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Arming shoes of the fifteenth century

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Abstract – Military footwear for the fifteenth century includes arming shoes worn under sabatons. Written sources suggest arming shoes and footwear used for fighting were ordinary shoes adapted for the purpose. Archaeological footwear was examined for signs of such modifications. Medieval shoe technology is presented, showing the range of footwear and its uses and gait biomechanics. Based on experiences from re-enactors wearing armours, medieval shoe styles are discussed for appropriateness as arming shoes. The question of why medieval military footwear shows no purposed development is addressed.

Keywords – Arming shoes, fifteenth century shoe fashion, footwear technology, turn-shoes, pattens, repair soles, gait biomechanics.

I. INTRODUCTION

Specialised footwear for the military is a modern concept. At the beginning of the nineteenth century, General Blucher's infantrymen were the first to wear a purpose designed military ordinance shoe, today known as a Blucher boot[1]. The advent of consumerism in the twentieth century generated footwear production for specific markets created by selling strategies based on perceived need rather than actual function. The overwhelming variety of purpose-designed footwear available today imposes specific footwear for each type of physical activity. The present skewed compartmentalisation of purposed footwear can present an obstacle for identifying a medieval military shoe or the 'arming shoes' worn with armours. The modern idea of a shoe specifically made for use with armours or for military manoeuvres in the fifteenth century is seemingly at variance with fifteenth century iconographical sources and assemblages of archaeologically recovered leather shoes. Only the rare mentions of arming shoes in household expense accounts suggest that specially adapted or designed shoes for armour existed. Examination and evaluation of text, iconography and recovered archaeological footwear may, in combination with biomechanics and practical experimentation, help to identify what fifteenth century arming shoes may have been.

[1] Partridge, *A Short Etymological Dictionary of Modern English*, p. 51.

II. BIOMECHANICS (GAIT AND GROUND SURFACES)

Something noticeable among late medieval images of men marching is their straight-legged 'open scissor' style of walking. Is this merely a contemporary artistic style or does it reflect what artists saw? It may be an indication of the fore foot strike method of walking and running. Medieval shoe soles recovered from archaeology show wear patterns associated with fore foot strike- the most common wear area on medieval soles is directly under the metatarsal heads- where the impact and friction takes place. Some soles may show wear taking place at the back, but rarely on the point of contact associated with a heel strike, rather a wearing off on the lateral or medial edges. Osteological evidence from European archaeology shows a change in arthritis patterns occurring around the beginning of the sixteenth century[2] with hip or 'riders' arthritis being typical for the Middle Ages and earlier periods, changing to arthritic damage in the knees for post medieval and modern periods. The forefoot impact wears directly on the hip joints, while the heel strike destroys the knees. The medieval shoe's wear patterns in relation to those visible on the robust sole constructions invented around 1500 and post 1600 heeled footwear was noticed by June Swann in 1959, who consulted Olaf Goubitz in the 1980's; he confirmed that the wear patterns do show a change in foot strike[3].

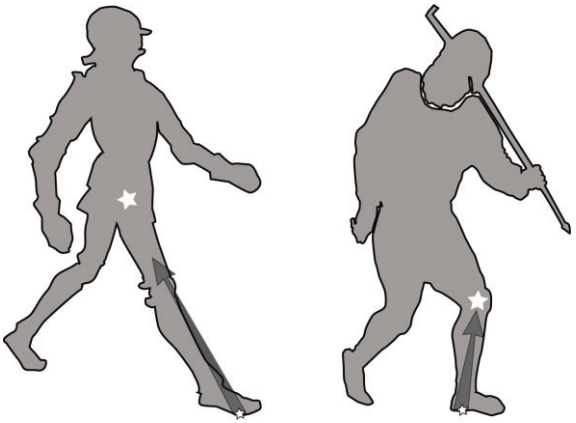

Figure 1. On the left, Medieval silhouette showing forefoot strike impact leading to the hip joint, on right, early sixteenth century silhouette showing heel strike impact leading to the knee (drawing M. Volken).

The role of footwear is important for the manner in which people walk, run, march and fight. The types and methods of construction for shoes, associated pattens and repair soles are a technological response to the variety of ground encountered at the time. During the fifteenth century, most roads were natural beaten earth, sometimes paved

[2] Waldron, *Shadows in the Soil*, p. 60.

[3] Swann, 'Walking before shoe heels', first page.

with wood or gravel. Concerns with sanitation in cities introduced street paving in the form of cobblestones or bricks, which became widespread by the end of the fifteenth century[4]. The change in the walking surfaces had an immense impact on the types of shoes being produced and by extension, the manner in which people walked. Paved streets quickly wore down the thin leather soles on turn-shoe construction shoes and contributed to stress on the legs and feet. Between the last ten years of the fifteenth century and the first ten years of the sixteenth century, more robust constructions were developed for making shoes with two or more sole layers: the welted construction and the stitched down construction[5]. The thick soled shoes and the paved streets eventually led to the invention of integral sole repairs in the late sixteenth century and the raised heel in the early seventeenth century. These developments also changed the manner in which western people walked- the protected heel area on the shoe allowed a heel strike method of walking, which is now considered as normal. But before the abrupt and consequential changes of the end of the fifteenth century, the fore foot strike, the natural gait for humans, was prevalent.

The foot is a complex structure of bones and muscles, capable of great strength due to the arch. The arch of the foot works as a spring, compressing during the foot strike and releasing the force when the foot is lifted from the ground. Rigid soled shoes change this natural gait to a rear or heel strike, a difference which has only recently been researched in regards to injuries sustained by modern runners, particularly barefoot runners who started wearing thick soled shoes[6]. The change from fore foot strike to a heel strike gait must be taken into account when considering the suitability of medieval footwear for modern recreations of ancient arming practises and combat techniques. Lower leg injuries among barefoot runners who change to thick-soled footwear also happen to people who change from a heel strike gait to the forefoot. In both cases, the muscles of the foot and lower leg are not able to rapidly rebuild to the new method thus causing crippling, long lasting pain. The function of fifteenth century arming shoes must take into account the forefoot strike as being the norm.

