
Archaeological Textiles – Links Between Past and Present

NESAT XIII

Milena Bravermanová – Helena Březinová – Jane Malcolm-Davies (Editors)



Technical University of Liberec, Faculty of Textile Engineering

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Archaeological Textiles – Links Between Past and Present. NESAT XIII.

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The Lengberg Finds

Remnants of a lost 15th century tailoring revolution

Rachel Case – Marion McNealy – Beatrix Nutz

Abstract

Among the textile fragments discovered at Lengberg Castle in East-Tyrol, Austria, were a few almost completely preserved pieces of garments such as several nearly complete linen bras and fragments of possibly skirted bodices. Before the finds at Lengberg Castle, no physical evidence of supportive undergarments, so-called 'breast bags', had been discovered, although garments of this type were mentioned in several written sources of the time. There were also fragments of linen linings for three gowns: two for a small girl (one of blue wool and one of red silk) and one blue woollen example for an adult woman. These linen linings are most noteworthy for the techniques applied to their tailoring.

The Lengberg lining fragments demonstrate that 15th century tailors had a highly-advanced understanding of the bias properties of fabrics, far beyond anything expected, and not to be duplicated in fashion until the 1930s. In the creation of the fashionable 15th century gowns with under-bust pleating, the tailors used the bias collapse and drape of the fabrics to provide the shaping around the individual breasts, instead of using straight grain panels and gores, as is seen in the Greenland finds – a dramatic revolution in tailoring techniques. While this design augmented the shape of the breasts, it provided no support, and thus separate supportive garments were worn under the gown to support, shape and lift the breast. With the transition to Italian style garments at the beginning of the 16th century, these bias techniques of women's tailoring were no longer needed, and thus were lost, with bias-cut hose and stockings being the only remnant of this tailoring revolution.

The aim of this research is to draw a correlation between supportive undergarments and the tailoring of the gowns worn over them. The bra allows for looser tailoring of the gown, which accentuates two separate breasts, as opposed to supportive kirtles which result in a monobosom (one curving mound). One garment requires the other. The three gowns, the supportive underwear and smocks are under reconstruction to better understand the tailoring methods used, how the single garments worked individually and as layers (supportive undergarment – smock – gown), and contribute to the study of female apparel of the second half of the 15th century.

Keywords: Lengberg, bras, bodice, underwear, gowns, 15th century, bias, tailoring

1. FIND CONTEXT OF THE TEXTILES

In the course of extensive reconstruction at Lengberg Castle in 2008, archaeological investigations of several parts of the building took place under the direction of Harald Stadler (Institute for Archaeologies, University of Innsbruck). During the research, a filled vault was detected below the floorboards of a room on the second floor. The fill consisted of dry material, among them more than 2,700 textile fragments. The architectural history of the castle and the archaeological features date the finds to the 15th century. This date has been confirmed by five radio-carbon-dates. The material was probably dumped in the vault when another storey was added to the building by order of Virgil of Graben who became lord of the castle in 1480. The extension was possibly finished by October 1485, when the castle chapel was consecrated by the Bishop

of Caorle (Egger 1947, 35). This leads to the conclusion that the finds from the vault most likely predate the year 1485. The garments found in the vault were perhaps worn by members of the family Mosheimer who were responsible for ('Burghut' or 'Pflege') Lengberg from 1419 to 1480 (Plattner 2013, 39-41).

2. THE MEDIEVAL IDEAL OF BEAUTY

In contrast to the modern erotic ideal of a full bosom, the ideal of a small, firm breast prevailed in medieval Europe. In the French *chanson de geste* 'Fierabras', dating to circa 1170, the perfect breasts are described as '*Petites mameletes, ... Dures comme pumetes*' [small breasts, ... hard as apples] (Kroeber – Servois 1860, 62; Waugh 1999, 8). In addition to medical tinctures to 'shrink' the bosom (Mondeville 1893, 589-590; Kruse 1999, 82-83), cloth bands, later 'sacks/bags for the breast' or 'breast-bags' were a means of achieving this (Descamps 1832, 142; 'Meister Reuauß' in Heyne 1903, 312). This ideal of beauty persisted into the 15th century. In one of his sermons, Gilbert of Hoyland (†1172) described how breasts should be to be considered beautiful, and how to achieve this beauty if they are not ideal by nature:

