C. (fig. 1). Beyond this, however, my impression is that on the whole the mummy bandages have few irregularities, and in the fabrics belonging to Mummy No. 1038 I found neither woven wedge-shaped areas nor anything like them. The weaving wedges occurred in the tunic shown in figs. 2 and 3 (about 1250 B. C.), and in the cruciform tunics of so-called Coptic time they must if anything be described as common.

On the whole the liberties taken with the weft in these garments is worth noting. Even the ornaments carried out in tapestry weaving are actually not unlike weaving wedges, for in making them the weaver selects the part of the warp to be decorated and then carries the pattern threads, which are of different coloured wools, freely to and fro, sometimes even along lines that are not at right angles to the direction of the warp. When the ornamented area was finished, the weft thread of the ground fabric had to run to suit and fill up the adjoining spaces, which often was impossible except by working in arcs or curves. This freedom from adhering to what was regular and traditional as seen in the weaving wedges was as it were taken up, or if you will developed in the ornamentation and evolved into a kind of deliberate technique which looks primitive but refreshing.

Turning now to considerations of chronology and summarizing what has been said above, we must first and foremost dwell upon the curious fact that these peculiarities in the weaving, *weaving wedges and weft intersections*, common as they are to both Danish and Egyptian fabrics from prehistoric times, seem to be of earlier date in Scandinavia, for, as so often stated, they occur in Danish fabrics dated to the middle of the 2nd millenium B. C. According to our material the wedges in Egypt make their appearance about 1250 B. C. but are common in Late Antiquity, whereas I have found weft intersections only in fabrics later than the 3rd century A. D. As it is scarcely contestable that these are really primitive features, this is strange. The idea that the Egyptians, who in very early times possessed a weaving art that must be

characterized as highly developed, should later have acquired more primitive methods from the North seems absurd, even if we are quite well aware that they may have been exposed to influences of many kinds under the sovereignty of changing foreign rulers in the period round about the beginning of the Christian era. But then, what is the explanation? Can it be that refined weaving, from which the aristocracy obtained the products it desired, was superseded by the growth of a folk craft which became the bearer of a rich ornamentation and yet was capable of retaining certain primitive features? If that were the case, those features would never have disappeared quite; and if they rarely or never are seen in the early fabrics, the reason would be that it was not the clothing of the lower class that accompanied the dead into the grave. It is a difficult problem, and I feel tempted to submit one or two more examples in the world of textiles that suggest a rather surprising connexion with the North.

Take "sprang" for instance, a plaiting technique known in Denmark in the Early Bronze Age but apparently making its first appearance in Egypt in the 4th-5th century A. D. (28). As I have explained its technical points previously (29), I shall briefly say that sprang is usually plaited in a frame in which one set of threads is stretched vertically round a pair of thin cross-bars or two tightly stretched horizontal cords in the frame; the cords are fastened at the two ends and the product is built up from above and below at the same time, being finished off in the horizontal middle line.

The female garments from Borum Eshøj and Skrydstrup — dated to about 14-1500 B. C. — include caps of sprang (fig. 35), and there was also one of these caps in a bog find at Arden in North Jutland — supposedly from the transitional period between the Bronze and Iron Ages. In these caps we have represented a pattern that is common among Coptic plaiting. The material preserved in Egypt, however, is much more comprehensive and richly nuanced

(28) The specimen shown on fig. 34 is dated to the 4th-5th cent. A. D. and belongs to the Vic. and Alb. Mus., London. Cat. No. 602. Register No. 762/1886. See A. F. KENDRICK: *Catalogue of Textiles from Burying*

Grounds in Egypt, Lond. 1921, p. 89, pl. XXX.

(29) *Cost. of the Bronze Age in Denmark*, p. 137. *Aarb. f. nord. Oldk. og Hist.* 1935 p. 36-40.