III. ARMING SHOES IN WRITTEN SOURCES

Written sources suggest that arming shoes were ordinary shoes with adaptations. The Hastings manuscript[7], dating from the middle of the fifteenth century, describes such an adaptation:

> *Also a pair of shoes of thick cordwene, and they must be fitted with small whipcords, with three knots upon a cord, and three cords must be sewn fast onto the heel of the*

4 Goubitz, *Stepping Through Time*, p. 79; Leguay, *La rue au Moyen Age*, 53-62, 66-84.

5 Volken and Volken, 'Der Schuhtechnologische "Big Bang" der Wendezeit'.

6 Lieberman et al, 'Foot Strike Patterns…'.

7 Pierpont Morgan Library, New York, Hastings Inv. Ms 55, fol 122b-123b.

> *shoe, and fine cords in the middle of the sole of the same shoe. And that there be between the frets of the heel and the frets of the middle of the shoe the space of three fingers*[8].

This passage relates to arming a man when he is to fight on foot. Curiously enough, this adaptation for creating grip on the soles has not yet been identified among the thousands of medieval leather shoes and soles recovered in archaeological excavations in England and Europe. While the cords sewn to the sole might well provide grip, the stitches in the leather would weaken the sole and the vegetable fibres create a moisture wicking effect and contribute to cold, wet feet. The Hastings text continues with the procedure for putting on armour, mentioning only that "first you must set the sabatons and tie them to the shoe with small points that will not break". Again, no evidence for holes or other additions on recovered fifteenth century archaeological footwear that show how the sabaton could have been physically integrated with the leather shoe. Perhaps this text should be interpreted more in the spirit that the sabatons are tied with points that do not fix directly to the shoe but were held fast with points fixed to the sabatons and tied at the back of the foot and under the sole, with a pointed cap at the toe to keep it in place. The points could have also been fixed to a mail foot covering.

Figure 2. Reconstruction of cords sewn on turn-shoe soles (fifteenth century shoe reconstruction and photo by M. Volken).

[8] Hastings fol. 122b: *Also a payre of shone of thikke cordwene and they muste be frette with smal whipcorde thre knottis up on a corde and thre coordis muste be faste sowid un to the hele of the shoo and fyne cordis in the mydill of the soole of the same shoo and that there be between the frettis of the heele and the frettis of the myddill of the shoo the space of thre fyngris.*

The late fifteenth century household expense accounts of Louis de la Trémoille, Viscount of Thouars, include various articles of footwear, with the costs paid, for the month of September 1495[9]. The modest price of 7 sous was paid for pair of shoes for the lackey but two pairs of slippers, presumably for the Viscount, cost 60 sous. A pair of shoes is listed as costing 35 sous and one pair of arming shoes for 40 sous. The five sous difference could be interpreted as the cost of adding layers to make the sole thicker since the text stipulates that it has five soles and one of felt. Until the invention of rubber soles in the 20th century, felt soles were used for traction on slippery ground. The disadvantage of felt and vegetable fibre cords sewn to a leather sole is the moisture wicking effect, making the shoes unsuitable in cold and wet conditions (common cause of hypothermia for 19th and 20th century mountaineers[10]).

These written sources seem to indicate that arming shoes were merely ordinary suitable shoes with additions to the soles for creating a less slippery soled footwear. Other than the sewn on cords, the types of sole additions or repair half soles used on medieval footwear can be seen among the recovered archaeological finds[11].

IV. MEDIEVAL FOOTWEAR, CONSTRUCTION, REPAIRS AND SHOE STYLES.

Shoes from the fifteenth century do not show a particular marketing strategy for shoe types. The available shoe styles (fashion) were probably more determined by shoemakers and the guild laws concerning production. The types of footwear produced covered a basic range: turn-shoe construction shoes and boots, wood pattens with a leather strap for outdoor wear, leather covered cork pattens for indoor wear, and towards the latter part of the fifteenth century, leather covered cork mules. Members of the shoemaker's guild made shoes, and wood and leather covered cork pattens were made by the members of the patten maker's guild. The third branch consisted of the cobblers, who were permitted to work only with used footwear either to repair or to 'translate' old shoes into 'new' ones. The control over shoe production was enforced by the guilds, and as a consequence, shoe styles and their associated cutting patterns are uniform through out Europe, with no identifiable local styles or fashions. For each generation of shoemakers there seems to be a few standard cutting patterns used to make a variety of shoe styles as based on fastening method.

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9 Barthélemy, 'Comptes de la maison de Louis de la Trémoille…', p. 180.

10 The death of six mountaineers in 1935 of hypothermia due to inadequate footwear led to the invention of rubber soled climbing shoes by Vitale Bramani, the invention bears his abbreviated name 'Vibram', <https://en.wikipedia.org/wiki/Vibram>.

11 Goubitz, *Stepping Through Time*, pp. 75, 84, 86, 118 ; Volken/Volken 'Les chaussures de la porte de Romont à Fribourg du XIVe au XVIIe siècle', pp. 156, 174, 176, 177, 178 ; Volken, 'The shoe finds from Criblet in the city of Fribourg (Switzerland), pp. 381, 385 ; Volken/Volken, 'Les cuirs des Halles du Molard 2-4 à Genève', pp. 42, 59, 60, 62.

IV.1. The technology of medieval shoe construction and sole repairs.

