A Comparative Study of Roman-period Leather from Northern Britain

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Abstract

This thesis draws together all of the data on Roman-period leather from northern Britain and conducts a cohesive assessment of past research, current questions and future possibilities. The study area comprises Roman sites on or immediately to the south of Hadrian's Wall and all sites to the north. Leather has been recovered from 52 Roman sites, totalling at least 14,215 finds comprising manufactured goods, waste leather from leatherworking and miscellaneous/unidentifiable material. This thesis explores how leather and leather goods were resourced, processed, manufactured and supplied across northern Britain. It considers the potential of inscriptions and stamps to provide insights into the leather trade. It also considers the contribution that the study of footwear might make to our understanding of the demography of Roman settlements, shedding light in particular on evidence which suggests that military communities may have been more diverse than previously thought, and that there were women and children living on the northern fringes of the empire long before the Antonine Wall and its civilian communities were established.

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1. Introduction

1.1 Research aims and methods

As an everyday material that fulfilled a wide range of purposes, leather can provide a wide range of information; and yet the wealth of information that can be gained from Roman leather from northern Britain has never before been synthesised. The same major assemblages are drawn on repeatedly as comparanda (particularly Carlisle, Vindolanda and Bar Hill[1]), which heightens the risk of smaller assemblages languishing, all but forgotten, in museum stores. The distribution of sites yielding leather has never been mapped. The amount of material in existence and available for study has not been quantified. This thesis aims to rectify that deficiency. It identifies, characterises and goes some way to interpreting all of the Roman-period leather discovered in northern Britain.

The first task was to conduct desk-based research to identify which sites have yielded leather: over 50 are known to the author. Once this was established, the assemblages were characterised. This information was drawn from publications and/or by examining material at museum stores. It was necessary initially to identify where assemblages are stored, and then to assess the condition and characterise the nature of the leather items. Many modern excavations have been written up to modern standards, so assemblages from antiquarian excavations were prioritised for first-hand study. Re-evaluation of a handful of 'forgotten' assemblages has yielded a significant amount of new information.[2] Assemblages from Castlecary, Mumrills and Strageath, and a limited amount of material from Newstead, was examined at NMS, Edinburgh. Material from various sites in Carlisle and from Kirkbride was assessed at Tullie House, Carlisle. Material from Wallsend, Haltonchesters and Carrawburgh was examined at Great North Museum (Hancock), Newcastle. Material from Cramond was examined at City of Edinburgh Council's stores.[3]

[1] The author acknowledges that these larger assemblages often include near-complete items, and do provide a wide range of information and a good baseline for comparison.
[2] The author had hoped to examine material at both the Hunterian, Glasgow, and at Alnwick Castle but due to time constraints it was not possible to arrange a mutually convenient appointment to do so.
[3] See site reviews on accompanying CD for specific information on material examined.

Characterisation of the assemblages has included consideration of: the nature of the items recovered; the type of site; the context of deposition; the period to which they date; and the social, economic and demographic information that can be gleaned from the assemblages.

To this end, this thesis has focussed on the systematic study of all of the leather assemblages from within the study area, considering the following questions:

- Are there comparable patterns (e.g. categories of artefacts, typologies etc) among the assemblages recovered from different site types, across the geographical range of the study area, and in different periods during the Roman period?
- What evidence exists for how leather was sourced, processed and supplied across northern Roman Britain?
- Is there compelling evidence for tanning and leatherworking within the study area, and to what extent were these activities being carried out?
- What sorts of information can be drawn from leather goods and offcuts that have been stamped, inscribed or otherwise marked with letters/symbols?
- Can footwear, as an indicator of the presence of women and children, give us new insights into Roman military communities?

1.2 The study area

To explore the research potential of Roman-period leather in some detail, it was necessary to set a geographical boundary to the study area. For our present purposes, northern Britain is deemed to include all of modern Scotland plus the Hadrian's Wall zone. The latter is defined as the sites along the Wall itself and those immediately to the south, such as Corbridge and Vindolanda, and sites north of the Wall in Tyne and Wear, Cumbria and Northumberland.

Sites to the west of Bowness-on-Solway (i.e. Beckfoot, Maryport, Burrow Walls, Moresby, Ravenglass, Bewcastle) are not considered here.

The range of Roman-period sites within the study area includes: the Antonine Wall; Hadrian's Wall and its berm, *vallum*, milecastles and turrets; fortresses, forts and fortlets and associated annexes; temporary camps; settlements; roads; bridges; and culverts. Of these, it is the places where people lived and worked for prolonged periods – forts and settlements – that yield the most leather.

1.3 Terms and definitions

It has been common practice in the past to refer to any product made of animal skin as leather. Leather, however, can be defined more narrowly as those skins which have been vegetable tanned:

> "only vegetable tanning is capable of producing permanent and irreversible changes to the skin structure which are resistant to water (Sykes 1991). All other treatments – smoking, dressings of mineral earths, animals fats or oils – are "pseudo-tannages" resulting in cured leathers which are not water resistant and will decay in waterlogged or damp conditions (Haines 1991)" (van Driel-Murray 2002a, 17).

Vegetable tanning to produce a true leather requires the immersion of skins in water with vegetable matter such as roots, galls or bark so that tannins may be transferred from vegetable matter to skin (Thomson 2011,5). Any animal skin can be turned into leather, but the vast majority of the leather items recovered in Roman Britain are made from tanned cattle or goat hides.

Leather survives most commonly in waterlogged conditions.[4] On being removed from a wet environment, archaeological leather must be conserved to prevent shrinking, warping or

[4] Roman-period leather also survives well when desiccated, e.g. at Qasr Ibrim in Egypt. Desiccated leather objects can be subjected to a simple test that ascertains whether or not they were vegetable tanned – this test is unfortunately not applicable to waterlogged leathers (Driel-Murray 2002a).

becoming brittle as it dries. Common modern methods of conservation are freeze-drying or immersion in a water-based solution of glycerol or low molecular weight polyethylene glycol (PEG) (English Heritage 2012, 21). However, these processes are time-consuming and costly so excavation strategies often see limited, targeted excavation of waterlogged areas if the post-excavation budget will not stretch to conservation of large amounts of leather.

Traces of leather are often found on corroded metal items e.g. at Doune, where leather was identified "adhering to back" of a copper alloy horse harness strap junction (Masser 2010, 58). These traces do not lend themselves to the same analyses or interpretations as the more complete examples of leatherwork that are the focus of this research and are not considered further in this study. However, this is not to suggest that such items cannot occasionally yield useful information: hobnails from Carzield had sufficient leather preserved in their corrosion to confirm that the shoe from which they derived was of layered construction, and that it was well worn and had been repaired (Bailie 2013). Research has also been conducted on leather preserved by corrosion, analysing the microstructure to identify animal species and the effects of heat treatment (such as in the preparation of *cuir bouilli*) (Cameron 1991).

It is believed that the Romans introduced the practice of vegetable tanning to northern Europe (van Driel-Murray 2011, 74).There is no evidence that vegetable tanning was practiced in Britain before the arrival of the Romans in AD 43. The only true leather products that survive date from the Roman period or later, but leather items do occasionally occur on Roman-period, indigenous sites[5] (e.g. the pouches containing coin hoards at Birnie (Hunter 2007)). Though atypical, these examples will be included in this study, to assess the evidence for the use of leather by non-Roman communities. If leather was routinely made and used in the Iron Age, we might expect to find it among the well-preserved organic material from crannogs and other wetland sites, or in the waterlogged ditches of hillforts, for example. The production of leather does not seem to have flourished again in Britain until the early historic period, the mid/late sixth century at the earliest (e.g. a satchel, previously misidentified as a jerkin, from Loch Glashan (Crone and Campbell 2005) and shoes from Dundurn (Alcock *et al* 1989) and Buiston (Crone 2000)), but not commonplace.

[5] In the case of leather recovered from peatbogs (associated with bog bodies or as isolated finds), it is impossible to ascertain if the leather was tanned before entering the bog, or if it was simply subject to an accidental tanning thanks to the naturally occurring tannins in the bog. For this reason, only items that can be typologically defined or scientifically dated (e.g. the shoe from Lochar Moss and the shoe from Callander, respectively) as belonging to the Roman period have been included in this study.

1.4 Characterising the supply, use and disposal of leather in the Roman period

Leather was an everyday material used by people of all classes across the Roman empire. It was the main constituent of many essential items in both military and civilian contexts, such as shoes, bags, clothing, horse-gear,[6] tents, shield covers, and as a component of some kinds of armour.

The leather items most commonly recovered during archaeological excavations are shoes, tentage, waste from the processing of hides or leatherworking, and unidentifiable fragments. Waste leather can be divided into three categories: primary, secondary and tertiary waste. Primary waste consists of the unusable edges of hides, which are removed after tanning or currying. Secondary waste derives from the cutting out of pattern pieces (such as components of shoes), and tertiary waste refers to the small offcuts and slivers of leather resulting from the trimming of pattern pieces during the manufacture of items (Mould *et al* 2003, 3245).

Although we can postulate that leather was present on every Roman-period site – even if only as the shoes of its occupants – it survives most commonly in wet environments such as waterlogged pits, wells and ditches, and as such it is recovered from only a minority of excavated Roman-period sites. Most of the leather assemblages come from forts or *vici* – sites that were inhabited for many years, and often with more than one separate period of occupation. On these settlements, whether civilian or military in nature, large deposits of rubbish would accumulate and often the leather is found in this context of waste and discard.

