

A poor man's armour? Late-medieval leather armour from excavations in the Netherlands

Marloes Rijkelijhuizen and Marquita Volken

Introduction

The fourteenth century is known as a transitional period for armour. The shift from mail to plate armour is noticeable from effigies and historical sources. At the beginning of the fourteenth century, plates were strapped on top of mail, but during the following century, plate armour gradually replaced mail. Mann (1960, 12) suggests that metal plate armour had been developed in the thirteenth century for the shoulders, elbows and knees and that these could have also been made of leather.

Depictions of knights do not necessarily indicate the materials used or the fastening methods of the armour. Effigies mostly represent high-status individuals who could differ greatly from ordinary soldiers. The armour shown on the effigies could be slightly idealised to create a positive image of the deceased and impress those who viewed the monuments, though some carvings are remarkably detailed and do contribute to an understanding of the armour shown. Other stone sculptures showing common soldiers might be more representative, although the materials used can be difficult to identify with certainty. Small details are usually not visible or were perhaps simplified to make the carving work easier. The effigies and pictures therefore can act as an indication of what medieval armour looked like, but archaeological finds are an essential contribution to our knowledge of leather armour in the late medieval period. Excavated examples are rare and often not recognised as being parts of armour.

This paper aims to describe and present the first research about leather armour pieces from excavations in the Netherlands that have been found so far with the goal of contributing to knowledge and recognition of leather armour parts. Several research questions have been asked. How can we interpret leather armour? Was leather armour really a poor man's solution? Can we see leather armour as an experiment during the transition to plate armour or as specialised armour for tournament or other purposes? Where were these pieces made and by whom?

Armour gloves and gauntlets

The development of plate armour is also noticeable for gauntlets. While hand protection in the thirteenth century largely consisted of mail, some plate gauntlets also came into use. These consisted of a series of small metal plates attached to each other and/or attached to a leather, or possibly textile, glove. The finger protection plates covered only the back of the fingers. Plate gauntlets, made entirely of metal plates, have been found at the site of the battle of Visby (1361) (Lindholm and Nicolle 2003). Another notable example is the gauntlets of the Black Prince (1330-1376), which were preserved above his tomb as part of his achievements. The part protecting the hand was made of one piece of plate metal, but the finger protection consisted of several small plates attached to a leather glove and covering the back of the fingers. The leather glove was made of chamois tanned leather (Waterer 1981).

The fact that metal gauntlets have been used in combination with leather gloves can also be seen on an exceptional find from Delft, the Netherlands. Fragments of a metal gauntlet with a leather glove have been excavated in the city canal and probably date between 1300 and 1370. The metal and leather fragments have been conserved and a reconstruction made by Gotscha Lagidse (pers. comm. Steven Jongma, archaeological department of the municipality Delft (Archeologie Delft)). This reconstruction leaves the top of the fingers protected by nothing more than the flexible glove. Perhaps metal finger protection pieces were not present or leather finger protection pieces were originally sewn to the flexible glove, but have not been preserved.

Leather finger protection pieces from Dordrecht

Three recovered leather finger protection pieces, which protected the back of the finger, are unique artefacts that provide new information about the use of leather for hand protection. The finds are from the city of Dordrecht: two from the Statenplein site (D-S1 and D-S2, figures 1 and 2) (Rijkelijkhuizen 2013a; 2013b; Van der Dorst 2014), the third from the site at Heer Heymansuysstraat (D-HH). The first finger protection piece was found in 1997; the second is from the 2001 excavations. The excavation at the Heer Heymansuysstraat, where the third finger protection piece was found, was carried out in 1978. Due to the shrinkage that may have occurred since the excavations, we must keep in mind that the recent measurements may deviate from the original dimensions.

The thickness and rigidity of these leather fragments indicate that they were intended as protection for the back of the fingers. According to Goubitz's notes on the leather finds from the Statenplein excavation, the leather was sewn onto a glove made from thinner, more flexible leather (figures 1 and 2). Thus the use of leather finger protection pieces, which were attached to leather gloves and covering the back of the fingers, is comparable to the use of metal plates. It is possible that these leather finger protection pieces were used in combination with metal (demi-) gauntlets. The exact use of these finger protections is uncertain; they