Medieval shoes were made with a turn-shoe construction, a technique that imposes a single layer of relatively thin (2-3 mm thick) leather for the sole. The sole and upper of the shoe are fixed to a wooden shoe last, with the inside of the shoe facing the outside. The sole/upper seam is stitched, then the wooden last is taken out and the shoe turned right side out. The leather for medieval shoes uppers is relatively thin. For the fifteenth century, calfskin (between 0.6 mm to 2.0 mm) predominates but adult cow (2.0 mm to 3.0 mm) was used to a lesser degree. Goatskin has two grades depending of the sex of the animal, young and female goats can be as thin as 0.4 mm thick and rarely more than 2.0 mm but adult male goat can be as thick as 4.0 mm. Bovine leathers are firm and elastic; caprinae skins have a looser, spongy structure[12]. Since turn-shoe construction favours lightweight leathers for the uppers, shoemakers compensated by sewing in centre back and side linings- but not toe puffs since this area must be the most flexible for starting the turning process.

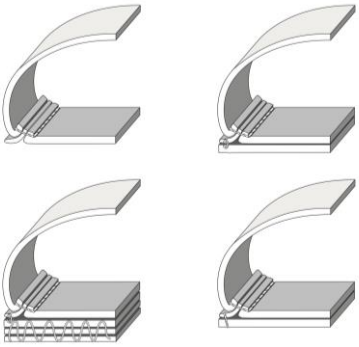

Fig 3. Turn-shoe constructions in profile: top left turn-shoe with rand, top right turn-shoe with tunnel stitched repair sole, bottom left turn-shoe with added multi layer repair sole, bottom right turn-welt construction (drawing S. Volken).

After the shoe has been turned, thicker more robust 'repair' soles could be added to the front and back with tunnel stitches (a serpentine single thread sewing technique) but due to forefoot strike manner in which people walked, could not bridge the centre of the sole. The forefoot strike requires the arch of the foot to be free of restriction. In light of the technology and quality of leather during the fifteenth century, full length soles, stitched to the rand, also known as turn-welt construction, appear to break apart under the arch of the foot, probably due the flexing of the foot during fore foot strike. The poor results obtained from full length soles may have put this attempt at improving the thickness of soles under sanctions of the shoemaker's guilds as inferior quality products were often seized and publically destroyed as well as having fines or other punishments exacted from the faulty shoemaker. An example of a new, never worn

12 Haines, *The Fibre Structure of Leather*, pp. 4-6.

shoe with a turn-welt sewn full-length second sole from the Halles du Molard site in Geneva Switzerland shows deliberate destruction by slicing through all layers of the shoe[13]. While it may have been seized and destroyed for reasons of poor leather quality, the early date of this example of turn-welt construction (1414 CE) may also be an indication of a new technique that was not approved of by the shoemaker's guild and destroyed because of it.

Repair soles were added after the shoe was made, sometimes before the shoe had been worn but usually after the soles had thinned due to wear. Some archaeologically recovered shoe soles show signs of being repaired several times[14]. In the late fourteenth century a particular type of repair sole appeared, made from several layers of old uppers, sewn together with a single thread serpentine stitch that quilted the layers together, and attached to the shoe sole like an ordinary repair sole with a tunnel stitch around the outer margin[15]. This technique assembling several layers of leather to make thick repair soles added to the front and back of the shoe' sole corresponds to the adaptation specified in the household accounts of Louis de la Trémoille. Among the many examples of this type of layered repair sole no signs of a felt layer have been found.

Very rare examples in the archaeological record and in iconographical sources show large headed nails used to attach front and back repair soles. The few examples of this type of clumsy repair use carpentry nails with long shafts, which were hammered over on the inside of the shoe and obviously caused some discomfort[16]. A thin turn shoe sole is not strong enough to support a true nailed or riveted construction. It is doubtful that a shoemaker would have made this nailed type of construction, and possibly is not even acceptable as cobbler's work, and may represent 'unauthorised' modification of ordinary shoes, particularly for travellers and pilgrims. Two figures of pilgrims in the church at Thann, Germany show repair soles added with large headed nails (fig. 4). Adding something to an ordinary shoe for specialised work can be seen in the medieval whaling industry- 'blubber spurs' were a type of three or four pronged iron cleat fastened with thongs or straps to the shoe sole so the worker could climb and walk over the body of the whale without slipping[17]. Similar devices were tied to medieval shoes for walking on ice or other slippery surfaces and occasionally being permanently attached to the shoe sole[18].

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13 Volken and Volken, 'Les cuirs des Halles du Molard 2-4 à Genève', pp. 41-42, fig. 9 f.

14 A late fourteenth century example from Constance Germany showed six sets of tunnel stitching for repairs, Volken forthcoming.

15 Volken and Volken, 'Die Lederfunde der Hundestrasse 95 in Lübeck', p. 385.

16 Goubitz et al., *Stepping Through Time*, p. 86, fig 20.

17 Ibid., p. 311.

18 Ibid., pp. 311-12.

Figure 4. Sculpture of a pilgrim praying, with nailed repair soles, Thann DE, c. 1430-50 (Photo by Andreas Petitjean).

IV.2. Pattens and mules

Apart from added repair soles, the mediaeval solution for walking in wet, muddy conditions with thin-soled shoes was to use wooden pattens. Stilted pattens are ideal for walking in muddy streets or snow, the stilts and long toe provide grip and lever action while the wood is a perfect insulation against cold and wet ground[19]. Pattens were taken off when entering a building, leaving the mud at the door. A drawback of wood pattens being worn while walking on wooden paving is that when both are wet it is slippery. This was solved by patten irons, bars of iron nailed across the stilts and along the bottom of the long toe[20]. While the wooden streets and footpaths rarely survive in archaeology, patten irons show they once existed. For insulating the foot indoors, leather covered cork pattens were used from the early fifteenth century. These often had triangular shaped straps decorated with scenes representing love, fidelity or 'wild men and women'; a testament to their use as marital engagement symbols[21]. The leather covered cork patten construction was adapted to make mules in the middle of the century and first appears in iconographical sources as being used by women inside the home, following the tradition of leather covered cork pattens[22]. By the turn of the

[19] Volken, 'Lopen op trippen, Het belang van het experiment'.