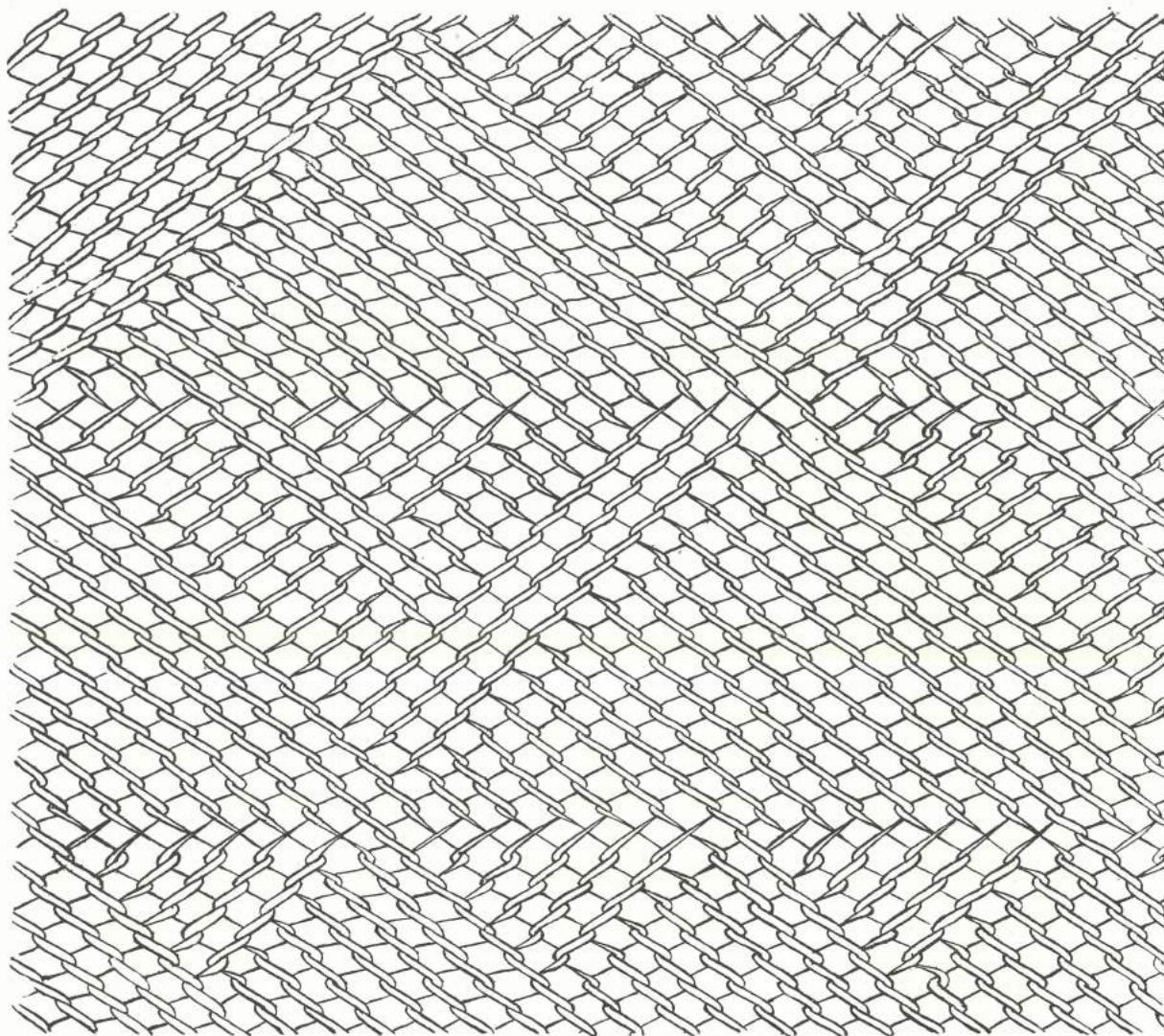


Fig. 34. Analysis of Egyptian "sprang" work from Akhmim, 4th-5th cent.
Victoria and Albert Museum, London.

M. Hald

than the Scandinavian, and judging from the beauty of the specimens left to us the technique seems to have been a great favourite among the Egyptians. This, however, is not the point at issue in the present context, but the fact that in time there is a space of nearly two thousand years between the products in the two regions, and evidently it was the Egyptians who acquired the technique

