Textiles and Textile Production in Europe
from Prehistory to AD 400

edited by

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Foreword

Lotte Hedeager and Kristian Kristiansen

Over the last 10–15 years, textile studies have moved from being a specialised niche at the academic periphery towards the centre stage of archaeological and historical research. This book, originating from the Danish National Research Foundation's Centre for Textile Research (CTR) at the SAXO Institute, University of Copenhagen is a testimony to the sustained and systematic efforts behind such a development. Furthermore, it is a major contribution to the expanding field of textile research, just as it adds yet another publication to the Oxbow Ancient Textiles Series, which has opened up the field to the non-specialist. Beginning with the major synthesis 'Ancient Textiles: Production, Craft and Society', which took the reader around all important aspects of textile production and consumption in the ancient world, as handed down through texts, iconography and archaeological finds, this most recent book addresses the archaeological traces of textile production and consumption during the Bronze and Iron Ages in Europe. The overview is systematically organised country by country, and each chapter is structured according to the same plan, beginning with chronology and cultural history and then moving on to a discussion of the archaeological evidence of textiles and their production.

It will be an invaluable guide for the increasing number of archaeologists who understand the central role played by textiles, their production, distribution and consumption during later prehistory. Compelling new evidence from strontium isotope analyses of textiles is now for the first time able to trace the origin of textiles, and the first results from the well-known Huldremose woman's dress, a bog sacrifice from Denmark, demonstrate that some of the materials for clothing and the woman probably originated outside Denmark. New studies of textile technologies are also increasing our understanding of the complexity and sophistication of textile production in Europe from the Bronze Age onwards, when wool production took over as the dominant material, and subsequently changed the animal economy towards this new domain. We know from the famous texts in ancient Anatolia of how the Old Assyrian caravan trade during the 19th to 18th centuries BC was organised around the highly profitable trade in fine textiles, and it is now becoming increasingly evident that a major shift occured also in Europe, where new wool clothing encultured the Bronze Age body, and created an entirely new economic sector that persisted and expanded into the Iron Age.

The articles in this book not only provide an overview of the evidence, but also summarise recent research. The editors and the authors are to be congratulated for presenting such a major, systematic endeavour which will serve archaeological research in years to come.

Preface

This book had its genesis in 2007, when the Danish National Research Foundation's Centre for Textile Research organised the international conference "Textiles in Context" at the University of Copenhagen, Denmark. A group of specialists from across Europe were invited to bring their knowledge of textiles and textile production from their respective regions to Copenhagen in order to help place the unique Danish prehistoric textile and costume collections from the Bronze and Early Iron Ages into a wider context. Since then, more colleagues have joined this project resulting in the present 23 articles.

The book is organised geographically by country since these are the modern boundaries within which most archaeological research is conducted today. Each section is accompanied by a map of the sites mentioned and a chronological table for the region. Depending on the specialist knowledge, the material from the same region is in some cases split up into several articles (*e.g.* Italy, Germany, Austria, UK), while in others, two countries are covered by the same article (*e.g.* Czech and Slovak Republics, Ireland and Scotland). In the case of particularly important groups of finds, special case study articles are included (*e.g.* Verucchio and Eberdingen-Hochdorf).

All chapters generally follow the same structure: introduction, chronological and cultural background, and an overview of the material in question organised chronologically and thematically. The sources of information used by the authors are primarily textiles and textile tools recovered from archaeological contexts. In addition, other evidence for the study of ancient textile production, ranging from iconography to written sources to palaeobotanical and archaeozoological remains are included. The chronological period covered in the articles spans from the earliest prehistoric finds to *c.* AD 400. In some cases however, the presented material ventures into slightly later periods (*e.g.* Norway). In principle, the overviews stop at the time of the collapse of the Roman Empire since its aftermath brought many new transformations to the social, economic and ethnic organisation of Europe. Textile technology, too, underwent drastic changes in the following centuries eventually culminating in the medieval textile industry.

For most regions, the articles in this book provide the first synthetic overviews on the topic, and, in some cases, this information has not been published earlier. For example, the investigation of Greek textiles has only begun in the recent years and it has not yet been possible to compare them to surviving tools as well as written and iconographic evidence in a systematic manner. Likewise, most of the data on Ukrainian material has been unknown or inaccessible to western scholarship due to the linguistic barrier.

As editors, we have aimed at giving a balanced picture of the presented data, although the countries differ in size and not all periods are equally represented for each country. Furthermore, the quantity, kind and preservation of the recovered archaeological material vary considerably throughout the European regions. Europe has almost all

types of textile preservation conditions, but they are not equally distributed throughout the continent. For example, the salt mines of Hallstatt have created a unique environment for the preservation of textiles that were discarded during their use in the Bronze and Iron Ages. Textile production is hence well represented in Austria for these periods, although most of the preserved textiles are very fragmentary. The deposition of clothed bodies in peat bogs in Early Iron Age Denmark has ensured the survival of a large corpus of textiles and complete garments in this context, while textiles from graves are rare. The cremation burial practice used during the Late Bronze Age in Scandinavia has resulted in the virtual absence of textiles from this period compared to the well-preserved costumes from the Early Bronze Age oak coffin graves.

Another important factor is how and when this material was investigated. Scandinavian countries and Germany, for example, have long-standing traditions of textile scholarship, while in Mediterranean Europe, particularly in Italy and Greece, the topic has only been broached within the last decade.

The authors have collected and systematised essential information on textiles and textile production from each country, resulting in an up-to-date and detailed sourcebook and an easily accessible overview of the development of European textile technology and economy from prehistory to AD 400. It is our hope that this book will bring textiles to the attention of a wider range of scholars. As not all European regions are covered in this book and, in the case of some regions, the chronological coverage is incomplete, we also hope that this book will inspire the writing of similar overviews of textiles and textile production in other European countries. A recent overview for the Netherlands was published by Sandra Comis (in L. Bender Jørgensen, J. Banck-Burgess and A. Rast-Eicher (eds), *Textilien aus Archäologie und Geschichte*, 193–204, 2005), while a summary of Roman period textiles found on the territory of France was published by Sophie Desrosiers and Alexandra Lorquin (in L. Bender Jørgensen and C. Rinaldo (eds), *Textiles in European Archaeology. Report of the 6th NESAT symposium, 7–11th May 1996 in Borås*, 53–72, 1998).