[20] Goubitz et al, *Stepping Through Time*, p. 261.

[21] Ibid., p. 264.

[22] Catalogue *Spättmittelalter am Oberrhein, Maler und Werkstätten 1450-1525*, cat. No. 141, p. 253, Oberrheinischer Meister, *Birth of the Virgin*, 1460-65, mules on footstool, left altar wing from Kloster Ottobeuren, Stuttgart, Würtembergisches Landesmuseum, in. No. 5258.

century, men are portrayed wearing broad toed mules being worn with what may probably be termed as a buskin, a soft chamois type leather legging/boot[23]. When paved streets started to become more common, the stilts disappear from the wood pattens, making a smooth soled bottom to the sole. Leather covered pattens, mules and wood pattens disappear from the archaeological record around the beginning of the sixteenth century, replaced by the more robust welted and stitched down constructions for shoes[24].

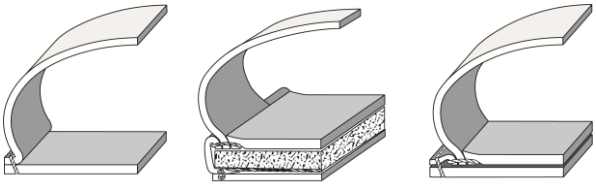

Figure 5. Modern shoe constructions in profile, left: stitched down construction, middle: leather covered cork pattens and mules, right: welted construction (drawing S. Volken).

Figure 6. Reconstructions based on archaeological finds: late fourteenth century stilted wood pattens for muddy ground, mid to late fifteenth century smooth soled wood pattens for paved streets, mid fifteenth century leather covered cork pattens for interior wear, early sixteenth century leather covered cork mules.

[23] Bamburg Staatsgalerie, Meister du Hl. Sipper, *Descent from the Cross,* 1500, inv. No. 37a and Wolfgang Katzheimer, *Martyrdom of Saint Bartholomew*, 1500, inv. No. 8 ; Catalogue *Das Geheinis des Jan van Eyck*, cat. No. 72, p. 195, Master from Holland, *The Holy Family*, 1500, private collection Staatliche Kunstsamlungen Dreseden ; Albecht Dürer, *The Albertina Passion*, circa 1500, Albertiana, Vienna ; Hans Fries, *Retable de Saint-Antoine*, 1506, Eglise des cordeliers, Fribourg, CH.

[24] Goubitz *Stepping Through Time*, p. 79.

V. SHOE STYLES FROM THE FIFTEENTH CENTURY IN THE ARCHAEOLOGICAL RECORD

Identifying a specific type of shoe as an arming shoe among the recovered archaeological footwear of the fifteenth century is difficult. Most styles occur in all sizes- even children's shoes were merely smaller sized versions of adult styles. Surveys of sizes among the styles is of little help- in a graph of shoe sole lengths, there are peaks for women's and men's sizes, but how to tell the difference between a boy's shoe and a small women's shoe when they may be exactly the same size and same style of shoe? Within a collected group of same style shoes arranged by size, large sizes are often made of more robust leather (men's shoes?), medium sizes of finer leather and often with decorations (woman's shoes?) and the smaller sizes made from a complete range of fine to thick leathers. This is only a generalisation since examples occur of very large sized shoes made of fine leather and with decorations. Iconographical sources from the fifteenth century are of little help since women's feet are rarely shown, and when visible, show styles that can be found on images of men's feet. This same lack of visibility occurs with the arming shoe- it is impossible to see what is being worn under a sabaton. When only greaves are worn, the shoe is visible but all identifiable elements of the fastening are hidden by the lower edge of the greave. The iconographical sources show a visible lack of a closing method, this allows the confirmation of shoes with a centre instep slit fastening in combination with laces or buckles to be eliminated for the styles appropriate for an arming shoe.

The one exception to the genderless quality of medieval footwear is the folded ankle boot, the St Martin and Fretton styles[25]. These boots have wide extension of the vamp and leg front that folds over to the lateral side and fastens by either a lace (St Martin) or with a small buckle and strap (Fretton). Folded ankle boots appear in the early fifteenth century, becoming more numerous during the middle of the century, and disappear by the beginning of the sixteenth century. Though a multitude of iconographical sources exist, these styles are exceptionally rare among recovered archaeological leather, surviving only fragments of the vamp or seams from the fold (three complete and 16 fragments of St Martin style, 41 partial examples of Fretton style)[26]. The missing leg parts of the vegetable tanned leather examples can be easily explained by the fact that large pieces of leather were an ideal source of material for cobblers. The few examples that have the leg part vary in height from ankle to mid-calf, but the illustrations of these boots from paintings and manuscripts also show heights from knee to mid-thigh. Most of the illustrations of these boots show a black boot, the tallest versions often have the top folded down, revealing a lighter colour on the inside. Yellow or pale grey folded ankle boots are also shown; these may be the only evidence of chamois tanned leather being used for this style. Archaeological leather recovered from waterlogged sites is

25 Volken, *Archaeological Footwear*, p. 161.

26 Ibid., cat nos. 15.02, 15.03, 16.11, 20.02, 20.03.

invariably vegetable tanned. Chamois tanned and white tawed (alum tanned) leathers do not survive in wet burial conditions, so if the uppers of some folded ankle boots were made of chamois tanned leather, they will not appear in the archaeological record based on water logged sites. The ankle fold boot was certainly a riding boot but probably not an arming shoe. The fold over the top of the instep and leg front does not allow greaves or sabatons to be worn comfortably and probably not even when made with thin, soft chamois leather.