The Roman army's demand for leather was enormous. Attempts have been made to quantify just how enormous (e.g. Groenman-van Waateringe 2009; van Driel-Murray 1985), although the wide range of variables make this a difficult task. The army may have had around 3 million goatskins in use at one time (tents, shield covers, saddles, kit-bags), with a further 1.5

[6] While saddle-covers and chamfrons are known, other horse gear such as straps, reins etc. remain rare and it is suggested that these items were made of skins that had been processed differently (van Driel-Murray 1993, 16).

million required annually for replacement and repair of equipment (Groenman-van Waateringe 2009, 210). Yet it remains unclear exactly how leather was provisioned across the empire. Evidence from the Vindolanda tablets confirms that trade in hides formed part of the economy across Britannia (*Tab. Vindol.* II, 343). It is accepted that the Roman army subsisted on a diet of both local and imported foodstuffs, relying largely on local supply for bulk items like grain, and supplementing this with imported goods (e.g. at Bearsden, where exotic foods such as figs, coriander, wild celery and opium poppy were consumed alongside local produce (Knight *et al* 1983, 143)). It is suggested that hides were sourced from across the empire (e.g. goatskins were probably supplied from north Africa and the eastern reaches of the empire, since there were not many goats in the north-west) but perhaps transported and tanned centrally by military owned/controlled tanneries (Groenman van-Waateringe 2009, 211-13).

Taxing the provinces in useful raw materials was one way of gaining essential supplies. In some parts of the empire, taxes levied on the local peoples could be paid in kind. The *Frisii* from north of the Rhine were taxed so steeply in hides (Duncan-Jones 1990, 187-96) that they were reduced to selling their farms, possessions and ultimately their own people before staging a rebellion in AD 29. The Romans were defeated and did not try to regain control of the Frisians' land (Breeze 1996, 92; Alston 1998, 38; Drummond and Nelson 1994, 82-83).

Rome clearly sourced at least some of its required hides from the provinces, but where and by whom those hides were processed is uncertain. Although certain Roman sites in Britain have in the past been thought to demonstrate possible tanning evidence, these interpretations have been revised,[7] and van Driel-Murray asserts that the only confirmed example of a Roman tannery anywhere in the empire is at Pompeii (2011, 71).[8] Groenman van-Waateringe suggests the possibility of military owned or controlled tanneries (2009, 213), although this is

[7] Excavations at Binchester in 2011 uncovered a series of pits and related structures which, along with the faunal assemblage, were initially interpreted as evidence of tanning. The interim report, however, conceded that the existence of a tannery could not be proven (*Binchester International Field School interim report 2011-12*, 8). Catterick was once thought to show evidence of a Roman-period tannery but this interpretation has been revised (Hooley 2002, 321-23). Artefactual and environmental evidence at Vindolanda was interpreted as evidence of tanning (Birley 1977, 123-24) but is in fact associated with the keeping of animals and poultry (van Driel-Murray 2011, 69; Birley 2009, 72-73).

[8] Groenman-van Waateringe suggests two more: *Saepinum* and at the site of the *Gerasa* hippodrome, Jordan (2009, 212).

not proven. This leaves us with a considerable gap in our understanding of how the Roman imperial economy operated: we still have very little idea of where and how one of the army's most crucial raw materials was processed and supplied.

1.5 Ritual deposition of leather in northern Britain

There is an important distinction to be made between items that are disposed of as waste and those that were ritually deposited. This is particularly pertinent in consideration of items recovered from deep pits, shafts and wells (e.g. Newstead, Coventina's Well) and those associated with the burial of the dead. A careful assessment of leather discovered in ritual contexts was carried out while researching this thesis.

It is generally accepted that deep pits, shafts and wells regularly served as foci for votive deposition in Roman Britain. Whether this represents a continuation/appropriation of indigenous Iron Age practices, or heralds an entirely new form of deposition, remains disputed. The point at which an item was deposited, indicated by the item's position with the feature (i.e. close to the top, middle or bottom of the fill), is often used as an indicator of significance. However, the frequency with which waste (of all kinds, not only leather) was deposited in pits and wells, particularly on abandonment of a military site, renders differentiation between ritual and quotidian deposition very difficult: carved stone altars such as those dedicated to Apollo and Jupiter found in pits at Newstead (Curle 1911, 116; 135) might have been deposited with as part of ritual practice or simply disposed of during the abandonment process. Indeed, while some researchers (e.g. Ross 1968) aim to distinguish ritual from non-ritual, others conclude that "there is no clear cut-off point" (Clarke 2001, 80). Perhaps the most concise assessment of this potentially significant practice relates to the material from Newstead: "the different types of pits and the range of material deposited ... warns us that activity on Roman forts can be extremely complex, requiring sophisticated and careful examination" (Hunter and Carruthers 2012b, 41).

Leather was found to have been deposited in deep shafts, pits and wells at 13 sites in northern Britain. Particularly pertinent is the deposition of leather, especially shoes (usually the left shoe), in wells. Occasionally, intentional deposition can be deduced from the shoes' having been placed within the well during the construction phase (van Driel-Murray 1999, 137), although this is not noted within the study area. Where contextual information exists, leather is recorded most commonly from the lower deposits. It is impossible to know if this is due to differential survival or depositional practices, since leather deposited in higher, non-waterlogged, deposits would not survive. Leather does occasionally occur in settings that were certainly foci for ritual practice e.g. Coventina's Well (Clayton 1880; Allason-Jones and McKay 1985). Elsewhere, the perceived 'strangeness' of the deposits can lead to suggestion that votive deposition was at play e.g. Bar Hill (Macdonald and Park 1906; Robertson *et al* 1975). Further research is required to refine current thinking, with a view to eventually developing strategies to try to distinguish the ritual from the mundane. However, the study of leather found in deep pits, wells and shafts contributes little to the discussion of whether or not these features were ritual in nature. As such, this complicated and varied issue will not be considered further here.

The study of footwear deposited in association with cremation and inhumation burials is perhaps less hampered by taphonomic constraints and might lend itself to fuller exploration. Although this practice can be dated exclusively to the second to fourth centuries AD, its rural distribution suggests that it is not necessarily a Roman practice. Placing footwear in the grave may have been common in pre-Roman Britain, becoming visible in the archaeological record only after the introduction of nailed shoes. The inclusion of grave goods can signify the status of the deceased or, more broadly, can give clues about the regional economy. The beginnings of a tradition of including personal ornaments, for example, in burials where no grave goods had previously been included might indicate that these items had become more readily available and were thus more willingly committed to the grave (Philpott 1991,171-71; 218-20). The placement of footwear in the grave is most frequently represented by the recovery of hobnails. This thesis does not not consider traces of leather adhering to metal objects (above), nor recovery of hobnails, although the latter are necessarily directly associated with leather footwear. However, at Petty Knowes, one cremation burial included "eleven hobnails and the remains of a leather sole, with the hobnails fused into position by the intense heat of the

cremation" (Charlton and Mitcheson 1984, 17). This is the only attested instance in northern Britain of any significant portion of leather surviving in a burial alongside hobnails.

The occurrence of hobnails (without survival of the shoes themselves) as indicators of footwear having been deposited in graves within the study area was the subject of a thorough investigation. For inhumation burials, evidence was assessed to explore whether footwear was worn or placed in the grave, and if placed, how it was positioned. In consideration of evidence of footwear in cremation burials, consideration was given to whether shoes had been burned with the deceased or buried intact alongside the cremated material. However, there are few known Roman cemeteries within the study area and insufficient data available to draw any firm conclusions or interpretations.

Further afield, isotope analysis has been used to investigate whether differing grave goods and/or burial practices might offer some indication of the geographical origin of the deceased. However, it appears that there is little correlation. In the case of grave goods, while the deposition itself is significant, the exact positioning of the items in the grave yields little further information about the identity of the deceased (Müldner *et al* 2011; Hella Eckhardt, pers. comm.).

It is clear that the deposition of footwear in association with burials was not always carried out with a functional purpose in mind. The recovery of adult-sized shoes from children's graves indicates that the shoes did not necessarily belong to the deceased. However, the limited amount of data available from northern Britain means that the study of footwear in graves from this area contributes little to the conversation surrounding the deposition of grave goods in general, and as such will not be considered in more detail here.

1.6 The character of the Roman occupation of northern Britain

This is not the place to rehearse the details of the Roman conquest and occupation of northern Britain which, with occasionally areas of ongoing debate or dispute, are well established. It

was in the later first century under the Flavian dynasty that the Romans first pushed northwards, extending conquest, if not occupation, to the northern limits of the island. Areas of direct military occupation fluctuated over the following decades, which saw the construction of major linear frontiers across both the Tyne-Solway and the Forth-Clyde isthmuses, before eventually settling on Hadrian's Wall as the primary frontier.

As a result, there are almost 100 forts, 32 fortlets and two fortresses within the study area. Forts were usually constructed to house regiments of auxiliaries – non-citizens recruited from the Roman provinces. A fortress was essentially a very large fort, built to house a legion of around 5000 soldiers – all of them Roman citizens. Research is ongoing and opinion divided as to whether non-combatants[9] routinely lived alongside soldiers in these military installations, or whether they lived in extra-mural settlements (van Driel-Murray 1997; Greene 2011; Birley 2010). Both of the fortresses within the study area are in Perthshire, at Inchtuthil and Carpow. At the other end of the scale are the fortlets – small installations designed to house only 50 to 80 soldiers.

Many forts had associated annexes, enclosed areas attached to the fort. These may have been directly associated with the military, housing workshops for crafts/industrial activities and accommodation for the workforce (Bailey 1994, 304-09), or providing extra space for exercising horses and containing the animals of the baggage train (Sommer 2012, 77). Alternatively, these settlements may have been less closely associated with the military. Civil settlements (*vici*) are often found alongside forts, housing 'camp followers': crafts- and tradespeople making a living from the soldiers, and perhaps even soldiers' unofficial families[10] (Breeze 2006, 82-83), or along the roadside, taking advantage of the passing trade so effectively streamlined by the new Roman road network. It remains difficult to distinguish between military/official and non-military/unofficial extramural settlement as the range of excavated evidence for each may be very similar e.g. a mixture of domestic and industrial evidence (Bailey 1994, 209-10).