'And if you want to hear something spiritual, which expresses beauty, then I advise you to study the women who take care of their body and attire and who obtained some workmanship in it. Because what do they strive more to do in decorating their chests, as that their breasts are not oversized, ugly and cover a portion of the breast itself? Therefore they bind oversized and hanging breasts together with breast bands so as to cure an error of nature through their artistry. For only those breasts are beautiful that protrude just a little and are moderately plump, that are not too prominent, but are not at the same level with the rest of the flesh, as it were the breast that are compact, but not flat, who are a little restrained and do not hang immoderately.' (Hoyland undated, Sermo XXXI, 0163A; translation by Florian Schaffenrath 2016; see also Waugh 1999, 8; Eco 2002, 11).

3. THE EXTANT 'BREAST-BAGS'

Prior to the finds at Lengberg castle, no other supportive garments with separate cups for the breasts have been found that date back to the 15th century (Nutz 2013, 221-225). Although the extant garment is partially preserved, with only the front and some of the left side of the bodice remaining, there is enough left of the garment to understand how it was originally constructed (Fig. 1/3). At first glance, especially from a modern point of view, one would not necessarily conclude that it was originally skirted. But depictions of skirted undergarments in the visual record point to the very plausible idea that this garment originally had skirts attached, which were probably ripped away at some point in order to reuse the fabric.

The cups are constructed in two vertical halves which are cut on the straight of the grain, but are not quite symmetrical: the outer cup halves have a slightly steeper curve (Fig. 1/5), which may have counteracted the 'east-westing' phenomenon, in which the breasts would have tended to face away from each other if the two halves of the cups were the same size and shape. The linen in the cups is of a slightly finer weave (13 to 14 threads per cm) than the rest of the garment