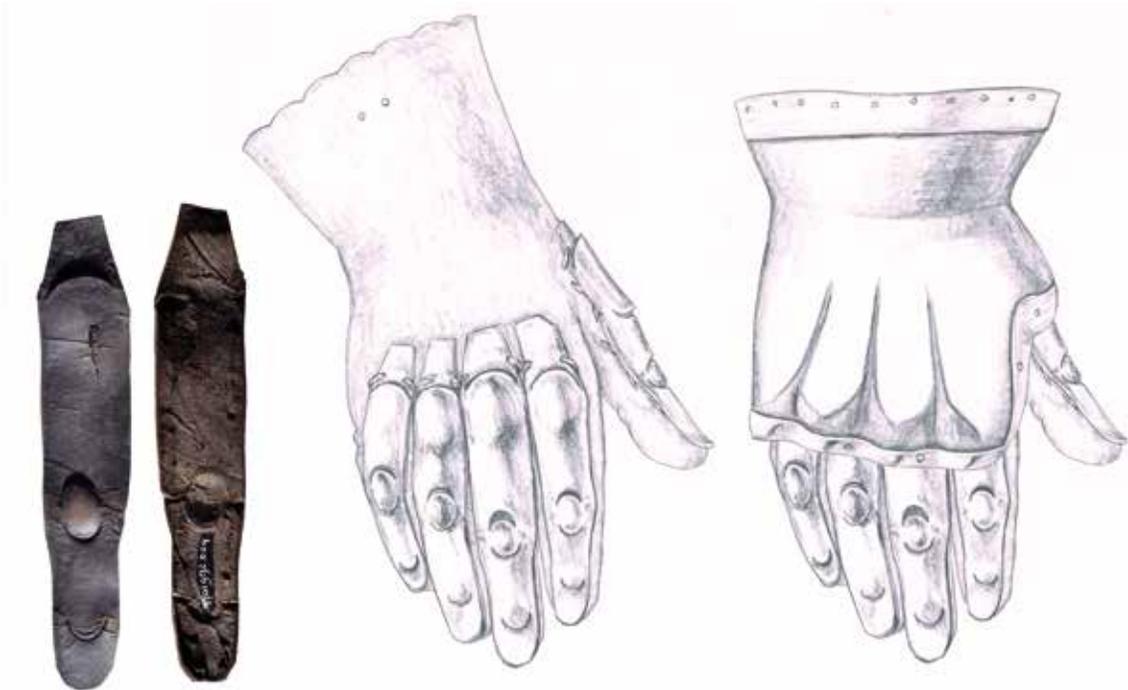


Figure 1 Finger protection piece from Dordrecht (D-S2; front and back view) and reconstruction drawing with and without metal demi-gauntlet. From the collection of the Regional Archives Dordrecht. Photograph by Roel Weenink. Drawing by Marquita Volken



Figure 2 Finger protection piece from Dordrecht (D-S1; front and back view) and reconstruction drawing of finger protection pieces sewn onto a glove. The leather back of the hand protection is hypothetical. From the collection of the Regional Archives Dordrecht. Photograph by Roel Weenink. Drawing by Marquita Volken

could have been used for military equipment, as part of tournament gear or for specialised work applications.

The first finger protection consists only of the first two joints (D-S1: find number 2001.060.006, figure 1). Made from 5 mm-thick adult cowhide, the current length of the fragment is 75.5 mm, the width of the finger part is 23 to 25 mm. The middle of the fragment has a circle shape, made by two half-circular cuts, with a third half circle at the end. The diameter of the circle is about 17 to 18 mm. The circular cuts were placed over the finger joints in order to improve the flexibility. The hinge made by the small joint between the half circles is a design weakness, shown by the breakage at the second finger joint. Stitch holes are visible along the edge on the flesh side of the fragment; the corresponding holes on the grain side were sunk in a channel and therefore protected from abrasion. The object was found in a landfill layer that was dated between 1325 and 1400. The context could not be associated with a particular house or other structure.

The second finger protection is complete and measures about 16.5 cm in length and 20 to 32 mm in width (D-S2: find number 9701.892.004, figure 2). It is thinner than the first finger protection, but also made from adult bovine hide. The finger protection has a small half circle punched through the leather for the first joint, two half circles punched through for the middle joint and a larger semi-circular cut into the surface of the leather for the knuckle. The top end of the piece finishes with a roughly cut rectangular shape with stitch holes at each side near the semi-circular cut. The flesh side has tunnel stitches around the edge. This finger protection was found in the same landfill layer as the first, but near a house, and also dates between 1325 and 1400. A large quantity of leather was found in the vicinity of this house, possibly representing waste from a leather workshop.

The Heer Heymansuysstraat example resembles the first Statenplein finger protection piece, but is complete - 10.5 cm long and 22.5 mm wide (DHH: find number DDT 968). The current thickness of the leather is approximately 4 mm. The rigid leather still shows the curve made by flexing the fingers. Two circles, composed of two half-circle cuts, allowed each finger joint to follow the movement of the hand. Stitch holes are present along the edges, except for the tip of the finger. The stitch holes on the upper side, the grain side of the leather, were sunk in channels in order to protect the stitching from abrasion during use. The finger piece tip was probably cut off and possibly re-sewn. This could have been an adjustment or a repair. In contrast to the Statenplein find, the finger piece from the Heer Heymansuysstraat also has impressed lines arranged in two rectangles. Unfortunately, the find comes from an unstratified context. Also at the Heer Heymansuysstraat site, part of a metal gauntlet was found (Inv. No. 7501.591.001). The measurements are 10.5 x 4.5 cm and weighs 26 grams. It probably dates to the fourteenth century and has an imprint of textile covering. It is impossible to say if the metal gauntlet fragment and the leather finger protection piece were found in the same context.

Vambraces

The vambrace protects the forearm and was either made of metal or leather or a combination of both materials. The oldest known find of a pair of leather vambraces was in 1937 by a fisherman working on the Schelde River in the Netherlands. He discovered a heavy wooden chest on the river bottom. When the chest was opened, the contents included several wooden, leather and metal objects dating from the late medieval period. Among the finds were a case with six wax tablets, a wooden box with coin weights (1340), silver coins, a leather coin box, round wooden boxes, a pilgrim's metal flask, an axe handle, a leather scabbard and some roots of the Asian herb *rizoma galanga*. In addition there were fragments of mail and leather armour, probably for the arms and legs. The overall date for these objects is most likely the fourteenth century (www.maritiemdigitaal.nl; <http://beeldbank.cultureelerfgoed.nl>). Unfortunately, the storage shed in which the finds were kept was bombed during the Second World War, and all that survives of the armour is a photograph of the chest with some of the objects placed around it. We can see that the leather armour was actually well preserved. It is possible to discern the metal strips riveted to the leather vambraces and pairs of holes at the top and bottom edges for laces (figure 8).