[9] Greene (2011) applies the term non-combatants to those whose lives were tied very closely to the military and who might have lived on military installations but were not soldiers e.g. craftspeople, soldiers' families etc..
[10] Soldiers were not officially permitted to marry until at least the early third century, but some may have married under local law, and there is some evidence for the presence of families within the forts themselves (Breeze 2006, 82-83).

In addition to these fairly permanent Roman installations, there are 155 known or probable temporary camps north of Hadrian's Wall (Jones 2011, 3). These rectilinear enclosures could be created in the space of a few hours (Welfare and Swan 1995, 24) and leather tents erected in which the soldiers would sleep. Schematic reconstructions of Roman tents have been created by combining literary evidence, depictions and excavated tentage (McIntyre and Richmond 1934; van Driel-Murray 1990, 1991, forthcoming). The camps were traditionally known as marching camps and interpreted as being used for only a night or two when troops were on an exercise or campaign, or to break a long journey, but recent research suggests that some camps may have been less temporary in nature than others (e.g. Kintore (Cook and Dunbar 2008, 350)). The troops who slept there might be: breaking a journey while marching/ on campaign; training/on exercise away from their fort; besieging a site nearby; or constructing a fort or frontier. However, it remains very difficult to identify the function of any camp with certainty, particularly as those that are excavated usually see only a few narrow trenches cut over their ditches (Jones 2011, 6-7; R. H. Jones 2012, 18-31).

2. Distribution, categorisation and quantification

2.1 Distribution

Leather must have been present on all Roman sites, if only as footwear, and iron hobnails are recovered with great regularity even where leather is not. Though it has been acknowledged that the survival of leather relies heavily on taphonomy, and accordingly the distribution of excavated examples cannot be seen as indicative of the original distribution on a regional level, we can only work with the data we have. Thus, some attempt at quantification seems worthwhile to try to identify any patterns in that data.

Leather is attested to have been recovered from 62 Roman-period sites in northern Britain. However, a number of these should be discounted (Table 1). Some are known only from historical records, and in some instances the stories surrounding their discovery gives cause for doubt about the correctness of their identification. Additionally, the location of a number of these finds, if they survive is unknown. These include leather pouches or wrappings supposedly associated with hoards, for which no detailed descriptions or illustrations survive (e.g. Castle Greg (Wilson 1855); Possil Marsh (Eyre-Todd 1911)), and shoes to which the same applies and/or are unlikely to be Roman (e.g. the square-toed shoes from Kirkbuddo (Crawford 1949)). Lone shoes that *can* be assigned a Roman date, such as those from wetlands near Carlisle (Pennant 1774), Culloden (unpub.) and Callander (Anon 1851), have been included. Leather from three indigenous Roman/Long Iron Age sites has also been discounted from these statistics, so that my database comprises primarily Roman sites (forts, *vici*, camps etc).[1]

[1] While all known occurrences of leather from Iron Age (c. 700 BC to AD 43) sites are included here, Roman Iron Age sites (i.e. indigenous sites dating to between AD 43 and AD 410) were not included in the database and excavation reports were not comprehensively checked. To include these three sites in my calculations would skew the statistics.

Table 1: Finds that have been discounted for statistical analysis

Site name	Site type
Lochar Moss 1	Bog body
Kirkland Motte	Findspot
Trohoughton	Findspot
Drumdoch	Findspot
Castle Greg	Fort
Possil Marsh	Hoard
Birnie	Iron Age site
Traprain Law	Iron Age site
The Pict's Knowe	Iron Age site
Kirkbuddo	Temporary Camp

For the purposes of analysis, this reduces the number of Roman sites in the study area which have produced leather to 52. Four of these are chance or isolated finds (Table 2), but the vast majority (48 or 92%) can be directly associated with a Roman civilian or military settlement, representing 14.4% of 333 Roman sites.

Table 2: Chance or isolated finds which can be assigned a Roman date

Site name	Site type
Thorngrafton/Bardon Mill	Hoard
Lochmaben	Findspot
Lochar Moss	Findspot
Culloden	Findspot

A significant proportion of the 333 sites believed to be of Roman date have never been excavated, so cannot be expected to have yielded leather. A more accurate calculation to demonstrate the presence and survival of leather would discount 129 unexcavated sites. The 48 occurrences of leather which can be directly associated with a Roman site therefore represent 21.8% of the 220 Roman sites within the study area that have seen at least partial excavation.

Table 3: Roman sites which have yielded leather

Site name	Site Type
Balmuildy	Fort
Bar Hill	Fort
Bearsden	Fort
Birdoswald	Fort + *vicus*
Birrens	Fort
Bochastle	Fort
Bothwellhaugh	Fort
Burgh-by-Sands	Fort + *vicus*
Camelon	Fort + ?*vicus*
Cappuck	Fort
Carlisle	Fort + *vicus*
Carpow	Fortress
Carrawburgh	Fort + ?*vicus*
Carvoran	Fort + ?*vicus*
Castlecary	Fort
Chesters	Fort + ?*vicus*
Corbridge	Fort + *vicus*
Coventina's Well	Shrine
Cramond	Fort + *vicus*
Cramond Lioness	Findspot[2]
Crawford	Fort
Croy Hill	Fort + ?*vicus*
Denton Hall / Turret 7b	Signal station
Drumquhassle	Fort
Elginhaugh	Fort
Haltonchesters	Fort + *vicus*
Haltwhistle Burn	Fortlet
High House / Milecastle 50 TW	Milecastle
High Rochester	Fort
Housesteads	Fort + *vicus*
Inveresk	Fort + *vicus*
Kinneil	Fortlet
Kirkbride	Fort
Kirkintilloch	Fort
Mollins	Fort
Mumrills	Fort
Newcastle upon Tyne	Fort + ?*vicus*
Newstead	Fort + *vicus*
Old Kilpatrick	Fort
Peel Gap	Signal station
Petty Knowes Cemetery	Cemetery
Rough Castle	Fort + *vicus*
Sewingshields / Milecastle 35	Milecastle
South Shields	Fort
Stanwix	Fort + *vicus*
Vindolanda	Fort + *vicus*
Wallsend	Fort + *vicus*
Wilderness Plantation	Fortlet

[2] Although the leather recovered close to the findspot of the Cramond Lioness is assigned to site type 'findspot', it was discovered among midden material on the Roman riverbank and is assumed to relate to the nearby fort and *vicus* (Keppie 2001, 321).

Even a seemingly simple task such as calculating the total number of leather finds is not without complication. For some sites, particularly those with very large or very small assemblages, data is unavailable or incomplete. At Cappuck, for example, the leather assemblage is described as "some fragments of shoe-leather, one of them a complete sole" (Stevenson and Miller 1912, 476). This leather could not be traced, and its whereabouts remain unknown. In such cases, where a small number of leather finds is indicated but no further data is available, a quantity of five has been assumed as an estimation. Rough totals of 6600 for Vindolanda (E. Greene, pers. comm.) and 450 for Newstead (F. Hunter, pers. comm.) have been used. For the numerous excavations at Carlisle, data from publications have been combined with unpublished information which has been made available to me, giving a total of over 4700. With these constraints in mind, the total number of leather finds within the survey area comes to around 14,215.

The assemblages Carlisle and Vindolanda, each with both fort and substantial *vicus*, account between them for over 80% of all leather from within the study area: 46.4% from Vindolanda, which has yielded around 6600 items; and 33.7% from Carlisle, with around 4789 items (for which data is available). The next most significant assemblages pale in comparison: Birdoswald accounts for around 5.2%, Bar Hill 4.2%, Newstead 3.2%, Housesteads 2.1%, with the remainder of sites each accounting for less than 1% of the total. Indeed, almost a third (17) of the 52 assemblages comprise just one item, each representing less than 0.01% of the total (Fig. 2).