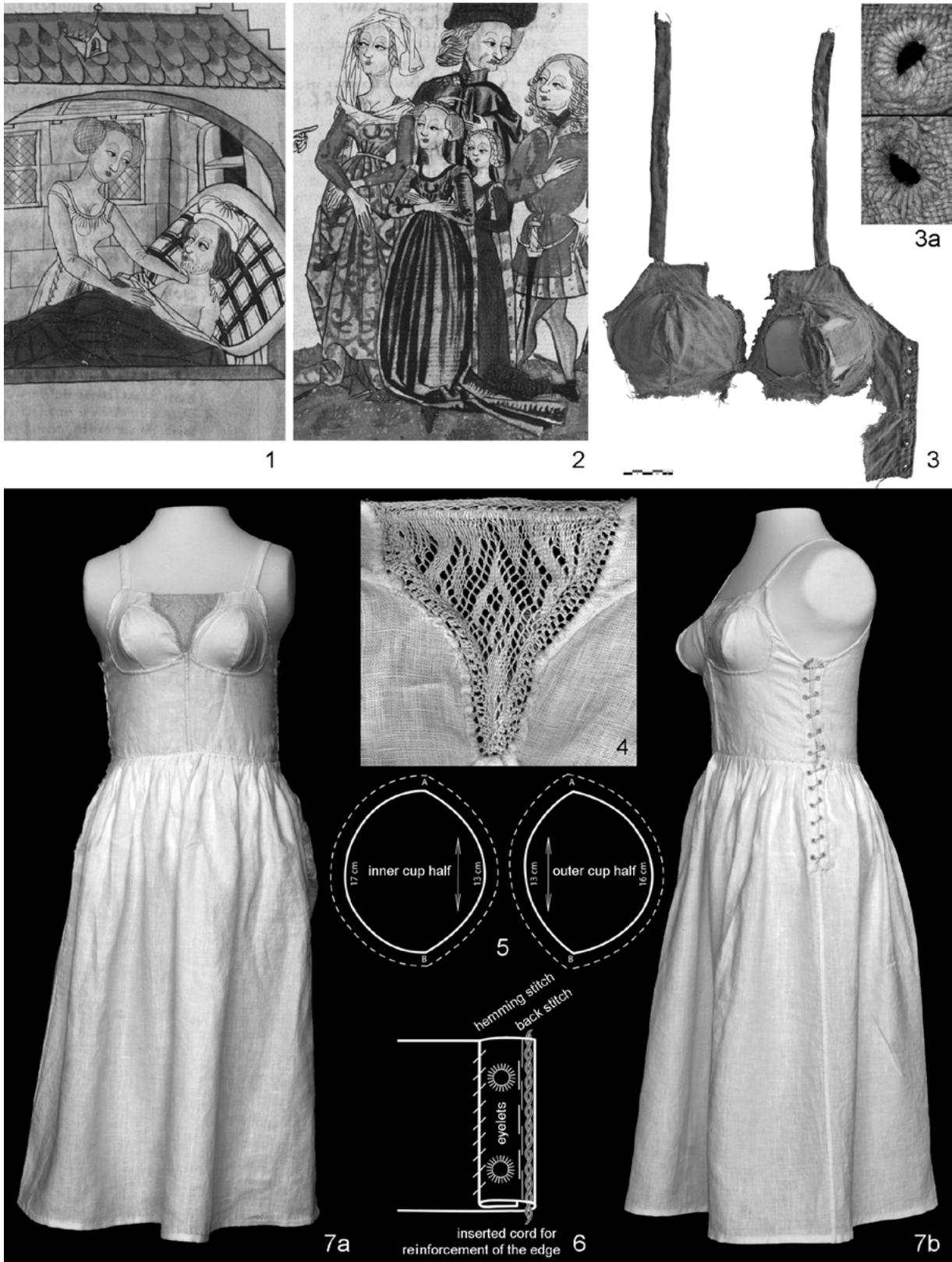


Fig. 1: 1) Woman with supportive (?) undergarment; 2) Woman and girl with ‘apple breasts’ (Schachzabelbuch – Cod.poet. et phil. folio 2, 73v, 255r. Available at <http://digital.wlb-stuttgart.de/purl/bsz330052896>). © Württembergische Landesbibliothek Stuttgart, Creative Commons Attribution-ShareAlike; 3) Extant skirted bra from Lengberg Castle, East Tyrol, circa 1410-1480; 3a) Front and back of eyelet; 4) Sprang insert on the reconstructed skirted bra; 5) Pattern of the cup; 6) Construction of the eyelet row; 7) Front (a) and side view (b) of the reconstructed skirted bra on a custom-made dress form, waist = 71.5 cm; bust = 84 cm (European size 36). © B. Nutz, A. Bläckner.

(12 threads per cm). There is also an indication that there was a centre seam in the rib cage area of the front of the skirted bra, the clever shaping of which may have helped the bra lie close to the body.

The space between the cups of the extant bra now has only fragments of needle lace remaining, but probably also held a sprang (*Collingwood 1999*, 33) inset connected to a fingerloop braid (*Nutz 2014*, 118) with simple needle lace.¹ This inset served two purposes; it helped the cups lie flat, and the sprang may have also provided coverage for the décolletage.

A small but important detail of note is the narrow hem on the extant bra, with a doubled (two 2-ply yarns) linen sewing thread still attached. The hem has sewing holes in it indicating that there was originally stitching along that edge. This indicates the presence of attached skirts. The eyelets are sewn with a simple whip stitch (**Fig. 1/3a**) in contrast to the eyelets on a silk facing from London dating to the 14th century (*Crowfoot et al. 1996*, 164). A twisted cord is encased in the fabric's edge where the eyelets are located at the side of the bra. This is stitched in place with back stitch (**Fig. 1/6**). This cord reinforces the fabric's edge, ensuring the garment fits closely without deforming the body of the bra.

The body of the skirted bra ends at what was most likely the natural waistline, just below the ribcage. Narrow shoulder straps made of fabric strips folded in half and whip-stitched closed remain intact; one strap was mended at some point with a blue linen thread. The back of the garment is missing.

4. POSSIBLE PICTORIAL EVIDENCE OF 'BREAST-BAGS'

Manuscripts dating from the mid-15th century begin to show a particular undergarment with skirts that is reminiscent of the Lengberg bra. These garments feature pleated/gathered skirts, and depict breasts as separate and lifted; a new fashion made necessary by a change in gown styles. Although these garments do not show separate cups, the sheer number of images supports the idea that a skirted undergarment was most likely an effective solution to breast support in 15th century Germany and Austria (**Fig. 1/1**).