The St Martin and Fretton styles can be eliminated as candidates for an arming shoe. Other styles with buckle fastenings or paired laces at the instep point are also unlikely options[27]. Open instep shoes from the fourteenth and fifteenth century are probably also unsuitable. Modern experiences of wearing armour shows that the shoe must fit perfectly at the instep point, which is the meeting point of the greaves, ankle voiders, sabatons and spur straps[28]. The ankle's largest range of movement is also at the instep point, so the slightest excess of pressure causes pain to the foot. The requirements for an arming shoe can be defined as a perfect, close fit over the instep point and around the ankle, a closed shoe covering all of the foot, a fastening method that does not interfere with the instep point, sufficient height to clear the sabatons but not so tall as to cause problems with the greaves, long enough toe for anchoring the front of the sabatons, and the possibility to add repair soles at the front and back of the shoe.

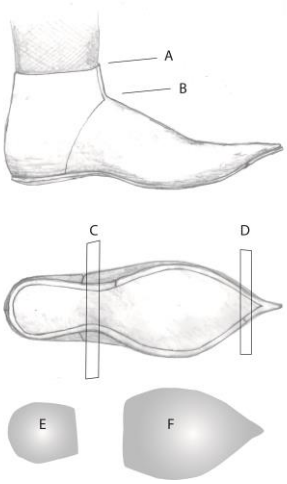

Figure 7. Requirements for a medieval arming shoe: A-maximum height, B-close fitting instep point, C-low impact passage for spur strap and sabaton ties, D-stable toe capable of supporting sabaton tips, E- back repair sole, F-front repair sole (drawing M. Volken).

[27] Ibid., pp. 161, 164, and 168.

[28] Capwell, *Armour of the English Knight*, pp. 183-4.

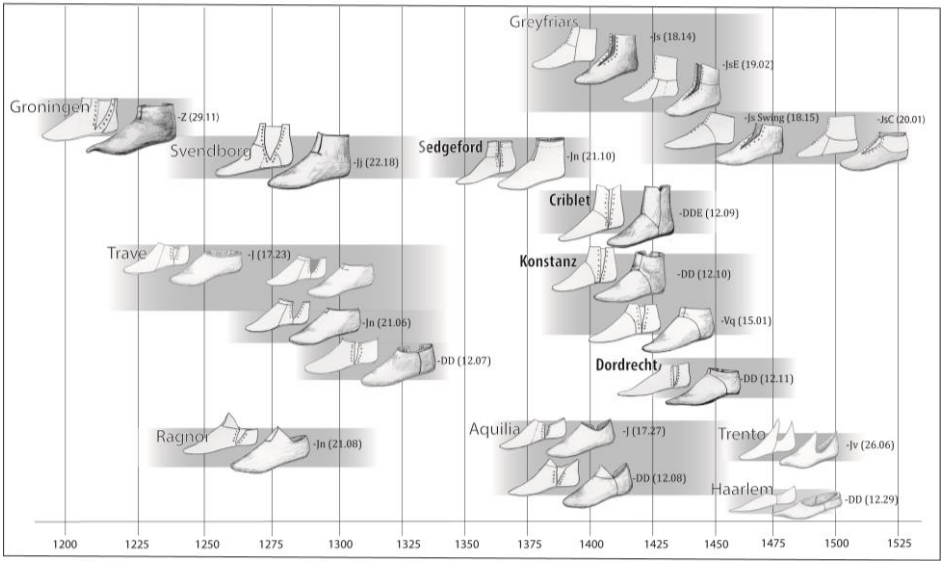

Figure 8. Style and chronology diagram for possible arming shoe styles, thirteenth through fifteenth centuries (within grey bar for appearance in the archaeological record: style name, image followed by cutting pattern letter designation and catalogue number in Volken 2014).

Among the recovered archaeological leather shoe finds the most apparently suitable styles for arming shoes would be those with side lace fasting types. The earliest medieval side lace fastening style, the Staraja-L, appears in the late eight century long before the fifteenth century arming shoes worn with sabatons and greaves[29]. This early side lace shoe did not have further development and the second side lace shoe in the archaeological record occurs during the beginning of the twelfth century, the Trondheim-Z and –Jj style, which also seems to be an isolated style[30]. The side lace styles emerge in force during the second half of the twelfth century, ranging from low models with only two laces to straight top line at the ankle with six to eight pairs of lace holes and taller examples with up to 18 pairs of lace holes[31]. The very low and very tall models were probably not ideally suited for arming shoes (figure 8: Groningen, Svendborg, the low variants Trave-J and –DD, Criblet, plus tall variants of Sedgeford and Konstanz). Side lace styles continue through to the middle of the fifteenth century and finally disappear from the archaeological and iconographical record at the beginning of the sixteenth century since the cutting pattern and fastening were not suited to the new technology of the welted shoe construction.

[29] Volken, *Archaeological Footwear*, p. 123, cat no. 28.06.

[30] Ibid., p. 136.

[31] Ibid., p. 147.

Simply being a side lace style shoe does not make it an arming shoe. Most of the style groups in figure 8 contain children's to adult sizes – evidence the style was being used by all levels of the population and not reserved for a unique function as an arming shoe, and provides support for the idea that an arming shoe was an ordinary shoe with special selection for leather type and additions. General observations of the styles show that smaller sizes tend to be taller and more decorated while larger sizes are of thicker leather and have the lowest heights. Taking into account the function of an arming shoe and its relation to the sabatons and greaves, a close examination of recovered archaeological leather shoes can possibly show specific modifications that may be in relation to use as an arming shoe.