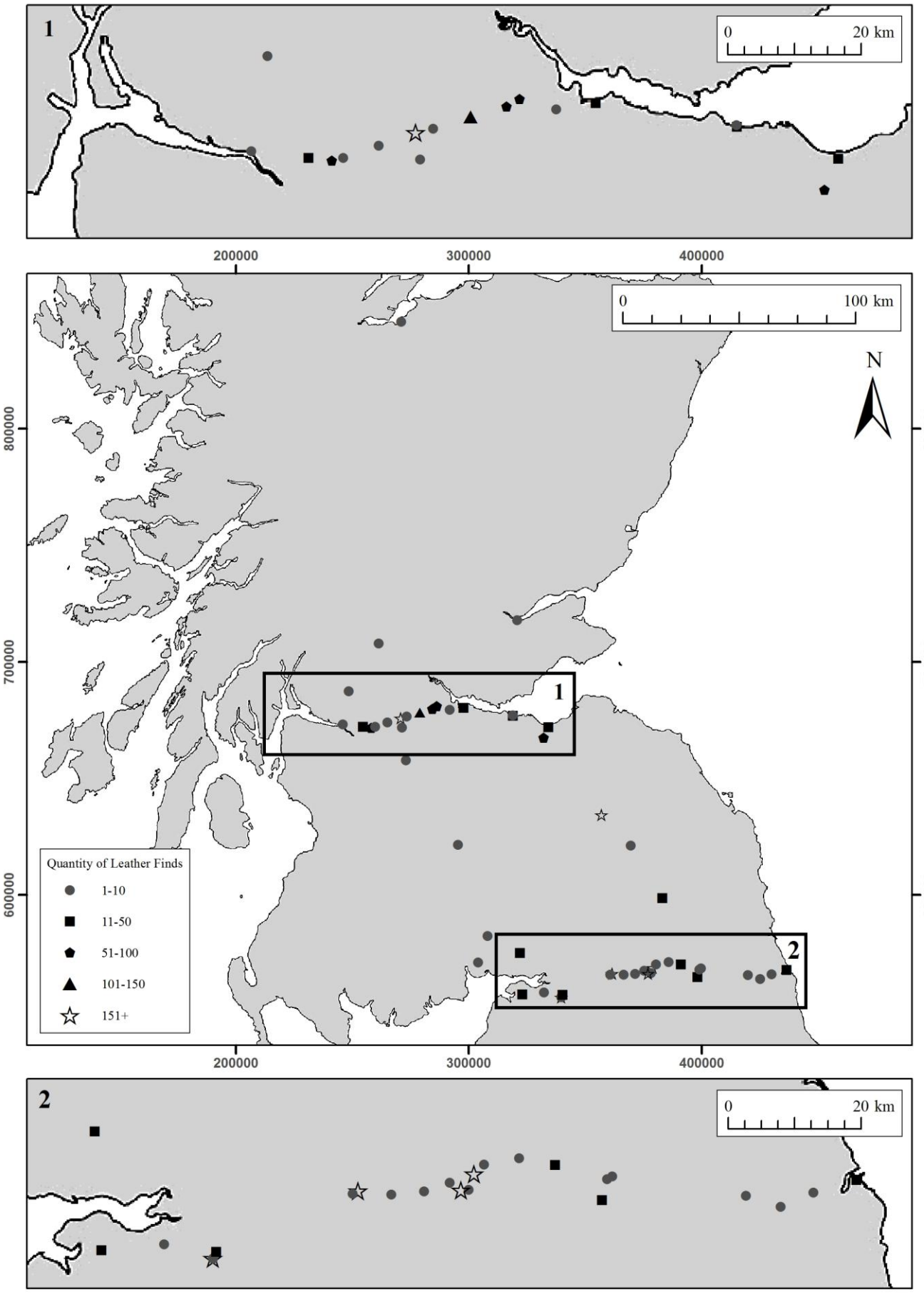
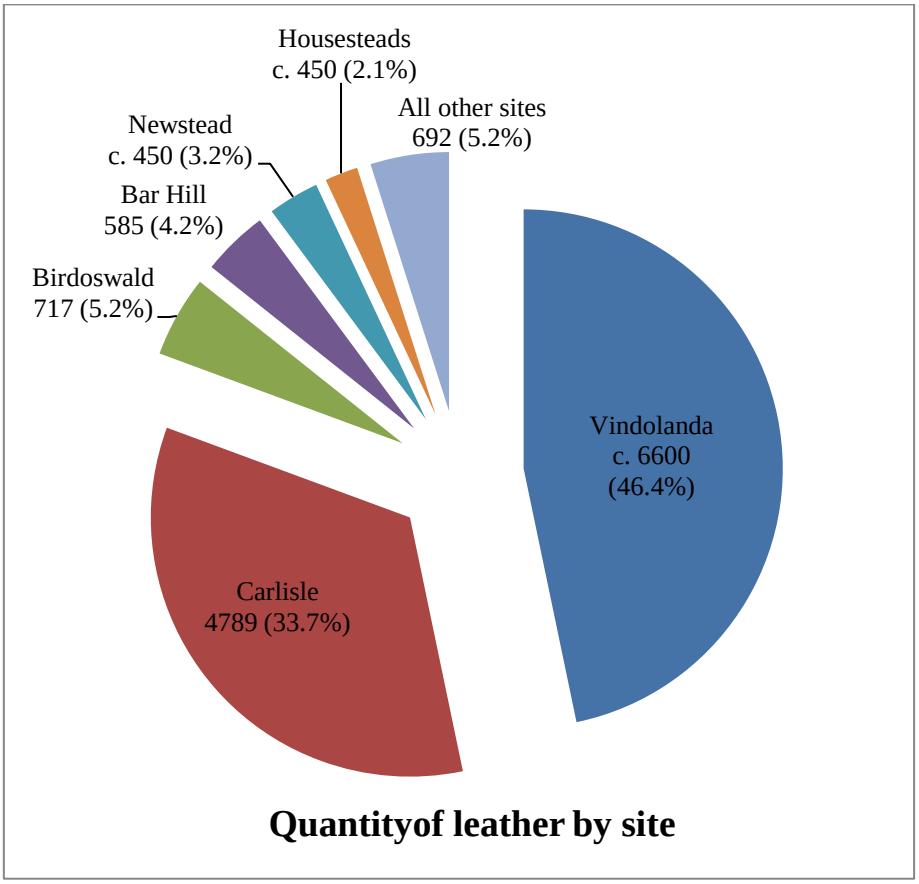


Fig. 1: map showing distribution of leather, with focus on Antonine and Hadrian's Wall areas

Figure 2: Quantity of leather by site



2.2 Publication and data availability

Analysis of distribution of artefact types and context of discovery is very dependent on publication. Thankfully, a number of the most significant assemblages have seen recent, comprehensive publication. Birdoswald produced 692 items during excavations in 1987-92, published in the late 1990s (Mould 1997), and there are three publications on major excavations in Carlisle: the Millennium excavations yielded around 2742 items (Winterbottom 2009; Mould 2009); work in the Southern Lanes produced around 580 leather finds (Padley and Winterbottom 2010); and excavations at Castle Street produced around 595 items (Winterbottom 1991a; 1991b). However, unpublished material from Annetwell Street accounts for at least 582 finds.[3] Only a small proportion of the leather from Vindolanda has

[3] 122 shoes/shoe parts and 460 items of sheet leather from Annetwell Street are noted in publication on the leather from the Southern Lanes (Padley and Winterbottom 2010, 280; Winterbottom 2010a, 301). Leatherworking waste is noted but not quantified (Winterbottom 2010b, 293).

been published (van Driel-Murray 1993) although a handful of useful papers exist including an early interim report (Metcalfe and Longmore 1975) and papers focussed on chamfrons (van Driel-Murray 1989) and tentage (van Driel-Murray 1991). Work at this complex and extensive site is ongoing, and publication now would produce only a partial picture. The results of excavations at Bar Hill in the early twentieth century, which produced a leather assemblage of over 580 items, were later comprehensively published (Robertson *et al* 1975). The assemblages from Newstead, Castlecary and Balmuildy are particularly in need of up-to-date assessment and publication, as they were neither catalogued nor fully described in contemporary reports (Curle 1911; Anderson 1903; Miller 1922) although the assemblage from Castlecary formed the subject of an undergraduate thesis (Martin 1983). Data from these sites is limited but has, where possible, been included in the analysis that follows.

2.3 Context of discovery: military vs. civilian

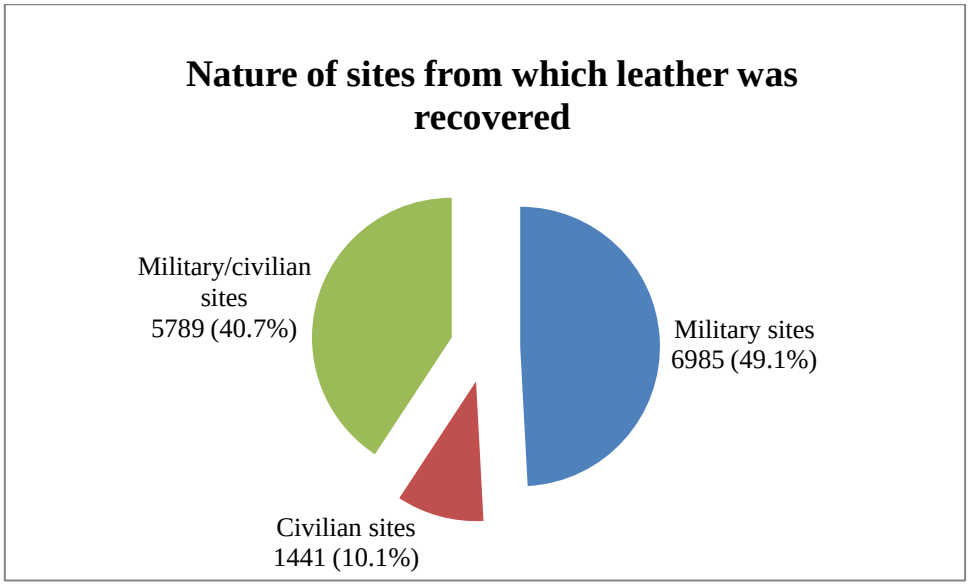
Among the key considerations when assessing leather from within the study area was whether it was recovered from contexts associated with military or civilian settlement. 26 (50%) of the locations which have yielded leather can be categorised as having been military in nature – forts, fortlets, milecastles etc. However, over a quarter (14, or 26.9%) of the 52 locations that have produced leather comprise forts with associated *vici*, representing areas of both military and civilian occupation. A further five sites (9.6%) comprise forts which are suspected to have associated *vici*. The most accurate way to categorise material requires careful consideration of contextual information: for a complex site such as Carlisle, it was necessary to take into account whether material was drawn from the fort or the *vicus*. Where sufficient data was available, it was possible to categorise leather finds as 'military' or 'civilian' in this manner. However, material recovered from contexts that may relate to either soldiers or civilians is categorised as 'military/civilian', since it is impossible to be certain of its origin (see below).

Around 6985 items, representing 49.1% of the total, is categorised as being related to military activity.[4] This material is drawn from 32 military sites within the study area. Approximately

[4] See Spreadsheet 1 on accompanying CD for relevant data

1441 leather items, representing 10.1% of the total, have been categorised as being related to civilian occupation. This material is drawn from five *vici* within the study area. The remaining 5789 leather items, representing 40.7% of the total, could not be readily categorised as either military or civilian in nature.