Many of these manuscripts also show a particular gown style, which features pleats in the front just under the bust and sometimes 'apple breasts' (**Fig. 1/2**). The construction of these gowns requires support for the breasts in an underlayer. The presence of the 'skirted bra' and an extant gown of this pleated type in the Lengberg finds supports the idea that the underlayer consisted of a supportive garment. Without this supportive layer, the profile of the breasts would change, and would not appear as separate, lifted breasts.

5. WRITTEN SOURCES ON BREAST SUPPORT

Several medieval texts mention the age-old problem of breast support as ways of achieving the desired ideal of beauty, for example, Henri de Mondeville in his 'Cirurgia' (*Mondeville 1893*, 590) and Konrad Stolle in his chronicle for the year 1480 (*Stolle 1854*, 189-190). While some writers did not voice an opinion or mocked the 'bundling up' (*Descamps 1832*, 142), some did, and the authorities of Strasbourg obviously considered it so damnable that their sumptuary law issued in 1370 demanded: 'That no woman, whoever she is, from now on show off her breasts, neither with shirts, nor bands, skirts or other prisons, ... that her breasts may not be seen, ...' (*Brucker 1889*, 292).

Despite the occasional expression of disapproval, the medieval beauty ideal of small, firm breasts may have led to the ‘invention’ of ‘breast bags’ (or ‘bras’) and consequently to the ingenious use of the bias properties in dress design at the end of the Middle Ages to effectively show off the ‘apple breasts’.

6. THE RECONSTRUCTION OF THE SKIRTED BRA

A reconstruction was made to demonstrate what the original garment may have looked like when it was new (**Fig. 1/7a, b**).

The body and skirts of the reconstructed garment are made of a mid-weight oyster linen with a thread count of 15 threads per cm, and the cups are of a slightly finer, thinner linen with 18 threads per cm. The threads used in the reconstruction are hand-spun linen plied yarn (z-spun, S-twist) made to match the extant threads as closely as possible. The four different stitch types in the extant garment were also used in the reconstruction. These were overcast stitches for the hems, whip-stitches to connect the skirts with the body of the bra, backstitches along the centre front and the eyelet edge (with encased cord), and a double running stitch (a running stitch with a second running stitch to fill in the empty spaces) on the cups. Double running stitch is mainly used for embroidery and, coming from Italy, spread throughout Europe in the 16th century (*Bergemann 2010, 290*). At Lengberg, however, it was used for a seam that needed extra strength and stability and, since neatness seems to have been unimportant, it was executed rather untidily. Half-fell seams are used throughout the reconstruction.

Three different thread manipulation techniques were used to embellish the space between the cups: sprang, fingerloop braids, and needle lace. The sprang covers the décolletage (**Fig. 1/4**), in the same pattern found in another sprang piece from the Lengberg finds. It was shaped to fit the space by untwisting unnecessary areas and fixing them in place, thus removing extra bulk. Fingerloop braid was used to span the space between the top edges of the bra, and is connected to the sprang with a simple needle lace pattern. Needle lace is also used to embellish the inner cup edges. The sprang inset is sewn directly to the needle lace. A ‘broad lace with five loops’ (*Benns – Barrett 2005, 39; Nutz 2014, 126*) is used for all the fingerloop braids, including the braids used to lace up the garment.

The skirts serve a surprising practical purpose: without attached skirts, the garment would ride up and bunch up underneath the breasts. This problem is solved with the addition of attached skirts, with the weight of the skirts keeping the body of the bra in place. The skirts on the reconstruction are intended to fall to mid-calf on a woman of approximately 158 cm based on the historical height average of European women in the 15th century (*Koepke – Baten 2008*).

Although the extant garment is missing its right side, the reconstruction is made to lace up both sides to accommodate weight gain or loss. Lacing along one side would misalign the garment if the wearer gained weight and the lacing needed to be loosened. The lacing eyelets continue to the hip.

The skirts are made of two wide panels sewn together with a running stitch and pleated along the top edge using a technique similar to the shirts in the Lengberg finds, using a stem-stitch to fix the pleats in place (*Nutz – Stadler 2012*). A narrow strip covers the pleating stitches on the inside. The skirts are whip-stitched in place with a doubled thread.

This garment served as the layer worn next to the skin, with additional layers of garments, including a smock and a gown and possibly another in between them.