This book would not have been possible without the help of numerous people. Marie-Louise Nosch as director of the Danish National Research Foundation's Centre for Textile Research at the University of Copenhagen has provided the organisational framework for the editing of the book. Cherine Munkholt has assisted the editors during the proofreading and copyediting process. Vibe Maria Martens, Marianne Bloch Hansen, Peder Flemestad, Henriette Koefoed, Sidsel Frisch, Niels Møldrup Petersen, Sandra Holm, Egzona Haxha and Ingeborg Philipsen have helped with proof-reading, images, maps, communications and numerous other tasks. Joanne Cutler and Sergei Polin kindly provided information on the archeological background of Greece and Ukraine. Susanna Harris helped with the introduction. Yevgeny Kokorin created maps. Sylvia Mitschke provided images for the chapters on Germany. Juliet Blackmore created the layout. We thank them all and the authors of the following chapters for their enthusiasm and desire to participate in this pioneering endeavour. The project and the publication of the volume have been financed by the Danish National Research Foundation with support from the Culture Programme of the European Union DressID programme.

Margarita Gleba and Ulla Mannering

February 2011

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Case Study: The Tablet-woven Borders of Verucchio

Lise Ræder Knudsen

Introduction: Tablet Weaving

Tablet weaving is an ancient technique used to make bands and borders. The weaving equipment is very simple, consisting of little square tablets, often made of wood, about 5 × 5 cm or smaller in size, and with a hole in each corner. For very narrow borders only a few tablets are needed, while wide bands, known from archaeological material, would require more than a hundred such tablets (*cf. e.g.* Halvorsen in this volume). Four threads are threaded through the holes of each tablet (Fig. 11.1). These threads constitute the warp of the tablet weave. The tablets are raised upright and the far end of the warp is fixed to some sort of stationary device. Often, the near end of the warp is fixed to the belt of the weaver, but it could as well hang from the ceiling. Once everything is set up, the weaving can begin. Tablet weaving involves rotating or turning the tablets forward or back, which forms a shed through which the weft thread passes. Looking at a single tablet it is easy to see that the warp threads that pass through it are twisted together. These twisted warp cords are a characteristic sign of tablet weaving. The technique offers several different ways to make a variety of patterns and structures: using different colours in the warp threads, turning the tablets in different directions and inserting a supplementary thread as brocade weft. The method is suitable for weaving narrow bands, such as belts, starting borders for the warp of the warp-weighted loom, or

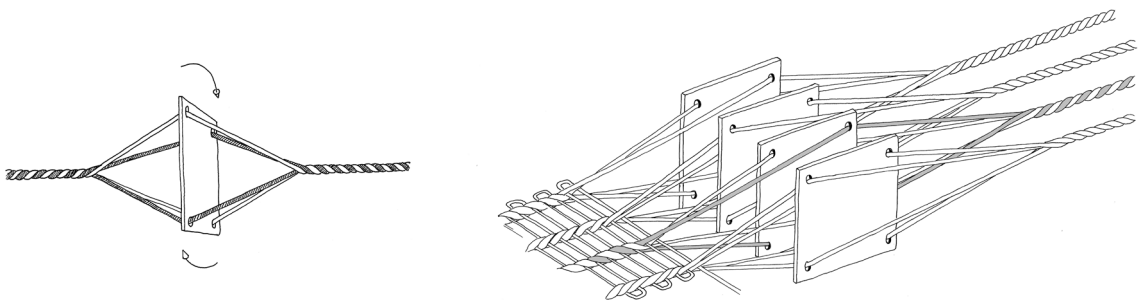


Fig. 11.1. The use of a tablet loom. Left: A tablet with a thread in each corner is twisted around a horizontal axis and the four threads are twisted as a cord. Right: More tablets set beside each other make it possible to create borders and bands. There will be a twist of the threads both on the near side of the tablets, where the border is woven, and on the far side of the tablets (Drawing: L. Ræder Knudsen).

decorative borders. The latter use of the tablet-weaving technique is aptly demonstrated in the Verucchio material.

Verucchio Tomb 89/Tomba del Trono

In Tomb 89 at Verucchio, dated *c.* 700 BC, at least three garments with borders woven in a tablet-weaving technique were found (von Eles 2002). This chapter discusses the technique of tablet weaving and its specific use in the Verucchio garments (for which see Stauffer in this volume).

The Tablet-Woven Borders of Mantle 1

The tablet-woven border of Mantle 1 (Inv. 13541) decorates the curved edge of the mantle (Fig. 11.2). The straight top edge of the mantle is not preserved, but it is likely that it was also decorated with a border, as in Mantle 2 (*cf.* Stauffer in this volume). The border was woven using 36 tablets with 4 holes each. The warp yarn of the tablet weave is thinner than the yarn used for the ground twill fabric and is plied. The warp count of the border is about 15 tablets/cm; the weft count is 14 threads/cm. Despite the degraded state of the textile, it is possible to see that, in some places, two weft threads of the ground weave unite to form the weft of the tablet weave. The fringes created by the remaining warp and weft threads of the twill fabric of the mantle have thus been utilised as the weft of the border. The number of weft threads entering the border varies since the ground weave is not very regular (warp count varies between 22 and 26 threads/cm, and weft between 12 and 14 threads/cm) and furthermore, because fringes derive from both the warp and the weft of the ground weave in the curving edges of the mantle. Dye analyses (*cf.* Stauffer in this volume) indicate that the mantle had a reddish colour while the border was blue or purple.

The tablet-woven border of Mantle 1 was constructed in the following way. First, two tablets of opposite threading lie adjacent to the twill fabric. The decorative pattern of the border consists of 17 tablets creating a triangular motif achieved by changing the direction of tablets one at a time. The following 17 tablets form stripes, consisting of groups of three tablets turned in opposing directions. The change in direction and the different twist of the weft threads create a subtle decorative pattern. In the places where the tablets change direction in the triangular motif, the weft is visible and since it had a different colour from the warp of the border, the triangles are more distinctive (see Fig. 11.5 which shows the nearly identical construction of the border of Mantle 2).