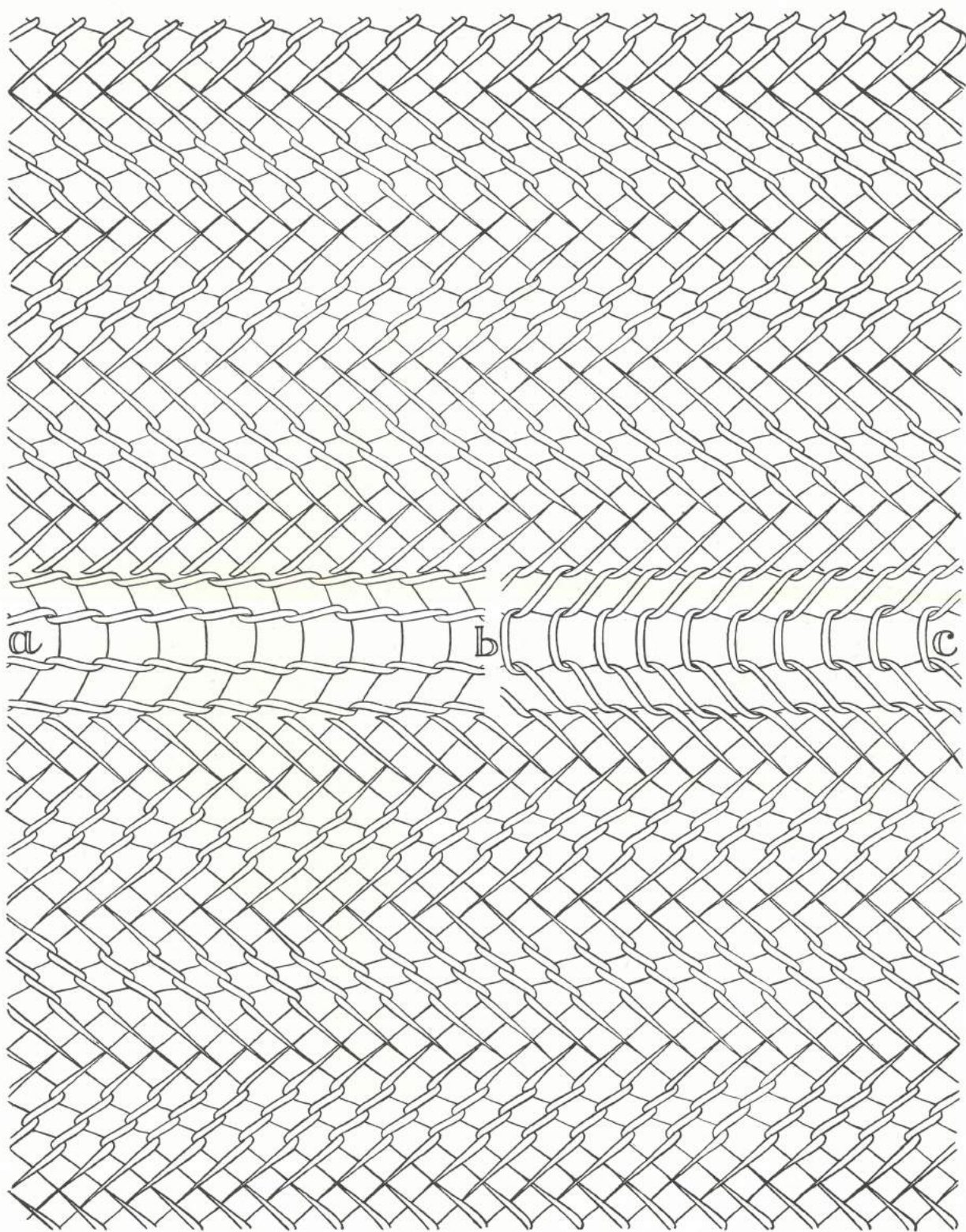


Fig. 35. The pattern in a "sprang" cap, Early Bronze Age, found at Skrydstrup, South Jutland.
National Museum, Copenhagen.

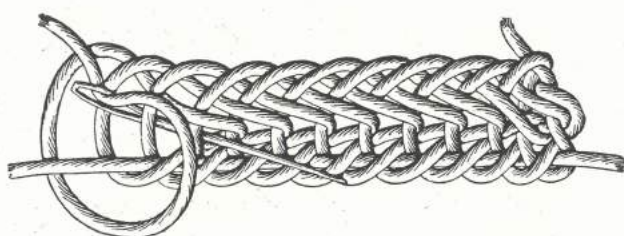


Fig. 36. Analysis of the sewing named "Naalebinding" in the Egyptian sock. After L. Schinnerer.

we need; but on Greek pyxides and vases of the 5th century B. C. there are pictures of women occupied on tasks at small frames. These have previously been interpreted as weaving implements, but in his publication "*Altgriechische durchbrochene Arbeit*" (30). J. Six is skeptical about this explanation and considers that they are more likely plaiting frames, in which I am inclined to believe he is right. But in any case, the Greek evidence of the existence of sprang-work is about a thousand years later than the Scandinavian. This is remarkable, but the lack of Greek material prohibits deeper investigation into the question.