Figure 3: nature of sites from which leather was recovered



While these categorisations are useful in enabling us to see more easily whether material has been drawn from locations that were predominantly military or non-military in nature, the processes of deposition are notoriously complex. Members of the military mixed with civilians regularly, whether buying goods from tradespeople and merchants or sustaining personal relationships with those dwelling outside the walls (see Chapter 6). Similarly, it appears as though civilians were able to enter and move around certain areas of forts quite freely: while we do not necessarily fully understand the dynamic between fort and *vicus*, "the old belief in a rigid demarcation between soldiers inside and civilians outside seems much less acceptable" (Mattingly 2007, 171) now than previously. Thus an item deposited within a *vicus* may well have belonged to a soldier, and an item from a fort may have belonged to a civilian. However, as a base categorisation, this method serves at least to illustrate whether material has been drawn from an area of civilian or military occupation. Where sufficient data exists, and discounting the somewhat blurred military/civilian category, we can distinguish between 6985 leather finds drawn from military contexts, representing 82.9%,

and 1441 items drawn from civilian contexts, representing 17.1%. Thus we can establish a broad ratio of 4:1, demonstrating that leather is recovered much more commonly from military settings than civilian sites.

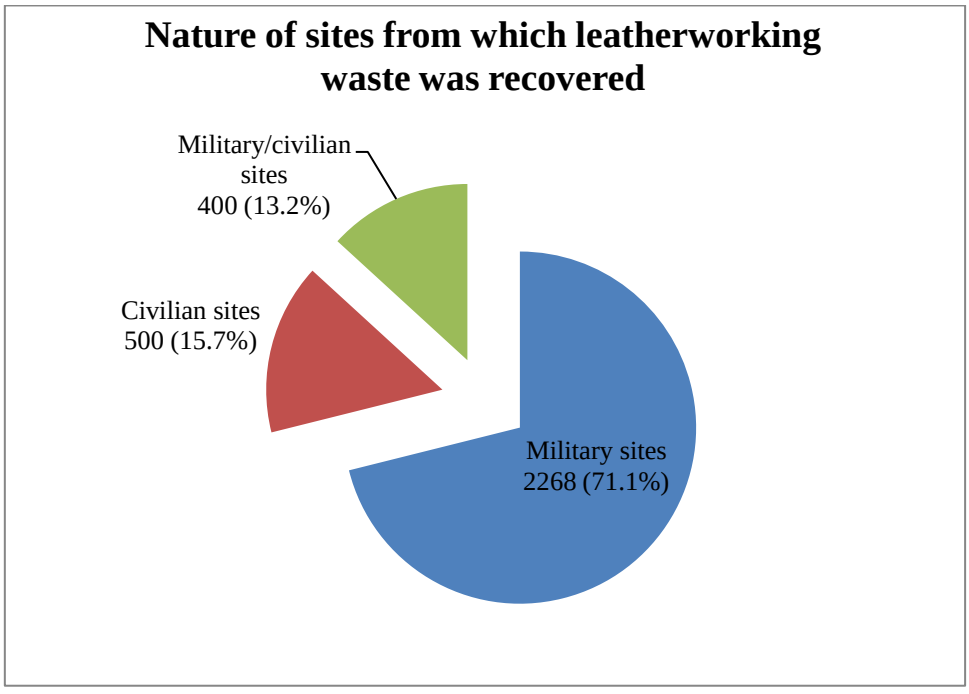
The preponderance of leather from military sites does not necessarily indicate that leather was used more commonly by the military sites than elsewhere, as this may relate to an element of bias in the sites which have seen excavation. That 40.6% of all of the leather within the study area cannot be confidently categorised is due in part to the unpublished material from Vindolanda, the focus of "the only substantial *vicus* excavation [on Hadrian's Wall] in modern times" (Mason 2009, 65). Publication of this data in due course will no doubt alter these figures, and is likely to transform our understanding of Roman leatherwork.

The largest leather assemblages come from forts and/or *vici,* sites that were inhabited for numerous years – if not decades – sometimes with multiple, discrete periods of occupation during which much rubbish would have accumulated. On longer-term settlements, whether civilian or military in nature, large deposits of rubbish would accumulate and leather is almost always found in this context of waste and discard, thrown into ditches or wells that were no longer serving their primary purpose (van Driel-Murray 1985, 43-44), or in secondary deposits related to the dismantling and abandonment of a fort (van Driel-Murray 1993, 3-4). We rely on its being disposed of in an environment conducive to its survival, so that we might find it preserved centuries later. However, leather is very plastic, hardwearing and thus versatile, and large items of sheet leather such as tentage were frequently reused as scrap, as demonstrated by the bundle of unusable edge pieces that were discarded at MC 50 TW (Simpson and Richmond 1935, 10). This recycling reduces the number of complete/identifiable objects that might be rediscovered by archaeologists. The abundance of items of footwear is at odds with the rarity of garments, for example (but see below). Leather is less likely to be recovered from waste deposits on sites occupied for shorter periods, such as temporary camps, as the disposal of an essential item such as a shoe or tent panel would imply that a replacement was available; such goods would be most easily available at more permanent locations with established trade and/or workshops, such as forts or *vici*. No leather

has been recovered from temporary camps within the study area,[5] although this may be related to so few having been comprehensively excavated (Jones 2011, 25-26).

At least 3188 pieces of leatherworking waste have been recovered within the study area (see below and Chapter 4), of which the vast majority (2268, or 71.1%) is drawn from military contexts. Just 15.7% (500) is drawn from civilian sites, and the remaining 13.2% (420) from sites that could not be categorised as either military or civilian in nature. While it might be tempting to suggest that this indicates that the military was the predominant producer of leather goods in northern Britain during the Roman period, almost half of this material is drawn from excavations within the footprint of the fort at Carlisle, and cannot be seen as representative of all military sites. Indeed, the prevalence of leatherworking waste from Carlisle may be due to the significant proportion of excavations that has taken place within the footprint of the fort in comparison to many other sites. Rather, we might postulate that the fort at Carlisle was one of a number of centres for the production of leather goods, footwear in particular (see Chapter 4).

Figure 4: nature of sites from which leatherworking waste was recovered



[5] At Bar Hill, one shoe came from the ditches of the earlier construction camp (Macdonald and Park 1906, 13) although insufficient contextual information is available to ascertain if it was deposited during the occupation of the camp or the construction phases of the fort.

2.4 Site and feature type

Ideally, consideration of the contexts of all leather within the study area would establish where it is most frequently found, and facilitate some understanding of how and where leather was deposited in the past. However, detailed contextual information is not available for all assemblages. For example, at Bar Hill, where leather was recovered from the fort's ditches, pits and a well in the interior, we are told only that two pieces came from the well (Robertson *et al* 1975, 59). In excavation reports, information is usually sorted by artefact type and not by provenance, and where leather was recovered from multiple locations this causes particular problems when trying to gain a feel for which areas of a very large site produced particular finds. For example, to understand the contexts of deposition for the thousands of items from the Millennium excavations and excavations in the Lanes in Carlisle would require many hours of cross-checking of data, and would result in only a partial picture.

However, we can make some general statements based on the information available. Comprehensive contextual information is available for around 1556 items, around 11.0% of the total. Leather is commonly found in waterlogged cut features such as ditches, pits and wells. At least 1152 items of leather (74.0% of the total for which we have sufficient data) have been recovered from ditches within the study area, and a handful from the *Vallum* to the south of Hadrian's Wall. The frequency with which leather and other organic material is recovered from ditches can be attributed in part at least to excavation methodologies: these features are frequently targeted for excavation thanks to their potential to yield both artefacts and environmental material. If only a small percentage of a site can be excavated, exploring the defences will often be a priority e.g. Keppie and Walker's targeted investigation of fortlets at Seabegs Wood, Kinneil and Cleddans (1981), and the deliberate exploration of the ends of the ditches immediately outside the gates at Elginhaugh (Hanson 2007; pers. comm.). A focus on examining the ditches is particularly true of the excavation of temporary camps, such as those identified from the air by St Joseph. However, it is clear that more comprehensive excavation is worthwhile, with sites like Kintore showing that some of these supposedly temporary camps were in fact occupied for lengthy periods (Jones 2011, 25-27); should more camps see significant excavation, they might yet yield leather.

At least 31 (2.0%) leather finds have come from pits and a further 44 (2.8%) from wells. The distinction between these two feature types is not always clear – some deep pits were perhaps dug as wells – so it might be most accurate to indicate simply that 4.8% of leather was found in deep pits/wells. Pits were dug for the disposal of waste and covered over when full, and wells were frequently reused as rubbish pits when they had run dry or on abandonment of a site. Similarly, ditches were often used for the disposal of waste on abandonment (van Driel-Murray 1993, 3).

While deep, waterlogged, features often provide an environment conducive to the survival of organic materials, a significant proportion of the total (around 20% of that for which we have sufficient contextual information) comes from a range of less deeply stratified contexts, including floor deposits within buildings, midden deposits spread on the ground surface and so on. Waste was sometimes spread more widely across a site on abandonment, for example at Vindolanda, where paired shoes were found to have been separated from each other during this process (van Driel-Murray 1993, 4).

2.5 Composition of assemblages

Where detailed information is available, assemblages can be assessed by artefact type. 45.5% of the leather from within the study area is categorised as miscellaneous material. This means either that there is no data available for this material, or that the leather comprises unidentifiable fragments. Beyond this, the most common find type is leatherworking waste, representing 22.5% of all finds. Footwear accounts for 20.5%; tentage 7.7% and other stitched sheet leather, including that not definitely identifiable as tentage, 2.8%. The remaining 1.0% consists of rarely-found items such as saddle covers, shield covers and bags/purses/pouches.