A more recent discovery from an excavation in Leiden produced a leather vambrace and that has been studied in great detail. The Leiden vambrace was made of two layers of leather and measures 28 cm in length (Brandenburgh 2006). This vambrace shows similarities with two vambraces, a left and a right, which were both recovered from the same site in Estonia (Mäesalu et al. 2008; Pruus 2010, 43, 55). Both the Leiden vambrace and the Estonian vambraces were strengthened and/or decorated with small cone-headed nails riveted to metal strips. All of the vambraces fastened to the arm by buckles and two leather straps and none show pairs of holes for lacing. The lack of lacing holes may be an indication that these items were worn independently and not attached to clothing or other pieces of leather armour.

The Dordrecht vambrace

In Dordrecht a leather armour piece came to light during the examination of previously excavated and stored material (figures 3 and 4). Among the material recovered in 1997 from the Statenplein site, a vambrace was rediscovered by the researchers of the Archaeological Service of Dordrecht and recognised as leather protection piece for the forearm and dates between 1250-1350 (Rijkelijkhuisen 2014; Dorst 2014). A drawing by Olaf Goubitz of this object was published in his book *Purses in Pieces* as an 'unknown object' (2007, 110, figure 4). The same site (Statenplein) also produced two of the three finger protection pieces. The vambrace, measuring about 22 cm long, was made of hardened leather and moulded to fit the forearm perfectly. Originally fastening with two straps and two buckles, the latter were cut off, presumably for re-use. The straps were attached by passing out through slots parallel to the edges and the ends

stitched down on both sides of the slots. The straps are now missing but the cut-off strap ends for the buckles are still in place. A curved vent near the elbow was sewn shut to fit around the elbow. The two attachment straps and sewn vent at the elbow are comparable to those on the Leiden vambrace. Along the opening edges are two parallel impressed lines. Several pairs of holes in the leather along the edges were probably used to secure the gauntlet to the joining pieces or the garment. The Dordrecht vambrace differs from the other excavated examples, because it lacks the



Figure 3 Dordrecht vambrace. From the collection of the Regional Archives Dordrecht. Photograph by Roel Weenink

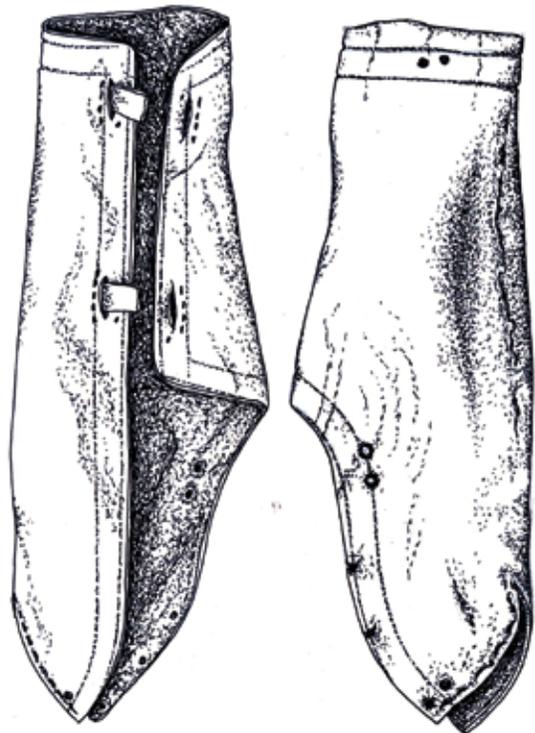


Figure 4 Dordrecht vambrace. From the collection of the Regional Archives Dordrecht. Drawing by Olaf Goubitz (previously published in Goubitz (2007))

Rerebraces

The richly decorated T-shaped object in the British Museum is a well-known example of hardened leather used as partial body protection. Its function has been interpreted differently through time, but the current thought is that it was a rerebrace for protection of the outer side of the upper arm. The use of a T-shaped rerebrace is also known from effigies and statues. For example, a statue of a soldier from St Bavo's abbey in Ghent, Belgium, shows a rerebrace that covered the outer side of the arm and could be T-shaped. This statue is dated to 1340. Other examples are the sleeping soldiers from the Holy Sepulchre in Freiburg im Breisgau, Germany, which show similar, probably T-shaped, rerebraces (Martin 1967). It is however difficult to determine if these rerebraces represent metal or leather examples.

An Italian fresco painting by Jaquerio from 1440 shows a decorated leather rerebrace (Giacomo Jaquerio 'Salita al Calverio' in the abbey of St Antonio di Ranverso, Torino). The soldier leading Christ to Calvary is wearing a pair of richly-decorated rerebraces on his upper arms. The finely-painted detail of the foliage-like decoration and the black-brown colour indicate that these are made of tooled leather. The fastening method is not visible but the T-shape can be seen. He is also wearing greaves that appear to be made from a single piece of leather that wraps around the leg and is held in place by a wrapping thong. The clearly vulgar facial expression and rudimentary clothing presents a high contrast to his leather finery, indicating that this is not an ordinary soldier but a person of low demeanour.

Rerebraces from Dordrecht

The British Museum rerebrace is the only example that has been recognised as such so far. However in Dordrecht are two similarly shaped pieces recovered previously from archaeological excavations that had been stored in different places and forgotten. A possible third piece, visible in a photograph with the previous two examples, was also excavated in Dordrecht, but has not yet been found in the archives. This example features metal rivets along the edges and was used for the reconstruction of an adult in armour for the battlefield shown in figure 12. Similar to the nailed/riveted vambraces, this piece does not have pairs of holes for attaching to other pieces or to clothing.