For the fifteenth century, three additional styles, the Greyfriars, the Trento and the Haarlem may also have been used as arming shoes. The Greyfriars is a front lace boot, ranging from above ankle to mid calf height. The instep point fits very close to the foot and tightly around the ankle and lower calf. The laces lie flat to the foot and probably would not cause problems with the lower parts of the greaves and upper section of the sabatons. The Trento and Haarlem styles, both a slip-on type lacking a fastening, appear in the latter part of the fifteenth century. The Trento's opening has a peaked instep rising above the instep point, curving down to the sides and raising again to a point at the centre back, mimicking the shape of the lower edge of the greaves in place on the leg/foot combined with the peaked top of some sabatons. In the archaeological record, this style is mostly represented by children's sizes, including an example from the Chateau de Chillon, Canton Vaud, which had rough slots cut in the peaked front and back for a securing lace to keep the shoe from falling off[32]. The Haarlem style is similar to the Trento but lacks the front peak and has a low open instep opening. From iconography and extant examples, the tall peaked back could be worn folded down, the flesh side of the leather creating a colour contrast. The Haarlem style has been found in mostly adult sizes. An adult sized (40 European) right shoe found in Delft shows a particular wear pattern indicating its use as an arming shoe (see VI.). For both styles, the lack of a firm method for fastening the shoe to the foot would not been a problem when worn with a sabaton and spurs, both would work to keep the shoe in place. The lack of a fastening would have been an advantage for wearing under armour since it reduces the number of layers that could cause pressure points from the armour and straps.

[32] Volken, 'Les cuirs, des trésors redécouverts', p. 115, fig. 142.

VI. AN ARMING SHOE FROM DELFT

By Elisabeth de Campenhout, Archaeological Service Delft NL

The city of Delft, The Netherlands, has a rich collection of leather material that until only recently has been examined in greater detail. An exciting recent (re)discovery within this material is a late medieval arming shoe, found during the Zuideinde excavation in 1993 outside the city of Delft in a cesspit dated broadly from the 15th to 16th century.

The shoe is a right, low model, slip-on shoe with a rounded toe. It is a relatively complete example, missing a triangular completion piece on the medial side of the shoe, a small section of rand and a portion of edge binding. It has a turn shoe construction with a DD pattern. The vamp of the shoe was made from goat leather and the back section with fine calf leather. It is a Haarlem style[33], which dates to the second half of the fifteenth century coinciding neatly with general date given to the cesspit it was found in.

The instep opening, including the edge binding, was modified by being cut out at some point during its use to lower (by no more than half a centimeter) the top line of the shoe along the vamp, as well as a small perpendicular cut to the top line of the vamp near the top of the foot. Further modifications appear to have been applied to the edges of the rand near the waist area of the sole, trimming them down so aggressively that the sole also bears evidence of being sliced into during this modification.

The identification of this shoe as an arming shoe is largely tied to the patterns of wear, or lack thereof on both the upper and sole suggesting that this shoe would have been worn with sabaton and spurs when riding.

The surface of the vamp across the top of the foot, with the exception of a small wear hole in the toe area, remains in fairly good condition with the grain clearly visible for the most part on the shoe as if it was hardly worn. In contrast moving down the sides of the shoe a distinct crease can be seen on both the lateral and medial sides of the shoe with significant wear to grain visible under this crease line. This suggests that the shoe may have been largely covered when worn, for example if worn as an arming shoe with a sabaton.

On the lateral side of the shoe the wear appears to take the shape of a strap with a hole located directly above it on the crease line indicating the possible placement of a spur strap. Notably if the lines of this strap are extended around the bottom of the shoe across the sole this coincides with the location of the trimmed rand hinting at a possible motive for the modification to alleviate discomfort caused by a strap in this zone.

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33 Volken, *Archaeological Footwear*, p. 170.

The tread of the sole shows significant signs of wear while in contrast the sole seat shows only very light evidence of wear. This could support the idea that the shoe was primarily worn while riding with the wear caused due to the interaction of the tread of the sole with stirrups.

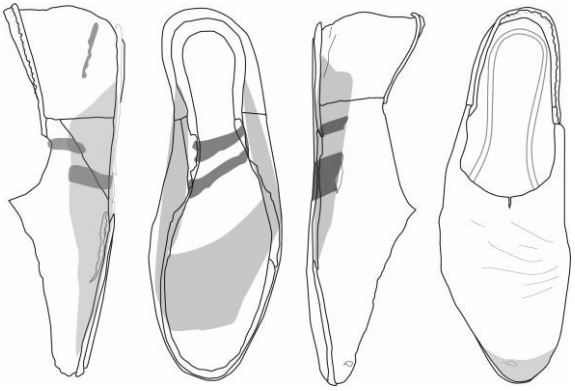

Figure 9. The Haarlem-DD style shoe from Delft, the Netherlands, showing the areas of severe wear in dark grey and grain loss wear in light grey associated with the sabatons and spur straps. (Drawing M. Volken).

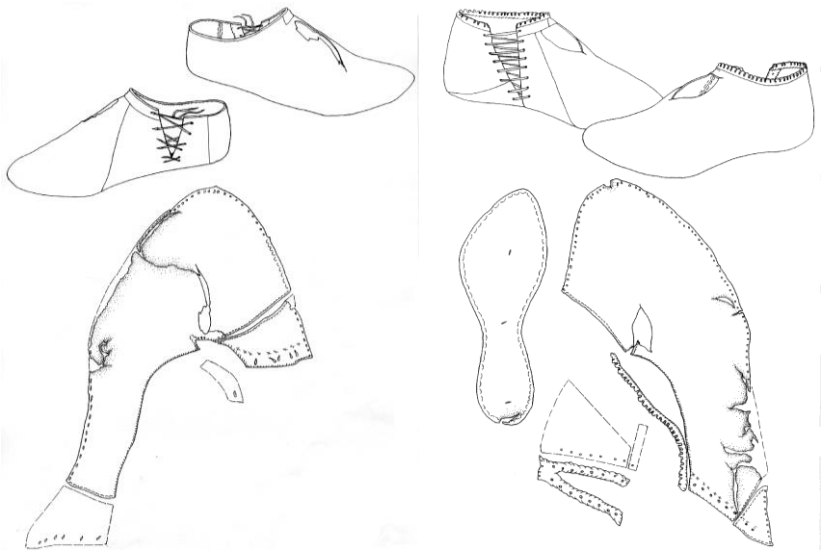

Figure 10 a b. Trave-Jn style shoes from Lübeck showing home made cut outs at the sensitive instep point (Drawing M. Volken 2002).