The weft of the mantle fabric continues as the weft in the tablet border and gives a superficial impression that the ground weave and the borders were woven simultaneously. However, a closer examination of the nexus between the fabric and the border reveals the original weaving method: two single threads from the fabric – each a weft in its own shed – unite into a 2-ply thread, which passes through the shed of the tablet weave.

This kind of border is created after the fabric was woven and taken off the loom. At the sides of the fabric, fringes are made during or after weaving the ground weave. The fringes of the fabric are then used as the weft in the tablet border. For every turn of the tablets, two weft threads from the twill fabric are passed through the shed of the tablet loom; they are then passed back through the next shed after turning the tablets in order to fasten the threads in an invisible and very strong way (Fig. 11.3). In the subsequent turn of the tablets, the spare threads from the first weft threads are passed through the tablet border and are cut just at the borderline between twill fabric and tablet border. Knowing these details makes it possible to see the weaving direction of the tablet border, as the weft going back into the shed will always be woven after the one going into the shed. As the weft is completely hidden inside the warp of the tablet border, these technical details are concealed if the border is well preserved, but since parts of this mantle are very fragmentary, it is possible to see details which would not have been visible when the mantle was new.

This way of making the border has various functions: the edge is strengthened, the threads which remain after weaving the twill fabric are fixed and the mantle is decorated with a border of a different colour and pattern. The technique is complex and would have required an extraordinary skill on the part of the weaver.

Fig. 11.2. (top left) The border of Mantle 1 from Tomb 89, Verucchio (Photo: L. Ræder Knudsen).

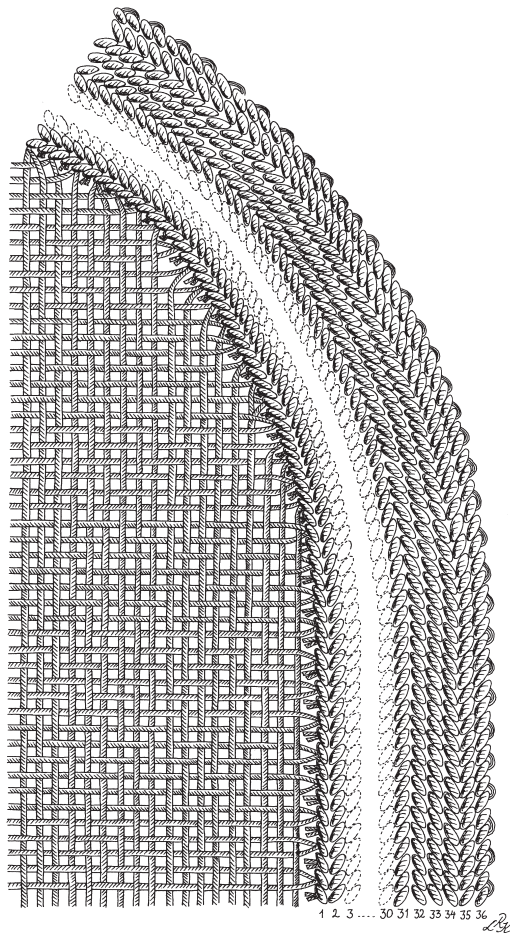


Fig. 11.3. (top right) Mantle 1: The fabric was woven first and afterwards fringes of the edges of the fabric were used as wefts of the tablet border (Drawing: L. Ræder Knudsen).

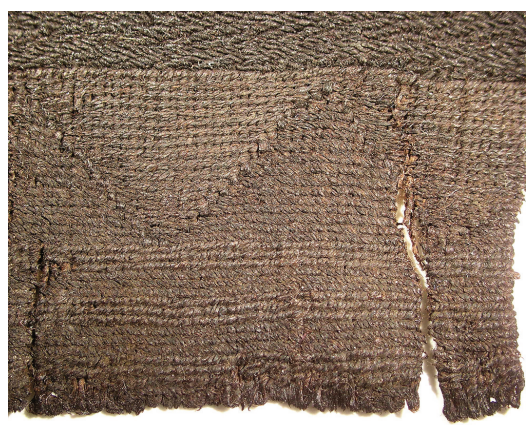


Fig. 11.4. (bottom) Mantle 2: Well-preserved tablet-woven border on the curved edge (Photo: L. Ræder Knudsen).

The Tablet-Woven Borders of Mantle 2

Mantle 2 (Inv. 13529) has a tablet-woven border on the semicircular sides and the straight top edge. On the curved edge of the mantle, a small fragment of the border without the outside edge is preserved. The surviving part of the border consisting of 18 tablets, which has a triangular pattern, demonstrates that the border went all the way around the mantle. Furthermore, another fragment belonging to this curved side of the mantle was found and it is well preserved in its full width and has a triangular pattern (Fig. 11.4). The border of the straight edge of the mantle was made using 35 tablets. The innermost tablet forms a stripe and apparently was threaded with a thicker yarn than the rest of the border. This tablet is followed by 17 tablets forming a triangular pattern and 17 tablets forming stripes. No differences are seen in the yarn of these 34 tablets as one could expect if the pattern originally was woven using different colours. The warp threads are 2-ply. The preserved border is now between 2.3 and 2.8 cm wide. The warp count is 52–60 threads/cm, which corresponds to 13–15 tablets/cm; the weft count is about 19 wefts/cm. On the preserved borders there are no changes in the turning direction of the tablets. The thicker threads in the innermost tablet could have been of a different colour. The tablets have been threaded from different directions according to the desired pattern (Fig. 11.5). The triangular pattern is produced with tablets 2–18, the turning direction of which is changed one at a time, as in Mantle 1. Where a change of turning direction has occurred, the weft is seen above the warp threads for a short distance. This detail makes the triangular pattern more visible, although it is more evident on one side of the border.