Of the two rerebraces from Dordrecht the first example comes from the Tolbrugstraat-Waterzijde site excavated in 1969 (find number Dd 69-285, figure 5) and is dated between 1325 and 1450. The second was found at the Heer Heymansuysstraat in 1975 (find number DDT 75-527, figure 6). Unfortunately this object is undated.

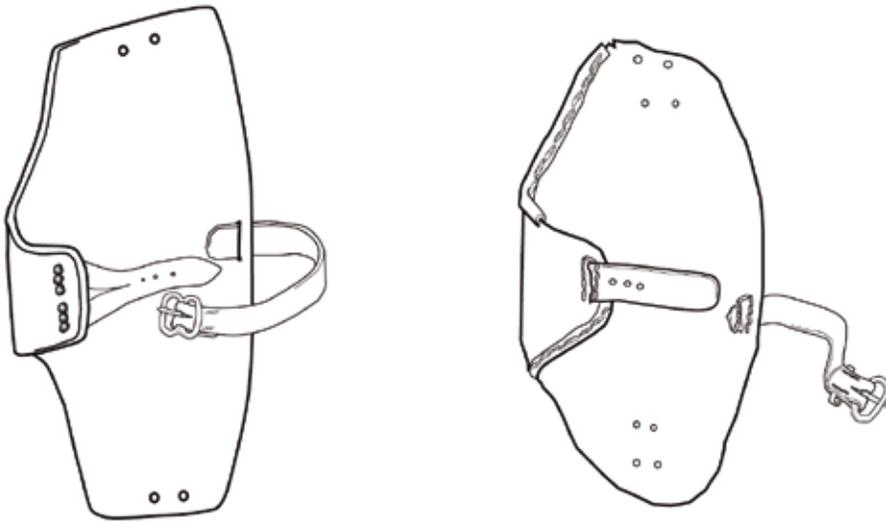
The first T-shaped rerebrace from Dordrecht is decorated and measures about 25 cm long and 19.5 cm wide (figure 5). Orienting the piece vertically, the narrow extension is to the right. The long side to the right has a gentle outwards curve, the top angles down slightly towards the right; the bottom is level. The edges are all plain cut and appear to



Figure 5 Dordrecht rerebrace, with detail of the grotesque figure (Tolbrug-Waterzijde). From the collection of the Regional Archives Dordrecht. Author's photograph



Figure 6 Dordrecht rerebrace, with detail of leather strap fragment (Heer Heymansuysstraat). From the collection of the Regional Archives Dordrecht. Author's photograph



have been burnished smooth. Around the edges is a border composed of two parallel impressed lines. Within this border the decoration is organised by horizontal divisions made of three impressed lines and alternating short vertical columns of lines formed by a row of circular stamps. At the centre is a large circle containing a grotesque figure with a large head in profile, a hood and two elephant like legs. The figure is made with impressed lines and a stamped background of circles using the same tool as that used for the vertical columns. Creatures like these are common in medieval paintings and manuscripts. It is said that these, and other hybrid and grotesque creatures and strange depictions, may have had a symbolic meaning as well as being decorative. It is not possible to determine if colour was used to enhance the figure and make it stand out from the leather. The direction and position of the figure's face also confirms orientation for the top and bottom of the rerebrace.

The rerebrace fits to the upper arm, most likely with the extension wrapping partially around the inner arm (figure 7). In this position the Dordrecht rerebrace would be used on the right arm. At each end of the horizontal central axis are the places where the securing strap would be fixed. On the extension's end are two groups of rivet holes aligned vertically along two slots. Originally a split strap had been inserted in the slots and fixed in place with large headed rivets that anchored in a narrow metal bar on the flesh side of the leather. On the opposite side of the split strap, another strap, perhaps with a buckle, was riveted into a slot. The strap with a buckle was broken or torn off. The area around the slot on the left side is broken, but the torn edges and grain surface impressions indicate that large headed rivets were used, probably with a similar bar and rivet system as the left side. The left side strap probably extended from the slot under the leather for four to five centimetres since the grain surface shows a raised worn rectangle in this area, though there is no clear impression of a strap on the flesh side.

Figure 7 Reconstructions of the Dordrecht rerebraces. Drawings by Marquita Volken

On the top and bottom of the rerebrace are pairs of holes. From the grain (outer) side, wear-marks from laces can be seen, V-shaped at the bottom and straight to the edge on the top pair but no wear or stretching can be seen around the holes, particularly on the flesh side, nor is there distortion from pulling in one direction or the other. This lack of distortion, but impression of ties, indicates that the holes were used for laces and that the rerebrace was lined with a stronger material. The top and bottom of the rerebrace may have been tied to mail, a padded coat or to other leather elements.

This decorated piece is thin, with a present thickness of about 1.5 to 2 mm. Several facts point to the use of a lining or second layer. A single layer of thin leather is insufficient as a protection. The flesh side is uniformly smooth and compressed; normally the flesh side of leather has visible loose collagen fibres. A second layer was therefore probably present on the inner side of the rerebrace. This also explains why there are no strap impressions on the inner side of the rerebrace. The smooth flesh side of the leather and the absence of stitching around the edges indicate that a second layer was glued to the rerebrace as a lining. There are no remains of the lining preserved nor are any impressions visible on the rerebrace. This lining could have been of rawhide or parchment, possibly glued on with either wheat paste or casein glue, both used by sword sheath and shield makers. The impressed border around the piece is slightly visible from the flesh side, indicating that the leather was pressed hard against a surface that yielded slightly. These types of creasing along the margins, plus the burnished edges, are techniques that would have been used to secure the edges of the glued leather to a support. The rerebrace from the British Museum has a leather lining of thinner calf leather. This lining was made of at least three pieces whip-stitched together to cover the entire back of the rerebrace, only the large central part remains. If worn over mail, the vegetable tanned leather could make the iron rust very quickly. Metal plate armour was often worn directly over mail; being secured either by laces or straps and buckles. The mail itself would most likely not have been worn directly over clothing, but on top of some form of padded garment. The leather therefore did not need to be very thick, because it would not be the only protection.