7. WOMAN'S GOWN LINING FRAGMENT

The woman's gown fragment consists of one side of the front of the gown. There is no back section (**Fig. 2/8, 10**). The style of the original gown is similar to that seen in a copper engraving dating 1460 to 1465 (**Fig. 2/9**). It is made of a fine linen fabric with 12 to 13 threads per cm (**Fig. 2/11a**) in a natural cream colour, stitched with a heavier weight cream linen plied yarn.

The lining is made of two main sections: a shoulder piece cut on the straight of grain, and a breast panel, which is set on bias point into the shoulder piece (**Fig. 2/8**). The breast panel also has a very clever side dart, which is part of the seam setting the panel into the shoulder piece, and this helps to curve the fabric over the side of the breast. Because of this dart, the grain of the fabric runs straight down between the breasts, allowing for the fashionable well defined look. The breast panel seam is strengthened with a strip of selvedge from the same fabric as the lining. The front pleats are formed by the fullness of the breast panel, and are secured in place with a row of stitching, with a linen thread tie extending from this edge (**Fig. 2/8**).

There are only a few tiny fragments of the original blue wool left on the outside (**Fig. 2/11b**), but these show that the wool was laid over the top of the linen lining after the latter had been sewn together, and the wool was pad stitched in place over the curved sections. Evidence for this construction technique is seen in a small section of wool remaining, which extends over the top of the linen seam, matching the bias grain of the linen, where there is no seam in the wool. This method would have resulted in the wool being on the bias grain at the shoulder. The lining thus became the supportive structure underneath it, with the wool being secured to it with pad stitching, preventing the wool from stretching out of shape at the neck and shoulder. The edges of the woollen pieces were then turned under, stitched with a spaced back stitch, and secured to the edge of the lining with a whip stitch. The linen has no edge finish to prevent fraying, even so the edge is only very slightly frayed.

8. GIRL'S GOWN LINING FRAGMENT

The girl's gown fragment has one half of the front, and the full back section extant (**Fig. 2/15, 16**). It is the only known surviving remnant of this type of pleated gown, and is similar in style to the back of the gown in a painting by the Master of Uttenheim dated 1470 to 1480 (**Fig. 2/13**). The lining is of a heavy weight linen with 7 to 8 threads per cm (**Fig. 2/14a**), with a finer linen of 12 threads per cm shoulder section (**Fig. 2/14c**), which places the front shoulder seam and neckline on the straight of grain (**Fig. 2/15 front**), similar to the women's gown. A heavier weight dark brown linen thread is used for all of the stitching.

The pattern shape for the back is ingenious, and allows for minimal fabric waste while fully utilising the bias grain in the design. The back shoulder seam and full length of the back straps are on the straight of grain. The short centre back seam appears to be on the 45° bias grain but it is actually a complex curve, as seen in the off-cut from a woman's gown of the same style found at Lengberg (**Fig. 3/19** – colour plates section). This complex curve allows the straps to be angled at 45° to 50°. The angle of the curve is then gradually reduced to 0° to ease out most of the angle into the centre back. During the reconstruction process, it was discovered that without this curve, the junction between the centre back seam and the straight grain body section is too sharp, and the fabric pokes out in an unsatisfactory way. Even with the curve, this is still a slight problem, but this issue is easily resolved by steaming the wool well, stretching it and pounding it flat as it cools. The wool and linen both flatten out during this process and the armholes also begin to open.