There are also points of resemblance between Northern European and Egyptian textiles that are almost contemporaneous. For example there is a rather special sewing technique which in Scandinavia is usually spoken of under the name of "Naalebinding". It may be described as a kind of sewing, which gives the impression of having been evolved out of the buttonhole stitch, see fig. 36. The thread is run in a spiral, and it is possible to make quite a number of variations more or less complicated. Products of this technique have been unearthed in Egyptian 4th-6th century finds, and a well-known specimen is a stocking (31) published by Louise Schinnerer in the 1890's. Within the Scandinavian area a Swedish bog find provided the earliest prehistoric work in this technique, for in 1921 a stitched mitten was found in Åsle Bog in Vester Götland, and the variation in the technique it presents is certainly no primary stage; indeed, the Åsle mitten exhibits a higher step in

last. How and whence they received it is scarcely determinable now, but there is no small probability that it was introduced to them by the Greeks. I admit that we have no textile material from Greece to give us the information

(30) J. SIX: *Altgriechische "durchbrochene Arbeit"*. *Jahreshefte des österreichischen Institutes in Wien*, Vols. XIX-XX 1919, p. 162 fig. 106.

(31) LUISE SCHINNERER: *Antike Handarbeiten*, Wien 1890's pp. 22-25 figg. 28-32.

technical development than the Egyptian stocking described by Mrs. Schinnerer. Dr. Arbman dated the Swedish mitten to the 1st-2nd century A. D. (32).

CLOTHING

Himation.

In conclusion, a few remarks on the garments examined. Presumably this group must comprise the rectangular pieces of cloth referred to on pages 55-56. Their dimensions are such that the length is between 2 and 2.80 m., whereas the width seems to have been about 1.30 m. These are measurements that might well be suitable for rugs and sheets. The find provides us with no information regarding the original purpose of the cloths, as they were merely used as packing material for Mummy No. 1038; however, it is not improbable that they were a part of a dress and may be identified as the garment known to the Greeks as the *himation*. This consisted of a rectangular piece, richly folded, worn as an outer garment. It is thought to have been adopted for the clothing of the Romans in a very closely related garment passing under the name of *pallium* (33).

Tunics.

The two kinds of tunic in our Egyptian material must be described as poncho types; one has sleeves, the other has none. The latter, consisting merely of a straight piece of cloth folded horizontally across the middle, has many representatives in the coffin of Mummy No. 1038, which dates from the first or second century A. D. The garment shown in fig. 2, dated to about 1250 B. C., is another of the same kind. In principle these garments are so simple that they seem to represent the limit of extreme simplification as far as man-made clothing is concerned. The type has a very wide range in both time and space and it would be futile to essay the drawing of any limits. Nevertheless, there is

(32) H. ARBMAN and ELISABETH STRÖMBERG: *Åslevanten. Nordiska Museets och Skansens Årsbok* 1934 p. 67.

(33) LILLIAN M. WILSON: *The Clothing of the Ancient Romans*, Baltimore 1938, p. 80.

room for certain variations, as indeed is suggested by even our small material. We see for instance a round, cut-out neck opening with an adjoining slit, and a vertical neck opening formed of a cut parallel with the warp of the fabric. The proportions of the garment are also variable to some extent: Tunic No. 25 (page 64) is only 80 cm. long and No. 38 (page 66) 104 cm. long, whereas that on fig. 2 measures 140 cm. There is greater uniformity in the widths, that of the specimen on fig. 2 being 120 cm. and of all the Roman tunics between 120 and 140 cm. In every case the edge of the arm-hole reaches right down to the forearm, or even to the wrist of the wearer. We must assume that a girdle was worn to gather the voluminous folds. It is possible that in this great width we have evidence that these tunics are oriental, or at any rate from a warm region. In a cold climate it is obvious that people would prefer a garment that fitted the body more closely, and in fact the only garment in a Danish find having the same form — an undatable poncho from Rønbjerg Mose in Jutland — measures only 91 cm. across, and even then it is roomy compared with other Danish clothing.