The term ‘offcuts/scraps’ is used in this chapter only when it applies to fragments of leather that represent leatherworking. It is not uncommon to see the term ‘scraps’ used to describe miscellaneous pieces of leather (e.g. scraps of leather are noted from Bochastle (Anderson *et*

al 1956, 53) and Mumrills (Macdonald and Curle 1929, 553), and in an interim report from Vindolanda the term 'scrap leather' is used (Blake 2001, 21)), but such examples are interpreted as miscellaneous material rather than leatherworking waste. The preponderance of offcuts is not representative of all sites, and is influenced by the significant amounts of leatherworking waste recovered from Carlisle, where leatherworking was taking place on an industrial scale: the fort and *vicus* between them account for almost 2500 items of leatherworking waste, over 78% of all such material recovered within the study area. Waste indicative of leatherworking is known from 12 of the 52 sites that have yielded leather (Chapter 4).

Footwear, representing 20.4% of leather from the study area, was essential equipment for the Roman military in Britannia. Each soldier had at least two pairs of shoes (van Driel-Murray 2001b, 185) which seem to have been considered quite disposable (see below). A number of the larger assemblages from within the study area are particularly dominated by footwear, including Bar Hill (89.9%), Rough Castle (79.4%), Camelon (71.5%), Castlecary (71.3%) and Elginhaugh (69.5%). Shoes are of course not an exclusively military item: most styles were worn by civilians and soldiers, adults and children alike. Footwear is perhaps one of the most revealing artefact types available to us, yielding demographic, technological and even ideological information under rigorous analysis, and – less scientifically – the oft-elusive "human touch" (Macdonald and Curle 1929, 553) so sought after by archaeologists as we explore the lives of those who went before us.

Careful measurement and interpretation of footwear can inform of shoe size and thus provide demographic data (Greene 2014; Groenman-van Waateringe 1978). Of particular significance to Roman archaeology, analysis of footwear assemblages has been central to the developing body of evidence for the presence of families in forts (van Driel-Murray 1977; Greene 2011). Women's and/or children's shoes are known from 13 sites within the study area (see Chapter 6). A chronology of fashions has been established (van Driel-Murray 2001b), and shoes can demonstrate status and class. Some examples from Vindolanda, including the 'Lepidina' slipper, footwear with elaborate openwork fishnet uppers (van Driel-Murray 1993), or children's shoes that mirror adult fashions (van Driel-Murray 2005; Green 2014) are of markedly higher quality than the majority of footwear from the site. Footwear can allow us a

window on Roman superstitions: apotropaic symbols are sometimes incised onto shoes, and hobnails are arranged in shapes (swastikas, circles and tridents) that may have been considered lucky (van Driel-Murray 1999a, 132-33).

The decorative or openwork uppers that are characteristic of many styles of Roman footwear would render little leather suitable for reuse, although the uppers were sometimes cut away from worn out soles, as at Birdoswald, perhaps for reuse in cobbling (Mould 1997, 340). While much of what we can learn from shoes focuses on the individual and society, they can also provide clues about the economy: evidence of significant repair activities is interpreted as indicative of problems with supply, previously visible only on Hadrian's Wall in the first century AD (van Driel-Murray 2002b, 111). However, recent analysis of material from Camelon suggests that the Antonine frontier zone was also affected by shortages (Arkesteijn and van Driel-Murray 2015) (see Chapter 3).

It might be tempting to explain away the seemingly disproportionate survival of so much footwear by alluding to selective retention. Shoes are easily identifiable, and offer an intimate and tangible link with their previous owners, from the impression of the wearer's foot to their initials marked on the sole. This makes them an attractive artefact type that might be considered more worthy of conservation than other, less aesthetically pleasing, items. Early excavation reports sometimes hint at a competitive undercurrent to antiquarian work: for example, at Rough Castle, "portions of the sides and soles of shoes and sandals were found, but none showing features of shape or construction that have not been previously exhibited in the much larger and better preserved collection of these from Castlecary" (Buchanan *et al* 1905, 497). The leather from Rough Castle is not described further and was presumably considered to be of little interest or academic value. Similarly, the excavators of Mumrills lament that "there were only three scraps of leather to set against the three or four hundred specimens of footwear which lent such a human touch to the excavations at Bar Hill" (Macdonald and Curle 1929, 553). Very few antiquarian assemblages contain any indication that leatherworking waste was recovered. It is noteworthy that of the five substantial assemblages that are dominated by footwear (above), three were excavated in the early 20th century, before the advent of modern archaeological standards. However, a preponderance of footwear is commonplace, even in modern assemblages.

Tentage makes up 7.7% of the leather found within the study area.[6] Tents were essential to the army, both while on the move and while constructing more permanent accommodation. A 3m x 3m tent to house eight soldiers required around 70 goatskins[7] (van Driel-Murray 1990, 116) and it is estimated that the army may have had over 2 million goatskins in use as tentage at any one time (Groenman van-Waateringe 2009, 210). Tent panels were frequently repaired (e.g. at Housesteads (Mould 2009, 487) and Birdoswald (Mould 1997, 340)), and when no longer fit for purpose, the large panels of sheet leather were eminently suitable for recycling so were often cut up for reuse. Around 11% of sheet leather from the Southern Lanes, Carlisle, showed signs of such activity, rising to around 20% at Annetwell Street and Castle Street. Analysis of hems and seams aids in the identification of recycled tentage, but even where stitching remains, categorisation is not always possible (Winterbottom 2010a, 302-04) so the current known total of tentage is almost certainly an underrepresentation. That so much identifiable tentage survives is testament to the large volume of tentage in circulation in Roman Britain.

It has been noted above that footwear survives in much greater quantities than garments/clothing. A partial explanation for this discrepancy might be found in the very nature of the items' use: as a protective barrier between the soft sole of the foot and the ground, shoes are subject to unparalleled wear and tear, so are rapidly worn out and replaced. Garments are subject to little more than friction during use, and even when no longer serviceable, the leather used for garments could be usefully recycled into something else. Even where possible garments have previously been identified, further analysis sometimes proves otherwise. For example, "fragments of (?) garments" from the Lanes, Carlisle (McCarthy *et al* 1982, 84) are no longer interpreted as such (C. Howard-Davies, pers. comm.); and from Bar Hill, a possible apron found with a length of rope (Macdonald and Park 1906, 106) was reinterpreted as "a large leather sheet" (Robertson *et al* 1975, 90). However, fragments "perhaps from the tunic of an auxiliary soldier" are noted from Bar Hill (Robertson *et al* 1975, 91). It is on the matter of clothing that the assemblage from Balmuildy warrants particular attention: Miller notes "leather clothing of the soldier… Some of the larger pieces

[6] Occasionally, associations of multiple tent panels are recovered e.g. Vindolanda (van Driel-Murray 1993, 24-27). Each of these associations is counted as one find, in the same way that a shoe of composite parts is treated as one find.

[7] The back panels of Tent III from Vindolanda are of hair sheepskin, which is of lower quality than goatskin. However, since army tents were laid out back-to-back in rows, these inferior panels were not immediately visible to passers-by. It is not yet clear if this was standard practice (van Driel-Murray forthcoming).

with stitched hems… must have been parts of tunics, aprons or the like. One piece with a scalloped edge… may have been the fringe of a jerkin" (1922, 98). Antiquarian excavators were quick to identify what they believed to be clothing, believing that "leather during the Roman occupation was much more widely used for clothing than it is now" (Curle 1932, 349). While some garments *were* made of leather, felt or fur (e.g. Pliny indicates that male slaves should be provided with "long-sleeved leather garments" to protect against the weather (*Farming* 1.8.9)), most Roman-period clothing[8] was made of more versatile, supple and comfortable woven materials such as wool and linen (Croom 2010, 20-21). Some of the material from Balmuildy may be tentage, or simply unidentifiable sheet leather – much work has been done on the types of seams and stitching used in the construction of tents since Curle was writing, and reassessment would be worthwhile – although the possibility remains that the assemblage could include fragments of clothing. Though confirmed examples of leather garments are rare, a number of pairs of women's leather briefs have been identified in London (van Driel-Murray 1999b; 2014), and an embroidered leather panel from Carlisle is interpreted as a possible shoulder panel from a textile or leather garment (Winterbottom 1991a, 312-13).

2.6 Loss and deterioration

Quantifying the proportion of leather that survives compared with material that has been lost over time has proved very difficult. A lack of detailed publication for assemblages recovered during antiquarian excavations prevents comparison of how much was found with what survives today. Material recovered during modern excavations might be published in much more detail, and although we might have a clear idea of exactly how much was found, it is often not stated where such material is stored/archived. Although attempts were made to contact local and national museums to locate all assemblages, not all were successful. This does not confirm that the leather no longer exists, only that it could not be tracked down. However, it is inevitable that a proportion of archaeological leather will not survive, either through accidental loss or because of deterioration/disintegration. The latter was particularly problematic before the advent of modern conservation techniques. For example, leather shoe

[8] A lack of evidence for tanning, and the prevalence of loom-weights and spindlewhorls on prehistoric and Roman sites indicate that clothing in Roman-period Britain would also have relied heavily on textiles.

soles and sandals from Newstead apparently "fell to pieces on drying, and were unfortunately thrown aside" (Smith 1857, 426). Even today, archaeological leather can be difficult to conserve, sometimes becoming brittle and fragmentary: for example, pieces of tentage from both Elginhaugh and Cramond did not survive conservation despite the application of modern conservation techinques.

2.7 Leather from Roman Iron Age Sites

The vast majority of Roman-period leather identified as part of this study derives from Roman sites, predominantly forts and *vici*. There are, however, three examples of leather from Roman-period Iron Age sites. The first is a short, narrow length of leather fitted with 23 silver-gilt studs, part of the Traprain Law hoard (A. O. Curle 1923, 84). The second, also found in association with a hoard, is from Birnie, a late Iron Age unenclosed settlement in Morayshire. Hoards of coins were deposited in leather bags in pots in the late second century AD (Holmes 2006; Hunter 2007a). The final example is a shoe sole from the Pict's Knowe, Dumfries and Galloway, a Neolithic henge that was appropriated in the Iron Age (Thomas 2007).