The Tablet-Woven Borders of Garment (Inv. 13530)

Garment 3 has rounded edges along which are preserved many fragments of a tablet-woven border. It is a simple border consisting of 13 tablets, which are threaded in opposing pairs and all are turned in the same direction (Fig. 11.6). The width of the band varies between 8

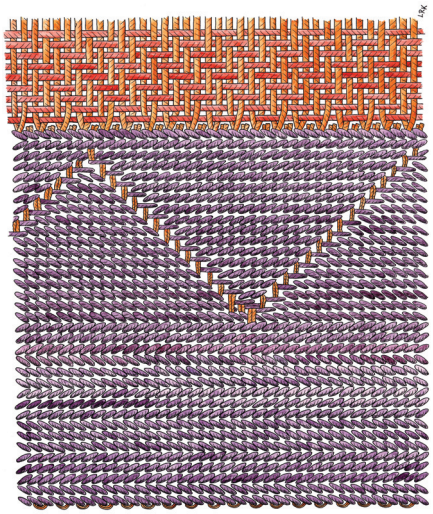


Fig. 11.5. (left) Mantle 2: The connection between the border and fabric on the straight edge of the mantle from Tomb 89, Verucchio. Close to the twill fabric there is one tablet which is turned the same way, followed by 17 tablets which create a triangular pattern by changing the turning direction of the tablets one at a time, and 17 tablets forming stripes of three tablets turned in opposite directions. (Drawing: L. Ræder Knudsen).

and 10 mm. The thread count of the border is about 12 tablets or 48 threads/cm in warp and 18 threads/cm in weft. The warp consists of alternating s- and z-twisted threads. The fact that the threads are not plied is remarkable, because single threads tend to untwist when used for tablet weaving. To avoid this problem, the tablets must be turned in the same direction as the twist direction of the yarn throughout the entire weave. Hence, the weaver must choose s- or z-twisted yarn according to the twist direction of the warp cord in the tablet weave. Only one error has been detected in this border: one tablet has been twisted in the wrong direction for some 5–10 cm. It is not possible to find any changes in the turning direction of the tablets. The fringes of the twill fabric are, as seen on Mantle 1, used as weft in the tablet-woven border and cut at the nexus between fabric and border.

Verucchio Tomb B/1971

Two garments from Verucchio Tomb B/1971 have also preserved tablet-woven borders (von Eles 2006). Object A, a possible tunic with rounded lower edges and straight and open side edges, has fragments of tablet-woven borders preserved along three of the four edges. In the middle of the garment, two fragments of a tablet border have been noted, supposedly the edging of a neck opening. All tablet weaves appear to be woven using single threads and using the fringes of the fabric as wefts of the border. Usually, two threads are used as wefts in each shed and they return back in the next shed. All tablets are arranged in opposed pairs and are turned forward. The twist direction of the threads of one tablet follows the twist direction of the tablet (see Fig. 11.6).

The two fragments of border at the neck opening are both preserved in full width, and were made using 17 tablets. One of these fragments is quite remarkable since it has a lump of threads and some irregularities, which demonstrate that this must be the starting point of the border (Fig. 11.7). The lump is possibly the point where the thread ends were secured and the starting of the border, where little eyelets of the first turn of the tablets

Fig. 11.6. Tablet-woven border of garment 3 (Photo: L. Ræder Knudsen).

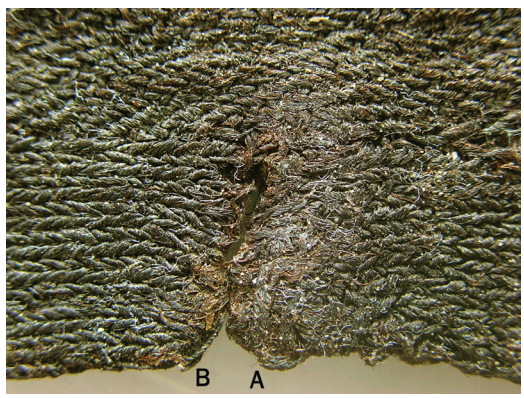


Fig. 11.7. Tablet-woven border of object A woven around the neck opening. The slit of the band possibly represents the starting point of the border (B) and the finishing point of the border, where the threads are secured by sewing (A) (Photo: L. Ræder Knudsen).

Fig. 11.8. Remains of a tablet-woven border of two colours are preserved at the lower front part of object B. The pattern is made of rows of tablets twisted in different directions (Photo: L. Ræder Knudsen).

are left. This interpretation is supported by the fact that the starting point has a small weaving fault (one tablet turning in the wrong direction) which is corrected after a few centimetres. If this irregularity in fact is the starting point of the tablet weave, it gives a good indication that the neck opening was square-cut with rounded corners. Otherwise it would not have been necessary to make the starting point of the tablet weave inside the neck opening. Rather, it would have been easier to start the border at the corner where the cut of the neck opening and its edges would have met each other to avoid the lumpy area where starting point and finishing point of the tablet weave meet.

One lower curved edge of the garment has a border of 13 alternately opposed tablets with the outer edge preserved. The tablets are turned forward where the border can be followed. This edge is presumably the back one, as the starting point of the tablet weave then would be at the back of the neck opening and less visible. This at least would be the choice of a modern weaver.

At the other curved edge, a small fragment of the tablet border with three tablets is preserved, but its outer edge is no longer present. At one of the straight edges, a tablet border of at least 10 tablets is preserved. We have thus reason to believe that this garment had tablet-woven borders on all edges, as well as around the neck opening.

Object B is presumably a garment of the same shape as Object A, but not as well preserved (Fig. 11.8). There are remains of a broad border along one curved lower edge, which must have been at least 2–3 cm wide. This border might have had a pattern. At the opposite curved edge, tiny fringes possibly indicate that it was edged by a border as well. Along the neck opening, a border of at least 7 tablets turned in different directions survived, but there are no remains of a border along the straight edge.

Characteristic Features of the Tablet-Weaving Technique in Verucchio

The tablet-woven borders of Verucchio are remarkable in terms of their technique considering their early date. Even though these are amongst the earliest securely identified examples of tablet weaving, they already present many advanced technical characteristics. In the following, the special characteristics of the tablet-woven borders and tools possibly used for their manufacture are discussed.