The second rerebrace from Dordrecht is undecorated (figure 6). It is also T-shaped and used for the right upper arm. It measures 26.5 cm long, 20 cm wide and is about 2.5-3 mm thick. The extension has a single long slot and stitch holes (figure 7). Wear marks indicate that the strap end was attached on the inside of the rerebrace with a U-shaped seam (with stitching along both sides of the slot and across one end) and went through the slot to the outside of the rerebrace. On the opposite side, a strap, probably with the buckle, was attached in the same way. A small piece of the strap is still present in the slot.

Like the first example, this also has two pairs of holes at the top and bottom, presumably used for lacing the rerebrace to the undergarment or

a mail coat or possibly to other pieces of leather armour. The secondary attachment of the rerebrace is at this time still not perfectly understood. Some of the holes were made later. The bottom two pairs of holes and one pair of the top holes are later adjustments. These holes are not circular, but made by punching through the leather. The holes do not show much wear or any stress or distortion, which could suggest that the rerebrace was not used long after the readjustment.

The flesh side of the rerebrace is very smooth and a lining was probably used. Stitch holes are present along some of the edges. These stitch holes may indicate a bound edge with a narrow strip of leather. No thread impression can be seen on the grain or flesh side, an indication that the binding strip covered the edge completely. The edges lacking stitch marks have been cut down to make the whole piece smaller. Cut marks are clearly visible along some of the edges. After cutting down the rerebrace, some of the holes had to be remade. The bottom part was cut down more than the upper side, which only needed two new holes. This, together with its irregular shape, suggests that the rerebrace was altered and re-used by a smaller, or younger, person.

Greaves and shin guards

By the end of the thirteenth century, plate armour had developed to cover all the major areas of the body, including the legs. Leg protection is often shown on effigies and statues, but it is uncertain from which material this was made. Plate leg protection, though in use, was still relatively uncommon in the early fourteenth century. Examination of the written sources demonstrates that leg defences may have been in wider use than the archaeological and effigial evidence suggests (Gravett 2008, 104, 111).

Figure 8 Photograph of some of the finds from the Schelde chest, object number 20.295. © Rijksdienst voor het Cultureel Erfgoed, Amersfoort



Greaves and shin guards could have been made of both metal and leather or a combination of both (Richardson 2011). Historical sources mention leather greaves being used in tournament (Moffat 2010). According to Waterer (1981, 62-63), decorated moulded leather greaves occur on the effigy of Carluccio Vulcano (1345). However, leather greaves or shin guards have not been identified in archaeological or museum collections thus far.

The only examples of leather leg guards known are the two examples from the Schelde chest (figure 8). There is no description or details present of these protection pieces and the actual pieces themselves were destroyed during World War II. From the black-and-white photograph of the discovery we can see that the leg protection pieces on the left side of the photograph were guards and only protected the front of the leg. They represent the same style as the vambraces from this chest and metal strips were most likely riveted to the shin guards as a reinforcement.

Body armour

The basic body defence in the thirteenth century consisted of a mail coat, known as a hauberk. Also during this period additional body defences, the pair-of-plates and the (leather) *cuirie* or *cuirass*, were probably developed and worn under the surcoat and over the hauberk (Gravett 2008, 77). It is unclear exactly when the first pair-of-plates and leather *cuiries* came into use. Archaeological evidence is scarce and the armour depicted on effigies of knights from this period is usually covered with a surcoat that conceals what was worn underneath.

A glimpse of an additional body defence can be seen on the effigy of a knight at Pershore Abbey, Worcestershire, England (about 1270-1280). On his side a kind of body armour can be seen between the mail coat and the surcoat. This body armour, which could represent a (leather) *cuirie*, consisting of a breast and back plate, or a pair-of-plates, was buckled at the sides (Gravett 2008, 46, 70; Nicolle 2002, 217). Manuscripts also indicate that leather *cuiries* (or *cuirasses*) were in use in the thirteenth century (Gravett 2008, 46; Nicolle 2002, 211). It is possible that these *cuiries* were reinforced by plates (Gravett 2008, 104). It is not known if all leather *cuiries* were made of hardened vegetable tanned leather; some may have been made from supple vegetable-tanned leather or even buff (oil-tanned) leathers (Nicolle 2002, 211).

Specialised tournament armour appeared in the thirteenth century. The use of leather *cuiries* is mentioned in the Purchase Roll for the Windsor Tournament of 1278 (Gravett 2008, 51-52). According to Nicolle, the use of hardened leather armour of *cuir bouilli* gradually shifted from the battlefield to the tournament during the second half of the thirteenth century (Nicolle 2002, 211). Moffat states that type-specific armour for war and different types of tournament was already well established at the beginning of the fourteenth century (Moffat 2010). The mid-fifteenth-century illuminated French treatise on tournaments by René d'Anjou

states that both metal armour and hardened leather armour was used (Bibliothèque National de France, Ms Fr 2695, ff. 16v, 17r). The image (f. 17r) shows the front and back view of an arm protection consisting of a leather vambrace joined by a round couter to the upper arm piece, which is topped by a shoulder protection or spaulder.