The leather objects from Traprain Law and Birnie were clearly deposited as part of hoards (though the Birnie bags form the container rather than the valuables). If we accept the interpretation of various objects at Pict's Knowe as votive deposits (Crone, Sands and Skinner 2007, 106), it is notable that all three leather finds from non-Roman sites survive as the result of intentional deposition. It is potentially significant that excavated examples of vegetable tanned leather occur on non-Roman sites only in 'special' or unusual settings since it might indicate that tanned leather was not commonly used on non-Roman sites during the Roman Iron Age, and when it was available, was afforded special treatment. There is, however, a certain circularity to this strand of thinking as it makes sense that intentionally deposited, i.e. buried, items might have a better chance of survival than others, and had they not been intentionally deposited (in two of the three cases, they survive as a result of their proximity to metal), they may not have survived. Thus leather may have been used more commonly than the archaeological record suggests but, being quotidian in nature, the bulk of

leather items were disposed of in unexceptional circumstances, precluding their survival. This consideration is clearly mentioned regarding the wooden objects from the Pict's Knowe (Crone, Sands and Skinner 2007, 106).

3. How was leather resourced, processed and supplied on the northern frontier?

Strabo's *Geographica*, published in the early first century AD, refers to trade between Britain and Rome, with hides, cattle and slaves being among Britain's exports (IV, 5). Once under Roman rule (partially, at least), Britain no doubt continued to contribute to fulfilling the empire's enormous demand for leather through the provision of hides.

It is accepted that the Roman army subsisted on a diet of both local and imported foodstuffs, supplementing local supply of bulk items like grain with imported exotic goods (e.g. at Bearsden, exotic foods such as figs, coriander, wild celery and opium poppy were consumed alongside local produce (Knights *et al.* 1983, 143)). This flexible approach to resourcing was seemingly widely applicable (Breeze 1984, 281-82), with the military making using of local supplies where possible and manufacturing or importing the remainder (Hanson 2003, 206-07). It has been suggested that goat hides were sourced from North Africa and the eastern reaches in particular, where goats were more abundant, and were tanned centrally in military owned/controlled tanneries (Groenman van-Waateringe 2009, 211-13). Alternatively, it has been put forward that the Quraysh tribe of southern Syria may have supplied large quantities of hides, tanned leather and/or manufactured leather goods to the Roman military in the east (Crone 2007). However, it is probable that a proportion of the many leather items in use in Roman Britain were made from hides sourced locally.

The advent of the Roman period saw many thousands of military personnel and civilians arriving in Britain, all of them consumers (Hanson 2003, 203-06). Agricultural practices took on an increased intensity in the late Iron Age and into the Roman period (Tipping 1997). New urbanised settlement types developed, such as *oppida* and later, Roman forts and towns. These settlements did not have associated agricultural land but drew goods and produce from the surrounding area. Farmers and producers had to generate a surplus in order to supply these new settlements as well as their own (van der Veen and O'Connor 1998), leading to a shift in agricultural practices as producers adapted to meet increased demand for meat, cereals and dairy products, and also presumably for hides.

3.1 Sources of hides

The thick hides of cattle were an essential resource for the Roman military. While cattle were central to the Iron Age economy, an enhanced emphasis on cattle husbandry is noted with the advent of the Roman period (Albarella *et al.* 2008, 1841-43). The north of England has been described as "cattle country", providing an ideal environment for the rearing of large herds for an annual cull (Higham 1989, 166). Animal bone evidence from south-east Britain indicates that the size of cattle and other domesticates increased during the Roman period (Albarella *et al* 2008, 1829; 1843).[1] This phenomenon is generally attributed to the amplified need for meat, a cultural preference among the Romans for beef, and the increased use of ox-drawn ploughs due to a need to augment the yield of cereal crops (Albarella 2007, 396-97). Bone evidence indicates that the majority of cattle slaughtered in Romano-British towns were over four years old at death, mature animals that had probably produced milk or worked as beasts of burden (Cool 2006, 85). Indeed, the predominance of cattle in Roman-period assemblages may be directly connected to the increase in cereal production, with the additional meat gained from slaughtered draught animals being a side-product of the intensification of cereal agriculture. Had the cattle been bred primarily for meat, they would have been slaughtered younger (van der Veen and O'Connor suggest that 1998, 132). Greater variety in the age at death was noted among cattle from rural (and, the implication is, non-Roman) sites (Cool 2006, 85). An increased requirement for hides is not touched upon by any of the authors cited above as a possible contributing factor in the enhanced importance of cattle in the Roman period. This is perhaps because hides are in effect a by-product: animals were not generally slaughtered for their hides alone.

Demand for more hides would lead either to a requirement for more animals or the necessity to recover the hides from a higher proportion of animals slaughtered (if it was not already the case that all hides were recovered and utilised in some way). Animals slaughtered later in life would produce larger hides and thus make a more significant contribution to the leather requirements of the Roman empire. A desire to increase the dimensions of hides might seem

[1] No similar change is noted in northern Britain, although this may be due to a lack of analysis rather than a lack of evidence (Albarella *et al* 2008, 1829; 1843).

an unlikely or tenuous stimulus for the breeding of larger animals, but size did matter: the *Frisii* were taxed in ox-hides, but when the quota was increased to the same amount of hides of the larger aurochs, the *Frisii* were reduced to selling their farms, possessions and ultimately their own people before staging a bloody rebellion in AD 29 (Breeze 1996, 92; Alston 1998, 38; Drummond and Nelson 1994, 82-83).

Sheep were an important source of meat in prehistoric and Roman Britain although their skins were less valued than those of goats as they produced an inferior leather. The purchase of goat-meat is recorded (*Tab. Vindol. II*, 186) but bone evidence indicates that goats formed only a small part of the Iron Age and Romano-British diet, suggesting that they were not abundant (Maltby 1996, 21; 24; Cool 2006, 87-88). This would have limited Britain's capacity for providing Rome with goat hides for tents, for example. However, the known relative proportions of goat are undoubtedly affected by the difficulty in discerning sheep from goat from osteological evidence (Halstead *et al* 2002), hence the frequent attribution of 'sheep/goat' or 'caprines' (e.g. Izard 1997). As a result, goats are probably underrepresented in the archaeological record and were almost certainly more numerous than is currently thought.

3.2 Selection of hides

The difficulty in differentiating sheep from goat from osteological evidence applies similarly to leather, so the term 'sheep/goatskin' is sometimes used (e.g. Mould 1997). It is possible that some of the Roman leather identified as goat actually represents the skin of hairy sheep (van Driel-Murray 1998, 334), which were common in Britain until after the medieval period (Ryder 1981, 384) and sheep may also have provided a valuable source of hides for leather. Indeed, hair sheep leather was used for the back panels of a tent from Vindolanda, though it is not clear if this was standard practice or a frugal measure, perhaps indicating that goat leather was not in plentiful supply (van Driel-Murray forthcoming).

While pork was a popular foodstuff among the Roman military (and probably the higher ranks in particular) in Britain (Cool 2006, 82), pig skins were not preferred for leather. The same trend is noted in Anglo-Scandinavian and medieval York. This may be because pigs are traditionally butchered with the skin intact (O'Connor 2003, 3233) but also because: the hair follicles penetrate the full thickness of pig skin, reducing its water-resistance; having no protective fur, pigs are prone to scratches and scrapes in life, meaning the skins are often marked (scarred leather was avoided during cutting-out at Vindolanda (van Driel-Murray 1993, 56)); and the resulting leather is coarse-grained and less aesthetically pleasing than other leathers (Michel 2014, 39; Haines 2006, 15).

Calf leather was also used (van Driel-Murray 2001c, 62) and occasionally deer leather, both having been identified at Elginhaugh ((Groeman-van Waateringe 2009, 477-78). Deer leather would not have been a staple material. Its supply would have relied on hunting, which was certainly carried out in Roman Britain (*Tab. Vindol.* II, 233) but more for sport than for the meat it would provide (Bowman 2003, 72). While wild game might have supplemented the diet of higher ranking soldiers, their hides would not have made a significant contribution to the leather requirements of the Roman military.

3.3 Supplying the military

While the Roman military did sometimes appropriate agricultural land for their own purposes (Tactitus *Annals* 12.54, 55), they also turned to local farmers and producers, who were obliged to provide the military with goods. Thus while the military probably did not own herds of livestock, it may have maintained control over them by force or cooperation. One of the Vindolanda tablets, written by a civilian entrepreneur, records the supply of grain "to the oxherds at the wood" and "to father, in charge of the oxen" (*Tab. Vindol.* II, 180). In the same tablet are references to supply of grain to various members of the military garrison. Thus, this civilian entrepreneur was "not only trading with the Roman army, but actually being entrusted with part of the military food supply as well" (Evers 2011, 28). This is indicative of a supply system that was not rigidly controlled by the military. If the military did not rear many animals, it would certainly need to look to external sources for hides.

In some parts of the empire, the military could gain supplies through taxes levied on the local peoples which were paid in kind. Farmers and producers simply had to generate more or go without (Hopkins 1980, 101). Both tanned and untanned hides were requisitioned in third century Egypt (Davies 1967, 323-24), and, as already noted, the *Frisii* were pushed to bloodshed by Rome's demands for hides. Given that Britain had previously exported hides to Rome (above), it is likely that with the advent of the Roman period, the empire simply took possession of those hides through taxation.