The Egyptian sleeved tunic, sometimes called the cruciform tunic and a common element in late-antique finds, is a good deal more elaborate in its design and its execution in the loom. True, it would not require much ingenuity to provide the already familiar form with two pieces of cloth at shoulder height to act as sleeves, and there is ample evidence that this idea was hit upon at an early date here and there, but its execution is not so elegant as in this case. Even the Danish Bronze Age women's jacket with sleeves, which was a very well-fitting poncho, having been cut out of one piece of cloth, is less peculiar. The Egyptian cruciform tunics, on the other hand, received their special form in the loom itself. They were woven according to an exact pre-arranged plan (see description page 67), and I imagine it will be easy to agree that this modelling must be regarded as a secondary phenomenon; for there must have been a prototype — most probably of felt — to inspire what I am tempted to call a sophisticated form of weaving. It is an idea that would not suddenly occur to the weaver, and the inventor of the cruciform tunic would undoubtedly be very well versed in the art of weaving before he embarked upon the production of a garment like this; and yet, there is a primitive

stamp about it just the same, the weaver working in limited areas of the warp just as in wedge weaving and in the ornamentation.

By the way, the problem of the original provenance of the cruciform tunic seems to be unsolved so far. A cruciform tunic is reported to have been discovered at Palmyra (34) which is believed to date from the 2nd century A. D.; but presumably its prototype goes much farther back in time, for even in the tomb of King Tut'ankhamun, which is dated to about 1350 B. C., there was a sleeved tunic (35) with elements suggesting Syrian origin or at any rate Syrian influence; and though it is not clear whether the sleeves, now torn off, were sewn on or woven on originally, its proportions, viz. a width of 95 cm. and a sleeve length of about 35 cm., display an unmistakable likeness to the later cruciform tunics. From the dimensions of the cruciform tunic it can be judged that the sleeves were intended to come no farther down than to the underarm, and on the other hand the shoulder breadth is so great that the body of the garment would reach almost from one elbow to the other. If now we compare the measurements and plans of cruciform tunics described in the foregoing, it will be found that their mutual dimensions almost correspond.

In 1933 a smock-like blouse was found in Reepsholt bog in Friesland which, judging from the shape and the manner of its making, must be described as a cruciform tunic (fig. 37); here again we find great width in the part intended to cover the body and a relatively short sleeve, which as already said I consider to be a sign that the garment is of southern or oriental character; and although the Friesian smock is woven of darker, coarse wool and as regards the quality seems to be adapted to a colder climate, the tunic on the whole seems to me to be quite un-northern; and indeed for the present it stands alone in the textile material that has been preserved in our latitudes.

The garment came from a bog, and there were no other objects by which to date it. From certain technical details however, I am inclined to believe that

(34) According to G. M. CROWFOOT and N. DE G. DAVIES: *The Tunic and Tut ankhamun. The Journal of Egyptian Archaeology*, Vol. XXVII 1941. H. PFISTER's paper: *Les textiles du tombeau de Toutankhamon, Revue des Arts*

Asiatiques tome XI, fasc. 4 1937, is not available in Denmark at the time of writing.

(35) l. c. fig. 1 and p. 127.

(36) H. A. POTRATZ: *Das Moorgewand von Reepsholt*, Hildesheim 1942.

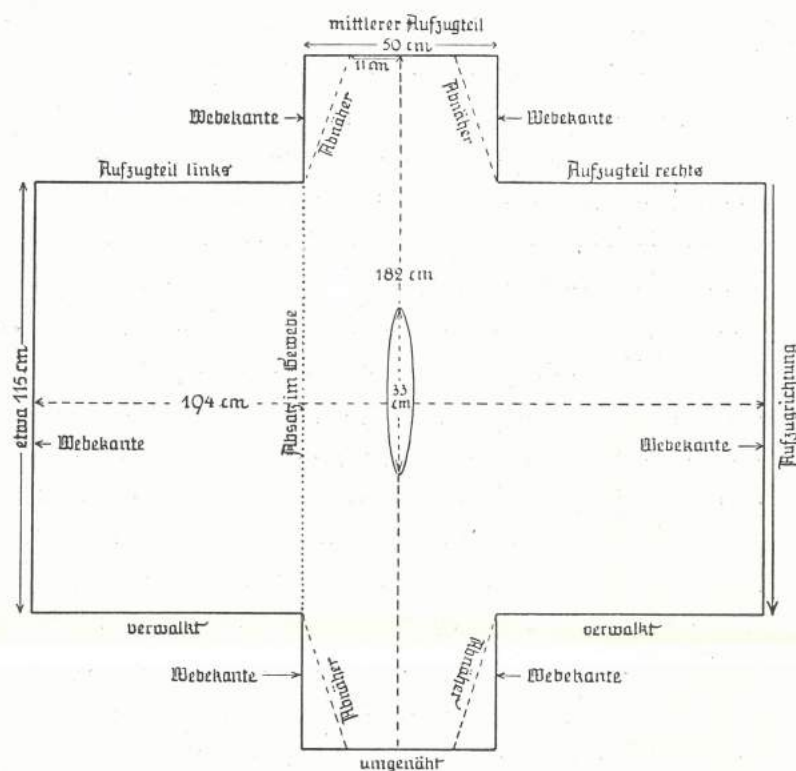


Fig. 37. Plan of cruciform tunic, unearched from Reepsholt Mose in Friesland.
After H. A. Potratz.