Internal leathering, ideally composed of three straps, two on the lower edges and a one running down the centre, holds the overlapping lames of sabatons together. As mentioned before, the join between the lower edge of the greaves and the upper

opening of the sabaton is situated on the sensitive instep point of the foot. Even one or two millimetres of excess material can cause discomfort and hinder movement. Modifications to the instep point by crudely cutting a hole in the shoe leather can be seen on shoes from the late thirteenth through fifteenth centuries. Two late thirteenth century Trave-Jn adult sized shoes from Lübeck have home made holes cut roughly into the leather just below the instep point[34] (figure 10). A third example from the same site is only a vamp with two slits running from the instep point down along the centre foot line. These modifications remove material exactly from the sensitive spot where the greaves and sabatons meet. Two other Trave-Jn examples, one from Poland, the other from Norway, show similar cuts at the instep point[35]. The Trave-Jn style group contains more than 70 examples found throughout Europe, dating largely from the second half of the thirteenth century to the first quarter of the fourteenth century. The problem of making a perfectly fitting shoe over the instep point seems to have been solved with the new styles in the second half of the fourteenth century since the side lace styles from this period do not show home made cutting over the instep, with the exception of two shoes from Coventry, a Sedgeford-Jn from the Broadgate site and a Dordrecht-DD from the Woolworth's house site[36].

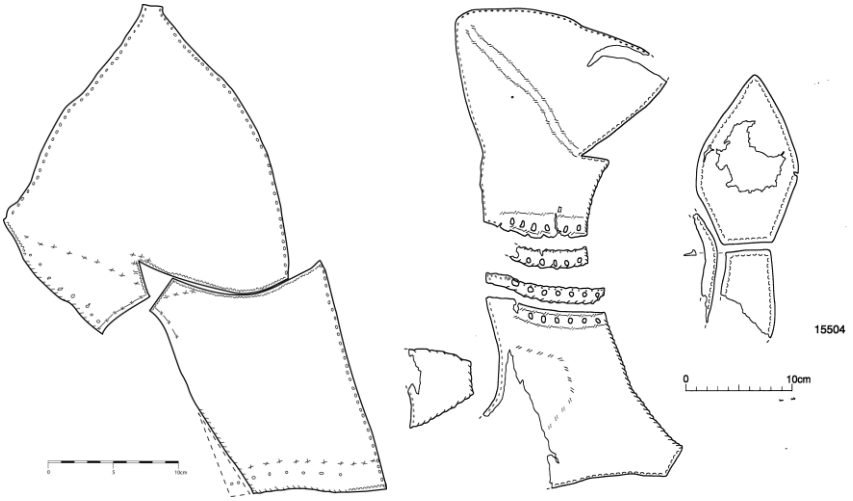

Figure 11 a b. The Dordrecht-DD style, example from Reimerswaal (left, drawing M. Volken 2014) and the example from York (after Mould et al., Leather and Leatherworking).

34 Volken, Volken 2002, 497, Abb. 6-2 (catalogue 16-2), Abb 7 (catalogue 16-3).

35 Kolberg; Wywrot-Wyszkowska, *Skornictwo w Lokacyjnym Kolobrzegu*, p. 174, Taf. IX-1, Bergen; Larsen, *Footwear from the Gullskoes Area of Bryggen*, p. 33, fig. 41-d.

36 Thomas, *Medieval Footwear from Coventry*, fig. 4, no. 78/51/47, fig. 18, no. 78/59/28.

The Dordrecht-DD style, dating from the first part of the fifteenth century, is particularly rare, only four examples have been identified and published, the above mentioned example from Coventry GB, the eponym example (vamp only) from Dordrecht, a complete example from the site of Reimerswaal, and the near complete example from York[37] (figure 11). All are adult sizes ranging from 40 to 43 Paris point. The York example shows a feature not observed on any other recovered archaeological footwear (in the published record)- a double row of strengthening cords sewn to the flesh side (inside) running from the instep point down the centre front to the toe. The space between the cords and the placement is analogous to the centre leathering on a sabaton. The upper leather is 2.9 mm thick goatskin, which would need reinforcement since it is more prone to stretching than calf or cow hide and being spongy, the cords would easily sink into the thickness of the leather and not cause discomfort on the foot. The rarity, large sizes and special adaptations for the Dordrecht style seem to be strong arguments in favour of identification as an arming shoe, notwithstanding the possible future discovery of small sized examples.

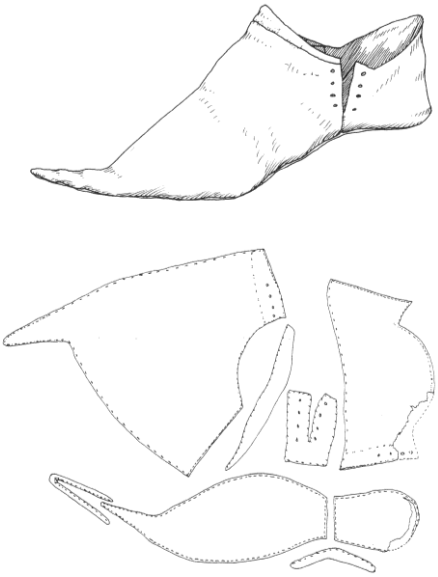

Figure 12. The Aquilia –DD style side lace style with peaked front and back, from the site of Reimerswaal (after Goubitz et al., Stepping Through Time, p. 179).