Starting Borders

In a warp-weighted loom, a starting border is often used to prepare the warp and, in prehistoric times, such starting borders were sometimes tablet woven. In the process, the weft threads of the tablet weave are drawn out to such an extent on one edge as to serve as warp threads on the loom. The *tintinnabulum* from Arsenale Militare in Bologna (see Fig. 9.16 in Gleba in this volume), dated to the 7th century BC, may in fact represent the scene of making the warp for an upright loom. The tablet weave serves as a tight band which can be used to fasten the warp to the loom; it is also useful to maintain an even spacing of the warp threads and keep them from getting mixed up on the loom. On a finished cloth it is sometimes possible to identify a starting border, as the weft threads of the tablet weave (which are the warp threads of the ground weave) go through the shed in pairs and are not cut.

The Verucchio mantles were probably woven on a vertical loom. The warp could have been made using a tablet-woven band as a starting border, but no starting border has been identified in the Verucchio material so far.

Selvedges

Selvedges can also be tablet-woven. Often they are made only using a few tablets and woven simultaneously with the textile, but sometimes tablet-woven selvedges using more numerous tablets are seen. It is very difficult to make such edge borders simultaneously with the weave as the thickness of the tablets requires a certain amount of space. Furthermore, the borders and the textile require different tension. Both the mantles from Verucchio Tomb 89 have curved edges with tablet-woven borders. Such borders could not be woven simultaneously with the cloth. The only way this can be achieved is by using the fringes of a finished textile as wefts in the tablet-woven border as described above. In order to use this method, it is necessary to cut or weave the textile to shape, leaving threads long enough to make the fringes. The border can be woven either on a horizontal tablet loom placed, for example, on a table, or by using a

tablet loom hanging vertically from a loom or ceiling.

The straight edge and hence the tablet-woven border of Mantle 2 is more than 280 cm long and, along it, the tablets without pattern were turned in one direction only. Changing the turning direction will always make a 'scar' across the tablet weave disturbing its regular appearance. Bands bearing evidence of the weaver trying to avoid or minimise the visible signs of changing the turning direction of the tablets are known from other archaeological contexts (Raknes Pedersen 1988, 117; Berlin Englund 1994, 25 and 42), but usually the weaver accepts changes in turning direction as a necessity. Not changing the turning direction of the tablets is very difficult, as the warp will progressively be twisted harder behind the tablets until it is impossible to move the tablets anymore (see Fig. 11.1). Usually, it is possible to weave about 20–30 cm of the band turning the tablets in the same direction before it is necessary to change the turning direction or do something to untwist the warp. It appears that the weaver who made the Verucchio mantle borders preferred to do extra work untwisting the warp in order to make the mantle as beautiful as possible. As the 'scar' resulting from a change of turning direction will only be seen by a trained eye, it is likely that the mantle was meant to be used by a person who was acquainted with the details of the weaving process, or alternatively that the quality of the weave had to be perfect for other, possibly religious reasons. This also means that time was not of the essence in this case.

Other Evidence of Tablet Weaving

Various kinds of tablet-weaving equipment can be found amongst Early Iron Age archaeological material recovered in Italy, including tablets, spools, spacers, clasps and beaters.

Tablets

Tablets, having been made of wood, bone or hardened leather, rarely survive. They are also not always properly identified. Recently, tablets from two sites in Italy have been published. At Ficana, near Rome, an almost complete small bone tablet, measuring 2 × 2 cm (Fig. 11.9a), was found in a context of the late 8th century BC (Lipponen 2007, 4). Other important finds are from Longola di Poggiomarino, an Iron Age settlement located north-east of Pompeii. Here, among the objects in organic materials preserved in unusual waterlogged conditions, there are small tablets, also approximately 2 × 2 cm in size (Fig. 11.9b), in both wood and bone (Pizzano 2005, fig. 16). Other examples of tablets are noted in Tomb 309 at Aliano-Cazzaiola in South Italy (Russo 2006, 144 note 65). Such very small tablets have been demonstrated to be particularly useful for weaving tablet borders next to the vertically hanging ground weave (Ræder Knudsen 2010).

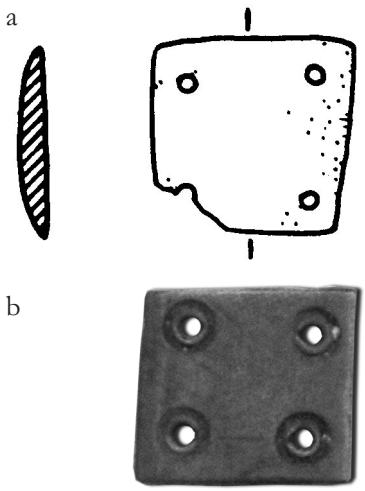


Fig. 11.9. Weaving tablets: a) from Ficana, 8th century BC (Courtesy of Eero Jarva); b) from Longola di Poggiomarino, 9th century BC (After Pizzano 2005, Fig. 16).

Spools

Spools (Italian *rocchetti*) are small cylindrical objects, often with concave shaft and flaring ends (Fig. 11.10). They are made of terracotta and range in length between 3 and 10 cm. Spools (sometimes also called bobbins in the archaeological literature) in Italy date since the end of the Bronze Age and have been found both on settlements and in graves. Many of the Early Iron Age burials of Central and North Italy contain multiple spools (Ræder Knudsen 2002; Gleba 2008, 140–150). Although other interpretations of their use have been suggested, it is most likely that they could have been utilised as weights for the sets of threads passing through the tablets used for making the tablet borders such as those on the Verucchio textiles. To keep the warp threads of the tablet weave taut while weaving, something heavy must be tied to the end of the warp. The weight of the spools varies between 5 and 100 g, with many having a weight of around 20–30 g and 35–45 g. While such a light weight would hardly

Fig. 11.10. (above) Spools found in a female grave in Verucchio (Photo: L. Ræder Knudsen).