Archaeological examples of body defence from the battlefield have been found at Wisby (Denmark, battle of Wisby, 1361), including several types of pairs of plates. These body defences were built up from metal plates connected with metal rivets to a textile or leather base (Lindholm and Nicolle 2003). Finds of body armour are rare and only a single example of a leather body defence is currently known; it was found in the Netherlands, excavated in the 1980s, and briefly mentioned in the Valkenburg site's publication. However, it has since has been overlooked by researchers.

The Valkenburg body armour

The exceptionally well-preserved fourteenth-century leather body armour, consisting of a breast and back plate, was found in a moat during the excavations at Valkenburg (Zuid-Holland, the Netherlands, Bult and Hallewas 1990, figure 9). The breast plate is 42 cm tall at the sides, the width across the top edge is 39 cm, and the bottom is narrower at only 20 cm. From the centre of the neck to the bottom edge is 38.5 cm. The top right corner is slightly fragmented. The back plate is larger than the front plate, also with fragmentation on the top, but on the left side. The sides measure approximately 44 cm long and probably about 39 cm wide across the top. The bottom is 21 cm wide. From the centre of the back of the neck to the bottom edge is 40 cm long. Both the front and back plate are made from a single thickness of bovine leather.

Various types of holes and stitch marks are present on the sides of the plates. At least six pairs of corresponding pairs of holes on both sides of the plates indicate that the breast and back plates were laced together at the sides. The pairs of holes are not evenly spread along the length of the plate but rather are mainly distributed along the upper half of the plates; some of the pairs are positioned horizontally, others vertically. It is possible that some of the holes were later adjustments. At the top corners one or two larger holes are present. At the centre of the neck is a pair of small holes. These, and the top holes at the sides, were probably used to lace the plate to a garment.

Parallel to the edges of both plates runs a row of stitch holes with deep thread impressions on the grain sides. Stitch marks with thread impressions on the grain surface also form the seven vertical lines on both plates. The stitches could indicate that a lining was sewn to the leather, possibly even containing metal bands or other reinforcement material. No metal was preserved and no corrosion residue is visible; however, the body armour was excavated years ago and the conservation and storage may have affected any former traces. The clear impressions of the stitching thread on the grain side shows that if a covering was



Figure 9 Body armour from Valkenburg. From the collection of the Provinciaal Archeologisch Depot Zuid-Holland. Author's photograph

sewn on by the seams then it would have had to be very thin to allow the stitching to mark the leather surface. The row of stitches across the bottom of the front appears to have been cut off. At the shoulders the row of stitch holes are placed a short way in from the edges, forming long rectangular shapes. Possibly these areas served as a base for leather straps or textile bands permanently connecting the breast and back plate, thus distributing the weight of the body armour on the shoulders (figure 12). Another possibility is that some kind of fastening system was used for the shoulders. The body armour therefore could be put on over the head or fastened at the shoulders. The laces at the sides were used for adjustment.

The size of the body armour is rather small and this makes it unsuitable for an adult. The size and material used would make it appropriate for training armour for boys (figure 12). The leather surface shows cut marks, with one particularly deep cut on the edge that slices into the body of the back plate. One can only speculate if these marks were made while the armour was being worn or if they were made afterwards.

Unidentified pieces

Another piece of leather armour (figure 10) came from the same moat as the breast and back plate described above. The overall shape is a domed oval with one end cut straight and it is made of two layers of leather with the grain sides facing outwards. The two layers of leather create a rigidity and strength that is still present in the curved, dome-like moulding. Not

taking into account the distortion produced by the moulded shape, the overall length is about 19 cm and the width between 14 cm and 15 cm. Before the pieces were moulded into their present shape, the flat pieces used for the armour were probably slightly larger to accommodate the curved final shape. Along the straight edge are large stitches holes, either from a butted seam or perhaps from a thick edge binding. At several places along the plain cut edge of the domed section are short rows of four to six stitch holes.

Due to the fact that this piece was found in the same context as the breast and back plate, it is likely that this piece of armour was part of the same defence ensemble. Though the piece resembles a spaulder, a small, slightly shaped plate for the shoulder (Gravett 2008, 112), it appears to be slightly too long. It may have been used as an alternative defence for the upper arm or the thigh/knee area. The stitching on the edges of the piece may have been from an edge binding or possibly sewn permanently to a garment or to a piece of equal width, thus making it part of a longer object.

A small rectangular piece of leather with a few stitch holes was found in the same context and based on thickness and rigidity of the leather it could belong to the body armour. It is 4.5 cm in length and 3.5-4 cm in width. Perhaps it was painted with a coat of arms and used as an ornament on the body armour or clothing.

Miscellaneous items

Many excavated leather objects or fragments remain unidentified in museum and archaeological collections. Some may have been used as armour or as part of an armour, but are not recognised as such, for example two miscellaneous pieces from Dordrecht (figure 11). The pieces were perhaps reused or home-made, but the exact function is still unknown. Publication might help in the identification of these pieces.

The first object is a longitudinal piece of thick and rigid leather with rounded edges and decorated with gilded *fleurs-de-lys*. This decoration indicates that it must have been an expensive and prestigious object. *Fleurs-de-lys* are often used in heraldic designs. Stitching holes or lace holes are absent and the use is therefore unclear. Its irregular shape and cut marks on the edges indicate that it was possibly cut out of an armour piece and later served a secondary use.