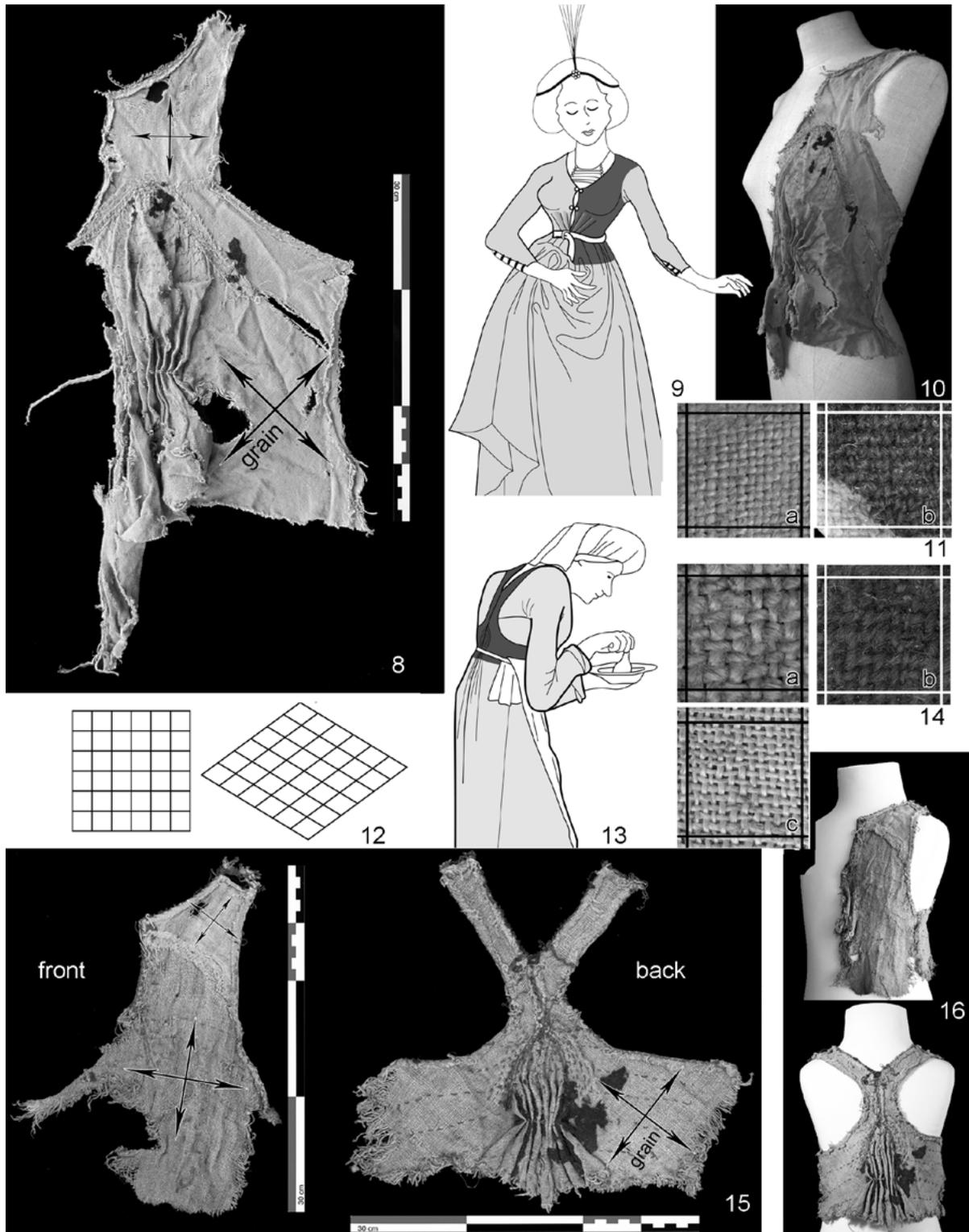


Fig. 2: 8) Fragment of the woman's gown from Lengberg Castle, East Tyrol. Linen lining with outer layer of blue wool with grain lines; 9) Partial re-drawing of a young girl, workshop of Master E.S., circa 1460-1465. The part of the dress that corresponds with the fragment from Lengberg is highlighted in dark grey; 10) Fragment of the woman's gown – three-quarter view – on a dress form European size 36; 11) Linen lining (a), blue wool fabric of outer layer (b), squares = 1 cm x 1 cm; 12) Schematic of the grain of the fabric rotating to the bias and collapsing into a diamond shape; 13) Partial re-drawing of servant, Birth of the Virgin Mary, Master of Uttenheim? circa 1470-1480. The part of the dress that corresponds with the fragment from Lengberg is highlighted in dark grey; 14) Linen lining (a), blue wool fabric of outer layer (b), linen lining of front shoulder part (c), squares = 1 cm x 1 cm; 15) Fragment of the girl's gown from Lengberg Castle, East Tyrol. Linen lining with outer layer of blue wool. Front and back of the gown with grain lines; 16) Front (top) and back (bottom) of extant gown on a dress form for a four-year-old child. © B. Nutz, A. Bläckner.