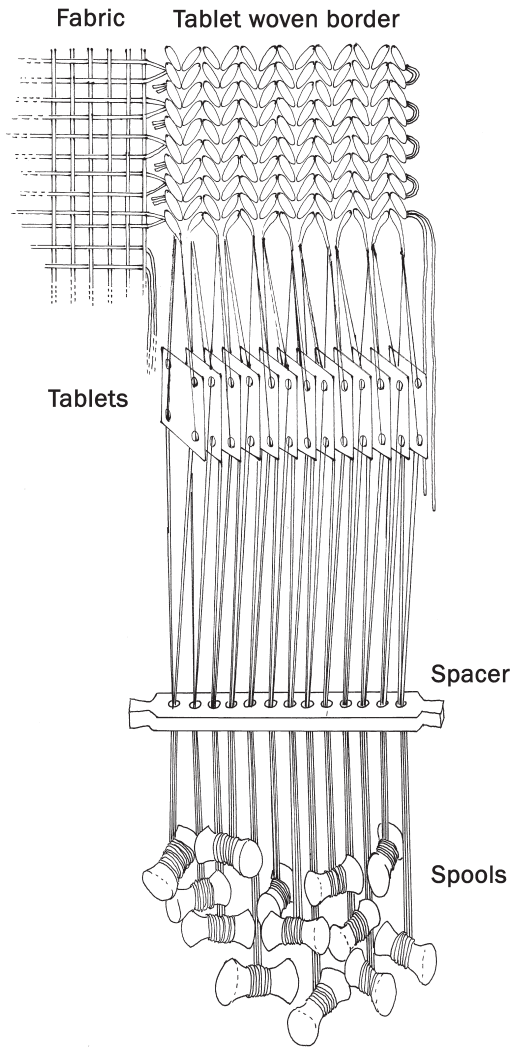


Fig. 11.11. (right) Interpretation of the weaving method for tablet-woven borders on garments from Verucchio. The twill fabric is woven first presumably on a vertical loom. Afterwards, the borders are woven to the edge of the fabric using the excess fringes as weft (Drawing: L. Ræder Knudsen).

be useful on a warp-weighted loom, each spool provides the optimal amount of tension for four threads passing through a tablet. The four threads from one tablet will need one spool, and depending on the thickness of the yarn, spools of different weight would be needed. The concave shaft allows the warp of the tablet weave to be wound on the spool. Using only one spool per tablet will also allow the spool to rotate and untwist the warp beyond the tablets (Fig. 11.11).

Spacers

Other objects possibly related to tablet weaving are spacers (Ræder Knudsen 2002; Gleba 2008, 152–153). A spacer *(distanziatore)* is usually a small, narrow, bone piece with a rectangular section, numerous holes along its length and, sometimes, narrowing at each end, as if it is meant to be inserted or fixed somewhere (see Fig. 11.11). Thus, in Verucchio tombs 55 and 102 (Fig. 11.14 top centre), three such bone tools have been found, one complete, three fragments of a nearly complete tool and a single fragment of another (Ræder Knudsen 2002, 229). The complete tool has 11 holes; the three fragments have at least 15 holes. The likely interpretation of the function of this implement is that it was used to maintain a distance between the warp threads in order to avoid entanglement. Given its length, it may have been used in tablet-weaving: threads of one tablet would pass through one hole of a spacer and subsequently be wound on a single spool. This may be what the horizontal stripes at the end of the warp represent in the weaving scene of the Verucchio throne (Fig. 11.12; also see Fig. 9.15 in Gleba in this volume).

Clasps

The use of another metal implement, a clasp *(forcella da telaio)*, is uncertain but may also be related to tablet weaving. It consists of two long, thin, rectangular pieces of bronze, fixed together with a rivet on one end and fastened together with a clasp on the other, and ending in thin coiling strips, sometimes with short chains attached (Ræder Knudsen 2002, 241). Only one of the extant implements has a clasp preserved. Examples come from burials at Marsiliana

d'Albegna and Vetulonia, Vulci, Veio, Bisenzio, Civita Castellana, Narce, Nazzano, Capena and Capua (Gleba 2008, 151). All items are dated to the 8th–7th centuries BC. Their use for textile activities was deduced from the fact that the Civita Castellana example had textile remains between the two bronze plates (Barnabei and Pasqui 1894, 390, Fig. 180).

Textile traces were noted inside the implements from the Quattro Fontanili Tomb YZ5 at Veii. Such instruments could have been practical for keeping a narrow band in place during weaving (Fig. 11.13). In the process, the coiling ends function to fix a string which goes around the weaver's waist, while the finished end of the tablet-woven band is held firmly between the two rectangular plaques, which keep it taut and prevent twisting. The weaver, thus, has both hands free to rotate the tablets and pass the weft back and forth. Grave goods assemblages with clasps have, in some cases, also contained spools. Similar instruments, made in wood or metal, were used until recently in North Africa. It is likely that, in ancient Italy, these implements were usually made of wood or bone and hence did not survive.