Figure 10 Unidentified piece from Valkenburg. From the collection of the Provinciaal Archeologisch Depot Zuid-Holland. Author's photograph



Figure 11 Miscellaneous pieces from Dordrecht. From the collection of the Regional Archives Dordrecht. Author's photograph

The second group of objects consists of two rectangular pieces connected with leather laces. The use of this object is not understood, but it could possibly be a home-made connecting piece. One of the problems of interpreting the leather armour pieces is how these were fastened. The question remains whether the armour pieces were fastened to the undergarment or if connecting pieces, of leather or metal, such as couters, were present. The reconstruction drawing (figure 12) shows an interpretation of these objects as home-made couters (armour defences for the elbows).

Archaeological context

The pieces of leather armour come from six sites: Leiden, Valkenburg, the Schelde River and three in Dordrecht. Though information about the context of each site is useful for interpreting the finds, research has not been completed for most of the excavations. The site at Leiden is published and a preliminary publication is available for the medieval site at Valkenburg. Street plans and structures for two of the three excavation sites at Dordrecht, Heer Heymansuysstraat and Tolbrugstraat-Waterzijde have been published by Sarfatij (2006), but the reports do not include the small finds. A full report on the third Dordrecht site, the Statenplein, has recently been published (Dorst 2014).



A leather worker at the Statenplein site

The Statenplein excavations began over 17 years ago and have produced a great quantity of archaeological leather which appears to be related to a structure identified as a leather worker's house. Though a vambrace and two finger protection pieces were found, only one of the finger protections was found in the vicinity of the leather worker's house. Since the archaeological leather layer in the landfill is from the same period as the occupation of the leatherworker's house, it is plausible that these objects can be related to the workshop. A great variety of objects were found, including scabbards, cases, gloves, shoes, and straps

Figure 12 A young boy with training gear and an adult dressed in leather armour for the battlefield. Drawing by Marquita Volken

(Dorst 2014). Amongst them was a unique find, a flat circular leather panel decorated with fabulous animals and a grotesque figure of a knight with an animal body. Its precise function has so far not been determined (Paalman 2009). Around the edges are slots, and if a strap was passed through, then the resulting shape could well serve as a cover for a drum. The depiction of the grotesque figure, the knight with an animal body, may indicate that it was used as a cover for a drum for tournaments.

Another unique find is a piece of stamped decorated leather, possibly part of clothing. The decoration, consisting of lozenge shaped stamps showing castles, *fleurs-de-lys* and flowers, is arranged in vertical panels. At each side, the leather is folded under to form a hem, and along these edges are a series of lace holes.

Other finds from the Statenplein craftsman are leatherworking knives and sketches on slates (Dorst 2014). It shows that the craftsman drew elaborate designs on slates before executing these on the leather objects. These intricate designs and the variety of products indicate clearly that this was a specialised leatherworker working for the upper class. Only two of these specialised leatherworkers are known from the late medieval period in the Netherlands; the artisan at Statenplein and a leatherworker from Hoorn. The remains of the leatherworker's house in Hoorn can be precisely dated between 1280 and 1310 and must have had the regional elite as customers (Van de Walle-van der Woude 2007). Perhaps the leather worker in Dordrecht succeeded the leather worker in Hoorn as a regional supplier of expensive leather objects.

An English/Scottish merchant

The artefacts from the Schelde River were exceptional. When found in 1937, the conservator of the Vlissingen museum, H. G. Grol, made a brief description of the chest and its contents, and, based on the coins, suggested that it belonged to an English or Scottish merchant (Algemeen Handelsblad 20-08-1937; <http://kranten.kb.nl>). The chest contained wax tablets for noting calculations, a balance scale for weighing gold and silver coins, medicinal roots and wooden jars also containing some kind of medicine. Also in the chest were pieces of leather armour (vambraces and leg guards) and mail.

Rich or poor?

In 1987/1988 the remains of a late-medieval moated enclosure with a brick building (*hofstad*) was found at Valkenburg (Zuid-Holland, the Netherlands). The thin enclosure wall and small, shallow moat as defensive structures are more likely to be signs of high-status occupants rather than a military installation. The brick house was probably built around 1300 (Bult and Hallewas 1990). This property belonged to the Van der Speck family. Historical and archaeological evidence indicate that this impoverished aristocratic family could not afford to maintain the house, which was eventually demolished around the end of the fourteenth century. From the beginning of the fifteenth century various

family members were forced to forfeit their military service, an indication that they were not able to afford the necessary personal armour, and by the middle of the fifteenth century this family were considered as peasant class with noble antecedents (Bult and Hallewas 1990). When the house was demolished at the end of the fourteenth century, the rubble was used to fill the moat. Among the rubble and filling were the leather cuirass (breast and back plates) and other leather pieces. Also found was a spur, an object reserved for use in the Netherlands by nobles only (Bult and Hallewas 1990). The small size of the body armour indicates that a young boy used it, probably during arms training.

Conclusions

The waterlogged Dutch soil has preserved extraordinary finds of late-medieval leather armour. These enigmatic pieces have few parallels in Europe and therefore provide valuable information on leather armour from this period. Much about this leather armour is, however, still not understood and more pieces could be still be hidden in archaeological storage. It is important that we recognise and study these objects in order to better understand late-medieval leather armour.