The armholes themselves are cut very small – see **Fig. 3/17** (colour plates section), where an offcut has been photographed next to the finished armhole. The latter is considerably larger than the piece cut away. If the armholes had been cut as large as they are in the finished garment, there would be insufficient fabric for the centre back pleats, and they would stretch out of shape quite easily. As this small armhole is expanded by the insertion of the sleeves, the fabric released by this expansion shifts from the sides to the centre back, and allows for the extra fabric needed for the back pleats.

The wool outer layer is cut in one piece on the fold. The back of the linen lining is in two pieces, seamed with a back stitch. The fold of the wool layer is caught in the linen seam, securing it to the lining, and creating a false centre back seam in the wool layer only, which was essential to the construction of the fan of back pleats.

The curved centre back seam in the wool was sewn in back stitch, and the seam allowances were opened up and back stitched in place. The edges of this gown were finished in a similar fashion to those on the woman's gown.

Pad stitching was also used, as in the woman's gown, to secure the wool to the linen, stabilising it and preventing it from stretching (**Figs 2/15, 3/18** – colour plates section). Bands of stitching secured the two layers around the armholes and in the upper front and back. Rows of pad stitching, with additional rows of back stitch and chain stitch also stabilise and frame the area around the top of the back pleats. The pleats are secured by several passes of threads through the pleats on the front, and a second row of stitches on the back, which secures the pleats to each other.

The front pleats were formed by a 45° angle extension from the centre front, and one row of chain stitches roughly following the straight of grain acts as a frame for the front pleat.

9. TAILORING TECHNIQUES

The gown fragments found at Lengberg offer a unique view into the tailoring techniques of the 15th century. Textile remains from this period of fashion are rare in the historical record. The breasts are not commonly visible as two separately defined mounds in the outer clothing layer. Cloth does not naturally dip between the breasts. It continues in a straight line between the two breast points. In order to accomplish this dip, the techniques used to create the Lengberg garments are highly instructive, relying heavily on the use of the bias in order to curve the fabric between the breasts.

These gowns are masterpieces of working with the grain of the fabric – by stretching it and shaping it – to achieve the desired result. The tailors used the bias in various ways to create the pleats, using different methods in different places on the gowns. As the grain of the fabric rotates to the bias, the threads do not remain square, but collapse into a diamond shape (**Fig. 2/12**).

To accomplish this desired shaping, the wool was pad-stitched into place over the curved linen lining, and then the two layers were stretched and shrunk into the desired shape using a damp pressing cloth and hot iron.

The reconstruction of the girl's gown (**Fig. 3/17, 18** – colour plates section) led to an interesting finding that these gowns appear impossible to recreate without the use of an iron. The iron is an especially important tool in the shaping of the back. Sad irons are known at least from the 14th century (*LoeCherbach 2006*, 60-63; **Fig. 3/20** – colour plates section) and can be seen in depictions of tailors' workshops (**Fig. 3/21** – colour plates section) but there were no actual indications that tailors of this time were using them to manipulate the shape of the fabric as 19th century tailors did.

10. CONCLUSION

These rare garment finds give us a unique view into the tailoring techniques which were lost with the change in women's fashion at the end of the 15th century. The support achieved by the skirted bra allows for a gown which skims the body and is not at all supportive of the bust. The impressive use of the bias, darts, pad stitching and iron to shape the garment were unexpected in garments of this era, and are the earliest evidence for such techniques. The study and reconstruction of these garments have found answers to many questions about the layers required to achieve the fashionable ideal of this era.

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Notes

1. See https://www.uibk.ac.at/urgeschichte/projekte_forschung/textilien-lengberg/nadelspitze/index.html.en [last accessed 14 November 2017].