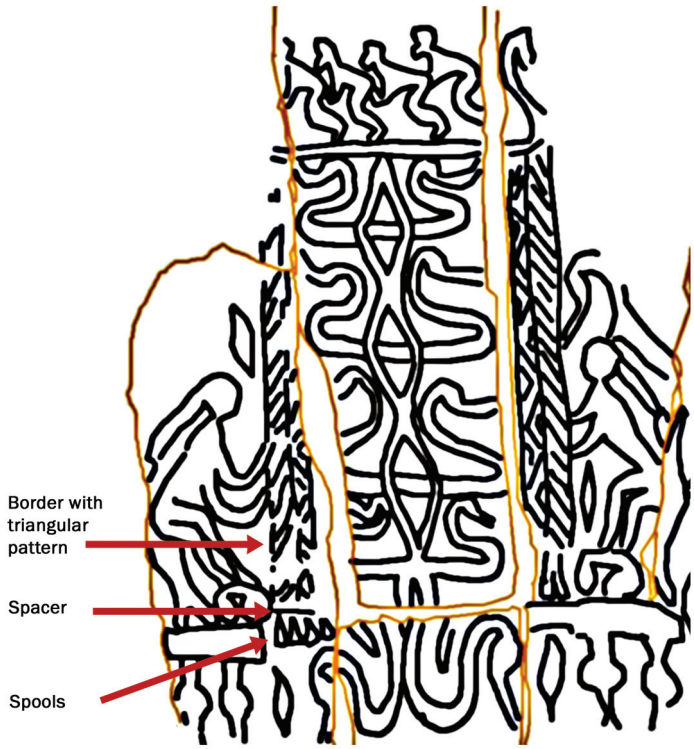
Beaters

Fragments of another type of bone tool have been found in tombs 55 and 102/1972 Lippi (Ræder Knudsen 2002, 229). It is shaped like a knife, but the edge is not very sharp (Fig. 11.14 bottom left). Neither extant tool is complete, so the original shape is not known. Nevertheless, they seem to be similar to small weaving swords, equipment essential for beating up the weft in a tablet-woven border. The cross section of both tools shows one rounded and one sharp edge – a shape very useful for beating up the weft quite hard, as would have been necessary for the borders of the Verucchio mantles.

Conclusions

The tablet weaves of the Verucchio finds are all made as borders. The fringes remaining from the weave are used as wefts in the borders. The borders follow both straight and curved outer edges of the garments as well as the inner edges such as the neck openings. Their purpose may have been to secure the edges as well as to make decorative borders which were emphasised by the use of different colours in the fabrics and the borders. Tablet-woven starting borders have not been identified in the Verucchio material.

The mantles from Verucchio Tomb 89 have tablet-woven borders preserved on all sides. The edges of the mantles were produced using plied threads. The borders show a pattern of triangles and stripes made by changing the turning direction of the tablets one by one. In contrast, Garment 3 has a simpler border made of single yarns. The twist direction of the threads of one tablet corresponds to the turning direction of the tablet. This is noteworthy, because using single yarn in a tablet weave can be complicated as single threads will untwist themselves if turned for



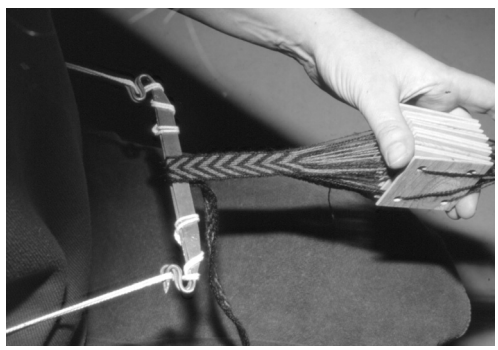


Fig. 11.12. (above) Weaving scene carved in wood from the throne of grave 89, Verucchio. The scene may depict women making tablet-woven borders on a textile using spacer and spools (Drawing: L. Ræder Knudsen after von Eles 2002).

Fig. 11.13. Work in progress on a modern tablet-woven band. To fasten the woven band in front of the weaver, a copy of an object found at Veio is used. The bronze clasp is very useful and functions even better than modern clasps used for tablet weaving (Photo: L. Ræder Knudsen).

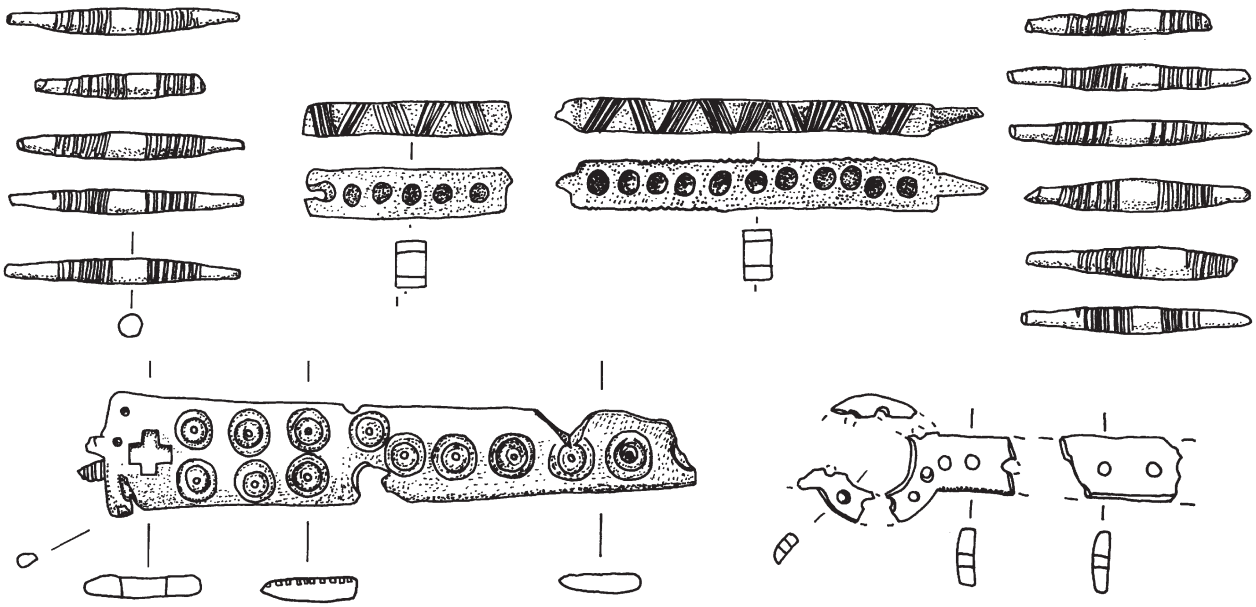


Fig. 11.14. Tools made of bone from Tomb 102/1972 Lippi. The knife-shaped tool could be used as a beater for making tablet-woven borders. The little hook at the left end of the tool would be useful to pass the thread through the shed of the tablet loom (Drawing: Courtesy of P. von Eles).

a long time in the opposite direction. This characteristic is also present in the mantles, but as the tablet-woven borders here are produced using plied threads, there was no practical need for using yarn with a specific twist direction. Nevertheless, when the twist direction of the yarn corresponds to the turning direction of the tablets, the border acquires a more homogeneous appearance.