it was Roman in time; it can be placed to about 200-400 A. D. and even if it is naturally prudent to take every reservation having regard to its isolated position, I am tempted to present the hypothesis that it was brought by the Romans or made locally to a Roman prototype or on Roman initiative. Perhaps it would be venturing too far to conclude that the long-sleeved tunic said to have come into use among the Romans a couple of centuries into the Christian era (37) was in fact this cruciform tunic, and from pictures and sculptures it is scarcely possible to read the fine details that signify the difference between this and the tunic with sewn-on sleeves (see below). On the other hand, investigators (38) seem to be agreed that it was the cruciform tunic —

(37) POUL NØRLUND: *Klædedragt i Oldtid og Middelalder*. Nordisk Kultur, Stockholm 1941,

15 B. p. 30.

(38) LILLIAN M. WILSON: *The Clothing of*

the prototype of the dalmatica — and it is quite credible that the Romans, who must have had much to see to within their wide empire, in their travels carried culture elements from one extreme limit of their possessions to the other.

Finally, a few words about the third type of tunic in our material. It is shown on fig. 25, and we see that it actually is an example of a garment with long sewn-on sleeves. The arm-hole was not cut out or shaped, the sleeve being attached to the body by means of a single straight seam, so that it must be regarded as a poncho just like the cross tunic, except that it has sleeves that narrow down towards the hand.

There is a considerable difference between the lower parts of the two garments, however. In the tunic with sewn-on sleeves there are gores in the side seam which increase the width very greatly. However, there can hardly be any doubt but that in this type of tunic we have the origin of the *Alba*, a liturgical vestment which is continuous at the middle and with no seams at the shoulders, has sleeves sewn on with a straight seam, and gores inserted from the waist line to the lower hem.

To my knowledge these features are not to be found in Scandinavian prehistoric garments, though we do encounter something like them in a mediaeval Danish garment found in Kragelund Mose in Jutland. But there is still clearer similarity to a shirt belonging to a mediaeval man's clothing discovered at Skjoldehamn, North Norway (39).

Concluding Remarks.

Whereas it seems credible that a cultural impulse from the south is expressed in the two different forms of sleeved tunics, it would seem that the opposite is the case as regards the distribution of a technical element like

the *Ancient Romans*, Baltimore 1938, p. 56.
MARGARETE BIEBER: *Entwicklungsgeschichte der griechischen Tracht*, Berlin 1934, pp. 40-42, pl. 46 and 47.

J. BRAUN: *Die liturgische Gewandung*, Frei-

burg 1907, p. 299.

(39) GUTORM GJESSING: *Skjoldhamndrakten. En senmiddelaldersk nordnorsk mannsdrakt. Viking* 1938 p. 27 fig. 1 and 2. Compare with J. BRAUN: l. c. p. 75 fig. 28.

Sprang, Naalebinding and certain weaving peculiarities; but for the present we lack the material to clarify the question of whether these were cultural impulses transmitted through many contacts between Northern Europe and Egypt, or an influence from a common source; perhaps it would even be futile to anticipate any solution from the textile material itself, because the perishable fabrics have been lost. It is not impossible that archaeology sooner or later may come to our aid in some other way, and perhaps it may not be out of place in conclusion to recall that in Scandinavia's Bronze Age and in the time of the old Empire in Egypt there were folding chairs which in form and technical manufacture come so close together that archaeologists (40) do not consider them as parallel phenomena but assume that they are evidence of a cultural connection. If this, however, should prove to be correct, we may also be entitled to assume that a similar connection has been between the ancient textile-work of Egypt and Scandinavia.

The thread counts are indicated on the drawings by a square, with the count-figures appended. Tr = warp, Sk = weft.

(40) OLE WANSCHER: *Nordische Klappstühle aus der Bronzezeit*, *Artes VIII* 1940, p. 185. H. C. BROHOLM: *Danmarks Bronze-*

alder II, pp. 110 and 220. — Similar chairs have also occurred in Cretan finds.