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VIII. COLOUR PLATES SECTION



R. Case – M. McNealy – B. Nutz: **The Lengberg Finds.** Remnants of a lost 15th century tailoring revolution (pp. 167-176)

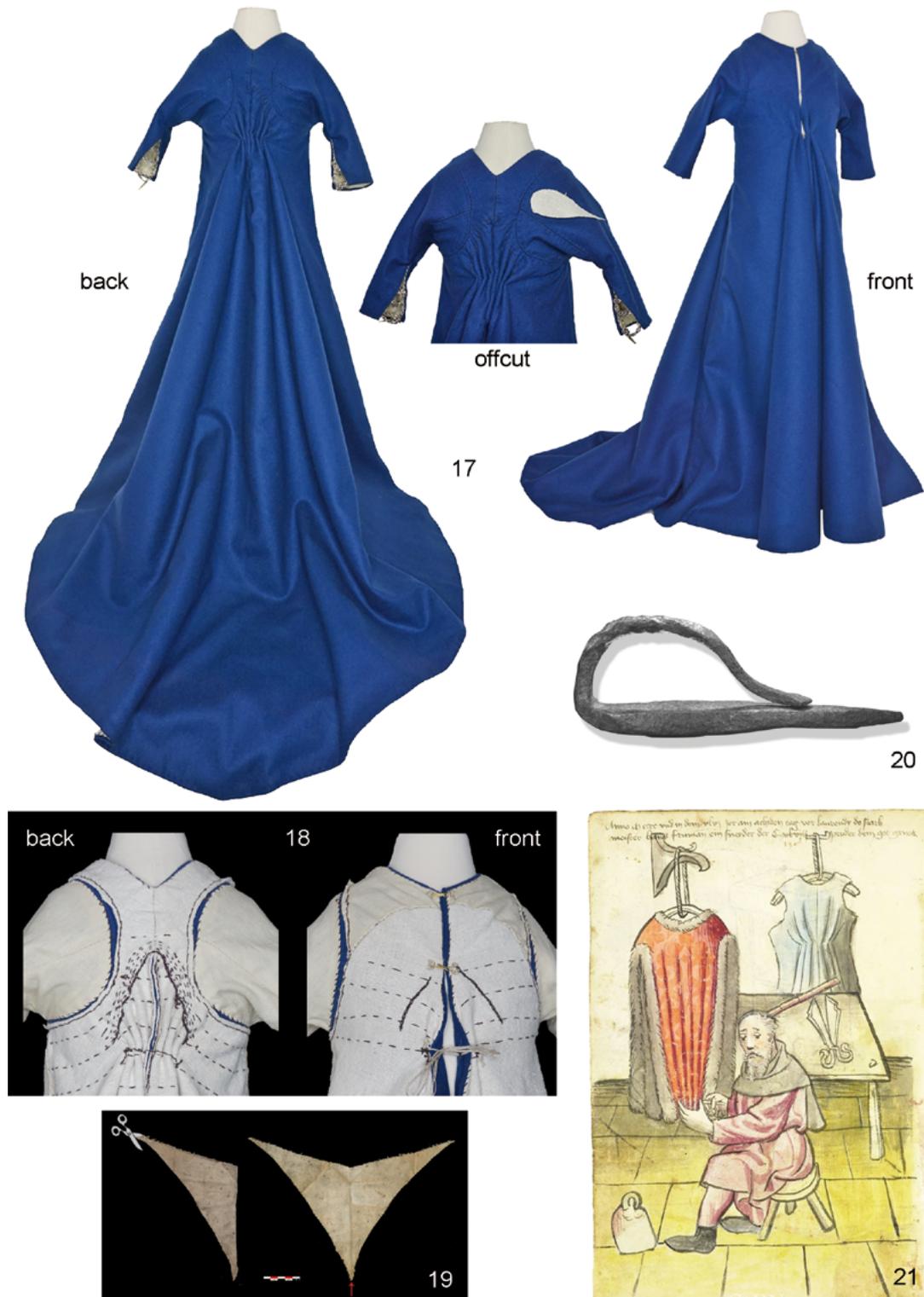


Fig. 3: 17) Reconstructed girl's blue gown. Full back and front views and back with offcut of the armhole from the linen lining; 18) Close-ups of the inside of the gown (linen lining), back and front view. © M. McNealy; 19) Triangular offcut, cut on the fold, linen, z-spun single yarn, balanced plain weave, 13 to 14 threads per cm. © B. Nutz; 20) Sad iron, total length: 183 mm, max. width 36 mm, Tyrol, circa 1360 to 1450. According to *LoeCherbach 2006*, 63; 21) Tailor from the 'Zwölfbrüderstiftung' with iron on the floor at his left foot. © Stadtbibliothek Nürnberg, Amb. 317.2°, folio 67v.