The neck opening of object A from Tomb B/1971 has a small border, which seems to have the starting and ending point of the tablet weave preserved. This could be an indication that the neck opening was made as a continuous circle, without a vertical slit in the front.

The borders of the Verucchio textiles are among the earliest tablet weaves found in Europe. In spite of this, they have many advanced technical details, which reveal the weaving process and the intention behind it. Great effort was put into making these borders as even and as high quality as possible, and special tools were used for this work, including spools which are frequent finds in Early Iron Age burials in Italy.

The tablet weaves of Verucchio are, however, not unique. At Sasso di Furbara in Lazio, a boat burial dated to the 8th century BC contained nearly 100 textile fragments, among which was a fine cloth with a spin pattern and tablet-woven borders (Masurel and Mamez 1992). Tablet weaving is also often seen among the textile fragments from the Hallstatt cultural zone. In Western Europe (France and Western Germany), 7.5 % of the textile fragments found in 49 graves were tablet-woven, while during the same period in Central Europe (Austria, Czech Republic, Hungary, Switzerland), 2 % of the textiles found in 85 graves contained tablet weaves (Bender Jørgensen 1992, 123). Among the earliest and better known examples are the tablet-woven bands and borders from the Austrian salt mines in Hallstatt (*cf.* Grömer in this volume), the princely burial at Eberdingen-Hochdorf (Banck-Burgess 1999, 72, 80–82 and this volume) and the princely burial at Apremont, France (Masurel 1990). Fragments of tablet-woven borders are also known from El Cigarralejo, Spain, dated 400–375 BC (Hundt 1968; *cf.* Alfaro in this volume).

Evidence for the making of tablet-woven borders may be present on the famous wooden throne from Verucchio Tomb 89, which is carved with decorative scenes, including two depicting weaving (see Fig. 9.15 in Gleba in this volume). In each scene, two women are seated on chairs placed on a high platform and are working on each side of a loom. They are either weaving a long narrow textile or making a border on each side of a large textile. The pattern of the border has a close resemblance to the patterns seen on the borders of Mantles 1 and 2 (see Fig. 11.2), consisting of triangles

and stripes. The analysis of the tablet weaves and textiles from Tomb 89 (*cf.* Stauffer in this volume) suggests that the long sides of the mantles represent the weft and short sides the warp. If that is the case, the scenes depicted on the Verucchio Throne do not represent the weaving of a mantle; rather, they show the making of the borders. The woven cloth appears to be attached to a beam with each end resembling the head of a bird. There is no indication of a roller beam on which the cloth could be wound up. This could be the reason why the weavers need a platform to reach the top of the loom. Another reason could be that, in order to make the borders without changes in the turning direction of the tablets, it was necessary to let the warp of the tablet weave hang in full length. If spools were used as weights for the tablet weaving, they would make the warp untwist itself, hence allowing the continuous turning of the tablets in the same direction. The round objects at the bottom may in fact represent the spools. Above them, at the end of the woven borders are depicted stripes across the warp threads, which may be the above-described spacers used to keep the warp threads organised.

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Bibliography

Banck-Burgess, J. (1999) *Hochdorf IV, Die Textilfunde aus dem späthallstattischen Fürstengrab von Eberdingen-Hochdorf (Kreis Ludwigsburg) und weitere Grabtextilien aus Hallstatt- und Latenezeitlichen Kulturgruppen*. Stuttgart.

Barnabei, F. and Pasqui, A. (1894) Degli ogetti di ornamento personale, delle armi e degli altri istrumenti del corredo funebre. *Monumenti Antichi* 4, 347–398.

Bender Jørgensen, L. (1992) *North European Textiles until AD 1000*. Copenhagen.

Berlin Englund, S. (1994) Brikvävning så in i Norden. Kalmar.

Gleba, M. (2008) *Textile Production in Pre-Roman Italy*. Oxford.

Hundt, H.-J. (1968) Die verkohlten Reste von Geweben, Geflechten, Seilen, Schnüren und Holz-geräten aus Grab 200 von el Cigarralejo. *Madrider Mitteilungen* 9, 187–205.

Lipponen, S. (2007) Textile-making tools from Ficana, Italy, Zone 4a. *Archaeological Textiles Newsletter* 44, 2–5.

Masurel, H. (1990) Tissus et Tisserands du Premier âge du Fer. *Antiquités Nationales* 1, 303.

Masurel, H. and Mamez, L. (1992) Étude complémentaire des vestiges textiles trouvés dans l'embarcation de la nécropole du Caolino á Sasso di Furbara. *Origini* 16, 295–310.

Pizzano, N. (2005) Scheda 10. In *Longola di Poggiomarino. Un insediamento di ambiente umido dell'età del Ferro*. Gragnano.

Ræder Knudsen, L. (2002) La tessitura con le tavolette nella tomba 89. In P. von Eles (ed.), *Guerriero e sacerdote. Autorità e comunità nell'età del ferro a Verucchio. La Tomba del Trono*, 220–234. Firenze.

Ræder Knudsen, L. (2010) Tiny Weaving Tablets, Rectangular Weaving Tablets. In E. Andersson Strand, M. Gleba, U. Mannering, C. Munkholt and M. Ringgaard (eds), *North European Symposium for Archaeological Textiles X*, 150–156. Oxford.

Raknes Pedersen, I. (1988) The Analysis of the textiles from Blindheim, Giske. In L. Bender Jørgensen, B. Magnus and E. Munksgaard (eds), *Archaeological Textiles: Report from the 2nd NESAT Symposium, May 1–4, 1984*, 116–125. Copenhagen.

Russo, A., ed. (2006) *Con il fuso e la conocchia. La fattoria lucana di Montemurro e l'edilizia domestica nel IV sec. a.C.* Milano.

von Eles, P. (2002) *Guerriero e sacerdote. Autorità e comunità nell'età del ferro a Verucchio. La Tomba del Trono*. Firenze.

von Eles, P. (2006) *Il potere e la morte. Aristocrazia guerrieri e simboli*. Verucchio.