Often pictured in fighting manuals, notably the *Alte Armatur und Ringkunst* by Hans Talhoffer (1459)[38], the Aquilia-J and –DD style side lace shoe has a distinctive added

[37] Goubitz et al, *Stepping Through Time*, p. 179, fig. 10; Volken, *Archaeological Footwear*, p. 151, fig. 208; Mould et al., *Leather and Leatherworking*, p. 3331, fig 1665, no. 15504, as intrusive material in 11th/12th century context.

[38] The Royal Library of Copenhagen, M29. Thott 290 2°.

peaked tongue at centre front of the shoe, and also occurs with home made cuts at the centre line and instep point. The ease cuts vary from a single incision at the instep point[39] to complete removal of the instep point and added tongue[40]. The Aquilia is also a rare shoe among archaeological leather shoe finds, with only 16 examples known in publications[41], with sizes ranging from 31 to 44 Paris point.

Any of the styles pictured in figure 8 could be suitable for arming shoes, it may have been possible to wear paired lace styles like the Haaksbergen or Amsterdam[42] though probably not with sabatons. Personal preference and individual perception of comfort may have been the deciding factor for selecting a shoe style to wear with armour. The low opening on the Haarlem style offers a different level of comfort than the closed instep styles with a side fastening lace like the Dordrecht. With the technological and fashion changes at the end of the fifteenth and beginning sixteenth century, the new styles of the Tudor or cow mouth shoes with the wide broad toe (lacking the pointed toe for anchoring the tip of the sabaton) would have required different adaptations for use as arming shoes. The use of arming shoes, attested by archival references, continues through the sixteenth century but how the adaptations of these shoes would appear among the archaeological material remains to be seen[43]. Without specific knowledge of how arming shoes functioned and the possible modifications linked to their use, archaeological leather shoe researchers may have difficulty in identifying the signs that indicate a shoe had been modified for use as an arming shoe.

VII. WHY SUCH LIGHTWEIGHT, SLIPPERY-SOLED SHOES FOR COMBAT?

But the question still remains in the minds of living history interpreters as to why didn't someone in the fifteenth century just invent a type of shoe that was more suited for fighting, with heavy robust soles that could support nailed second soles for good grip. The grounds for formulating such a question are rooted in modern mentality of consumer markets- invent a product that is needed and desired – but this was not a question that could have been asked in the Middle Ages. Shoes were made by shoemakers who belonged to guilds that dictated exactly what types and which techniques could be used for making shoes. Certainly within the cities and larger towns, the right to make shoes was strictly reserved for members of the guilds, who fought to keep the shoe repairers or cobblers in an economically and socially inferior position, preventing them from having access to new leather, commercially viable locations

39 van Driel-Murray, 'Lederen voorwerpen', p. 205, afb. 12.

40 Mould et al., *Leather and Leatherworking*, p. 3330, fig. 1664, no. 15501.

41 Volken. *Archaeological Footwear*, p. 150, cat. nos. 17.27, 12.08.

42 Ibid., pp. 154 and 164.

43 Hayward, *Dress at the Court of King Henry VIII*, pp. 113-4.

(often were only allowed to work on the street, or a shop that was less than 2 square metres) and even from forming guilds with any power[44]. Shoemakers controlled all means of production and by extension, all innovations, styles and associated technologies, and thus were above concessions to market forces, pressures of a fashion industry or 'purposed' needs of their clients. The small fraction of the population that required arming shoes were not in a position to tell the shoemakers how to do their job, and so had to make do with additions to the basic shoes available.

The rigidity of the shoemaker's guild system can be illustrated by the organization the patten maker's guilds in the 15th century[45]. Wood and leather pattens were not part of a shoemaker's repertoire, being a sort of cheap lower level type of work. The invention in the beginning of the 15th century of leather covered cork pattens used a construction technique that was quite the reverse of turn-shoe construction, but is in essence the basis for modern welted shoes. Leather covered pattens were a luxury item; made from imported cork, highly decorated, worn only inside the house by well-to-do housewives. The two constructions, the turn-shoe and the leather-covered patten, were used side by side for nearly 100 years with no crossover of technology! The situation changed at the end of the 15th century with the introduction of paved streets that wore leather soles out at an alarming rate and were rather slippery for wood pattens (and worse for iron barred pattens). The social order and general economic situation also started to change, including large paid armies that marched long distances. In order for the shoemakers' guilds to maintain their powerful position they had to adapt to the new problems and thus in a very short time, less than 15 years, new techniques like the welted and the stitched down constructions replaced the turn-shoe and the use of pattens all over Europe[46]. The innovative construction techniques also fostered new shoe styles like the cow mouth or Tudor style. The double soles of the welted construction could employ very thick leather unlike the turn-shoe construction with its necessarily thin soles. Added front and back soles with tunnel stitching were not needed and actually difficult to apply on the thick robust welted shoe soles. The turn-shoe construction was not completely abandoned and continued to be used for cheap, lightweight footwear. During the Middle Ages, even if one bright person could have invented a perfect non-slippery shoe, the Cordwainer's Guild would have never permitted its production by unqualified persons and probably not even among its own members.

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44 Waterer, *Leather in Life, Art and Industry*, p. 83.

45 Baart, *Opgravingen in Amsterdam, 20 jaar stadskernonderzoek*, p. 71.

46 Volken, Volken, 'Der schuhtechnologische 'Big Bang' der Wendezeit'.

the *Journées d'études sur le costume et les simulateurs d'armes* conference for providing personal experiences and demonstrations crucial for understanding how arming shoes function.

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