Leather armour may have been in use for a long period of time; most of the pieces presented here can be dated to the fourteenth century. The leather armour pieces could have been made locally. Based on the archaeological finds and the iconographical sources we can conclude that several pieces can be worn together or separately, in combination with or without metal armour parts. By the late fourteenth century, plate metal armour largely replaced the use of leather.

The leather armour pieces were found in high status contexts and therefore we can confirm that it was not a poor man's solution for metal plate armour. These pieces could have been used both on the battlefield and in tournament, particularly after specialised tournament armour was developed.

The leather armour reinforced with plates and rivets was not suitable for tournament and probably used only on the battlefield. Another option is the use of leather armour specifically by young boys when training (figure 12). The armour pieces were in use for a long period of time and sometimes altered and reused by another person and, therefore, could have served several purposes, including being reused for training.

Acknowledgements

Deborah Paalman, Mirjam van Oeveren, Marc Dorst, Jacqueline Hoesenberg and Roel Weenink from the Regional Archives Dordrecht/Dordrechts Museum; Frits Kleinhuis, Provinciaal Archeologisch Depot Zuid-Holland; Steven Jongma, archaeological department of the municipality Delft (Archeologie Delft); Chrystel Brandenburgh and Anne Hiske Grimme, Erfgoed Leiden; Nicolas Baptiste, Université Savoie,

Chambéry (Fr)/Musée Masséna, Nice (Fr); Marc van Hasselt, Archeon; Pol Verbeeck, Zeeuws maritiem MuZEEum; Tom Bilter.

References

- Anjou, R. d'.** 1460 *Traittié de la forme et devis comme on fait les tournoz (Le livre de tournois)*, Paris: Bibliothèque Nationale, Fr 2695, ark:/12148/6n168449033b.
- Brandenburgh, C. R.** 2006 'Een zeldzame leren armbeschermer uit Roomburg', in C.R. Brandenburgh (ed.), *Archeologisch onderzoek Roomburg 2003, Bodemonderzoek in Leiden 17*, 127-132
- Bult, E. J. and D. P. Hallewas** 1990 'Een onbekende begraven hofstad aan de Achterweg te Valkenburg (ZH)', in E.J. Bult and D.P. Hallewas (eds), *Graven bij Valkenburg, III: Het archeologisch onderzoek in 1987 en 1988*, Delft: Eburon, 188-97
- Dorst, M. C.** 2014 Stadsontwikkeling op het Statenplein. Opkomst en ondergang van een 14^e eeuwse ambachtswijk in Dordrecht, *Dordrecht Ondergronds* 40
- Goubitz, O.** 2007 *Purses in pieces. Archaeological finds of late medieval and 16th century leather purses, pouches, bags and cases in the Netherlands*. Zwolle: Stichting Promotie Archeologie
- Gravett, C.** 2008 *Knight. Noble warrior of England 1200-1600*, Oxford: Osprey
- Lindholm, D. and D. Nicolle** 2003 *Medieval Scandinavian armies 1300-1500* (2) (Men-at-Arms 399), Oxford: Osprey
- Mäesalu, A., J. Peets and E. Haiba** 2008 'Nahast küünarvarrekaitsmed keskaegsest Tartust', *Muinasaja teadus*, 17: Loodus, inimene ja tehnoloogia 2. Tallinn Ülikool, 27-36
- Mann, J.** 1960 *An outline of arms and armour in England from the early middle ages to the civil war*. London: Her Majesty's Stationery Office
- Martin, P.** 1967 *Waffen und Rüstungen, von Karl dem Grossen bis zu Ludwig XIV*, Fribourg: Office du Livre
- Moffat, R.** 2010 'The manner of arming knights for the tourney: a re-interpretation of an important early 14th century arming treatise', *Arms & Armour* 7 (1), 5-29
- Nicolle, D.** 2002 'Jawshan, cuirie and coats-of-plates: an alternative line of development for hardened leather armour', in D. Nicolle (ed.), *A companion to medieval arms and armour*, Woodbridge: The Boydell Press, 179-221
- Paalman, D.** 2009 'Mooiste vondst uit de collectie van archeologie: schildfoedraal', *DIEP Cultuur Historisch Magazine Dordrecht* 12, 10-11
- Pruus, F.** 2010 'Keskaegsed jäätmekastid Tartus Munga tn 12 hoovis', unpublished BA thesis, Tartu Ülikool, Ajaloo Ja Arheoloogia Instituut
- Richardson, T.** 2011 'Armour in England 1325-99', *Journal of Medieval History* 37 (3), 304-320

- Rijkelijkhuisen, M.** 2014 'A rediscovered leather vambrace from Dordrecht, the Netherlands', *Archaeological Leather Group Newsletter* 39, 7-8
- Rijkelijkhuisen, M.** 2013a 'Handig! Leren handschoenen uit Dordtse bodem', *Cultuur* 4, 8-9
- Rijkelijkhuisen, M.** 2013b 'Leather gloves and mittens: examples recovered from the Netherlands', *Archaeological Leather Group Newsletter* 38, 5-9
- Sarfati, H.** 2006 'Dordracum excavatum. Opgravingen in Dordrecht, archeologie van een deltatad', unpublished PhD thesis, University of Amsterdam
- Van de Walle-van der Woude, T.** 2007 'Draken en basilieken', in C. Schrickx and T. Van de Walle-van der Woude (eds), *Hoogtepunten uit Hoornse bodem*, Hoorn: Uniepers uitgevers, 19-23
- Waterer, J. W.** 1981 *Leather and the warrior. An account of the importance of leather to the fighting man from the time of the ancient Greeks to World War II*, Northampton: The Museum of Leathercraft