The collection of livestock as part of an organised system of taxation in kind is perhaps indicated in the archaeological record at Elginhaugh. Following its abandonment in the late first century AD, the fort remained under military control but was reused as a livestock enclosure. Most of the internal buildings were demolished and a series of ditches were established to create a funnel system to channel the movement of animals from the fort through the subdivided annexe to a single gateway. Within the fort enclosure, new wells were dug to supplement the water supply and cobbled areas provided hard-standing. It is suggested that the site may have been used as a collection centre for livestock sourced through taxation of local tribes after the Romans' withdrawal south (Hanson 2007, 651-53). Similar evidence for the gathering and corralling of animals is known at what is thought to have been a significant site in the military requisition of livestock at Metchley, Birmingham. It is suggested that in the mid-late first century AD the site functioned as a supply base, providing locally sourced meat to the forts in its hinterland (A. Jones 2012, 109). Van der Veen and O'Connor suggest that the sheer volume of animal bone found at sites such as Piercebridge, Vindolanda and Binchester indicates "increased mobilisation of livestock in the Roman period" and may signify centralised locations at which livestock was slaughtered and butchered (1998, 136). Strontium isotope analysis on cattle teeth from Owslebury, Hampshire, has indicated that cattle were sourced locally in the middle Iron Age but obtained from a wider geographical area in the late Iron Age. This trend intensifies in the Roman period, with cattle being drawn from up to 70km away. The evidence suggests enhanced mobility within food supply during the Roman period, with trading taking place over wider geographical areas than before, a trend which is paralleled across the spectrum of material culture in Roman Britain (Minnitti *et al* 2014). Animals intended for consumption might be herded to their final destination, which does away with the need for draught animals but also has obvious advantages with regard to the freshness of the meat. However, it is clear that

butchered meat was traded and transported across the Roman north (*Tab. Vindol. II*, 186). Bone evidence indicates that beef was frequently smoked or dried and salted/brined (Cool 2008, 89-91). Thus animals might be collected together at a holding station, butchered, and the meat salted or otherwise preserved prior to distribution, with other commodities (horns, hooves, hides etc.) being collected for use in a range of industries.

3.4 Transportation of hides

It has been noted previously that there is no definite evidence for tanning in Roman Britain. Indeed, there are only a few sites across the empire that display convincing evidence for having functioned as tanneries (below). If there *were* centralised tanning facilities in Roman Britain, we might assume that un-tanned hides were transported over fairly long distances. Freshly flayed hides would swiftly decay (at Castleford, quite large pieces of leather were discarded due to putrefaction prior to tanning (van Driel-Murray 1993, 56)). Drying or salting would prevent decay (Waterer 1976, 179): paired post-holes at Hofheim have been interpreted as racks on which hides could be hung to dry; pock-marks on leather offcuts suggest dry salting with coarse salt; and wet salting in lined pits may also have been an option (van Driel-Murray 2011, 74-75; 1999c, 184).

Documentary evidence on the transportation of skins suggests that varying rates of tax were levied, some being applicable per skin/hide and others by weight (Leguilloux 2004, 83). According to modern data, dry salted hides weight up to 45% less than when freshly flayed, making them significantly lighter – thus potentially incurring less overheads during transportation – than wet salted hides, which see a weight reduction of only 10%-15%. Drying without prior salting results in a weight reduction of up to 65%, although this weight loss is related to high shrinkage (Food and Agricultural Organization of the United Nations 1994). Salting would of course require the transportation of large amounts of salt to the skinning site (van Driel-Murray 2011, 75), and the availability of this resource may have influenced which method of preservation was selected. The weight of the hides might have been particularly pertinent depending on how they were to be transported to the tannery.

Once hides were temporarily preserved, a range of modes of transport may have been used for their distribution. Selkirk's Piercebridge formula suggested that transport by road in Roman Britain was slow and costly, and that forts being established close to waterways so that goods might be transported by river (1983, 58-60; 99). However, the waterways of north-east England in the Roman period were probably less navigable, and transport by road quicker and less costly, than Selkirk has supposed.

Supplies from continental and Mediterranean Europe and southern Britain were brought to northern Britain by sea, perhaps using ports at locations such as South Shields, Berwick-upon-Tweed and on the Solway Firth (Anderson 1992, 58-70), and possibly further north at sites such as Cramond, Camelon and Bertha (Hunter and Carruthers 2012a, 24). Transportation inland may have been carried out to a limited extent by river, but the rivers were not freely passable and to make them so would have required a great deal of construction and maintenance. While it is theoretically possible that Vindolanda might have been supplied by barges on the Tyne, there is no documentary evidence for river-borne transportation at the site. Transport by road would have been a quicker, more efficient and more economical option, thus the onward carriage of supplies from sea ports to inland military installations would have continued mostly by road, by cart or pack-animal (mostly ox-drawn and mules, respectively) (Anderson 1992, 17; 42-43). Documentary evidence suggests that hides (it is not clear if they were tanned or not) were carried by cart (*Tab. Vindol.* II, 343). Anderson also proposes that hides and skins might have been transported by pack animals (1992, 71). It has been suggested that in the medieval period the hooves/phalanges might be left intact on unprocessed skins to aid this process, as the weight of the dangling lower limbs would help keep the hides stable on the pack-animal's back (Serjeantson 1989, 136; Cherry 1991, 295). Excavated examples of concentrations of hooves and phalanges, as at Pompeii, are thought to support the idea that skins were sent to the tannery with the hooves attached. However, hooves were of no use to the tanner, and were themselves a commodity. It seems likely that they would have commonly been removed during the initial trimming process (van Driel-Murray 2011, 72; 78), so reducing the weight of the load for transportation. Rather than being spread across the back of a pack animal, hides were perhaps better packed in bundles – a miniature clay model interpreted as a votive object from Dun Fiadhairt, Skye, is thought to represent a bale of wool (Curle 1932, 289-90;

Hunter 2003, 333) similarly packaged for transportation – each animal carrying a balanced load of two bundles.

As noted above, taxation may have influenced the empire's behaviour regarding the sourcing and tanning of hides. Taxes were applied to goods moving between provinces, with tanned hides incurring four times as much import tax as untanned hides (Groenman-van Waateringe 2009, 212). It would probably have been preferable to keep the movement of hides, tanned or not, to a minimum. Taxation in the Roman empire is poorly understood. However, Hopkins suggests that taxation in kind "tempted the Roman government to have produce transported… without consideration of the total cost" (1980, 103). While it seems likely that hides requisitioned in lieu of cash were not taxed in the same way as traded goods, as the empire would essentially be imposing tax on taxes collected, it seems probable that those acquired through trade *would* incur taxes. Sourcing and tanning hides locally would be a more economical and efficient option.

3.5 Processing the raw material: from hides to leather

Vegetable tanning technology was not known in pre-Roman Britain, so the hides exported to Rome before the conquest (Strabo's *Geographica* IV, 5) must have been preserved in some other way (above) to allow for transportation over long distances without decay. Despite the taxes incurred, it is possible that the export of partially processed hides may have continued throughout the Roman period, without tanneries ever having being established. However, the establishment of industrial-scale production facilities, both military and non-military, was not uncommon in Roman Britain. Continual exportation of untanned hides and importation of tanned hides throughout the 350 years of Roman occupation seems unlikely. The lack of excavated evidence for tanneries in Roman Britain is perplexing and suggests we may be failing to identify the relevant evidence.

3.5.1 Arguments against the establishment of tanneries in Roman Britain

Catterick, Binchester and Vindolanda have in the past been named as having yielded evidence for Roman period tanneries, although further analysis has indicated otherwise (*Binchester International Field School interim report 2011-12*, 8; Hooley 2002, 321-23; van Driel-Murray 2011, 69; Birley, R. 2009, 72-73). By considering the tanning process in discrete stages and identifying the infrastructure, supplies, structures and tools required, and the physical remains and by-products generated, van Driel-Murray has shown that the material evidence required to prove that tanning was taking place extends beyond some leather finds, one or two pits and insect evidence suggestive of a dirty environment. She asserts that the only confirmed example of a Roman tannery anywhere in the empire is at Pompeii, with a second possible tannery at Vitudurum, Switzerland (van Driel-Murray 2011, 71-80). Groenman van-Waateringe suggests two more: at the town of Saepinum, Italy, and at the site of the Gerasa hippodrome, Jordan (2009, 212). Evidence from Castleford suggests that leather might have been sourced over long distances: tanned goat hides arrived with the heads already removed, which might be interpreted as a move to minimise volume and weight, perhaps indicative of long-distance supply. In contrast, at Vindonissa, Switzerland, the heads were left attached, suggesting local supply (van Driel-Murray 1998, 329-31). The tanneries at Pompeii, Vitudurum, Saepinum and Gerasa certainly could not have fulfilled the Roman empire's entire leather requirements. This leaves us with a considerable gap in our understanding of how the Roman imperial economy operated: we still have very little idea of where and how one of the empire's most crucial resources was processed and supplied.

One of the Vindolanda Tablets is often cited in reference to the trade in hides in the Roman north:

> "The hides which you write are at Cataractonium - write that they be given to me and the wagon about which you write. And write to me what is with that wagon. I would have already been to collect them except that I did not care to injure the animals while the roads are bad… Know that I have completed the 170 hides… A messmate of our friend Frontius has been here. He was wanting me to allocate (?) him hides and that being so, was ready to give cash. I told him I would give him the hides by 1 March. He decided that he would come on 13 January. He did not turn up nor did he take any

> trouble to obtain them since he had hides. If he had given the cash, I would have given him them." (*Tab. Vindol.* II, 343)

Octavius, probably a civilian entrepreneur, writes hastily to Candidus, perhaps an *optio* or centurion, at Vindolanda about the supply of goods including grain, sinew and hides (Bowman and Thomas 1994, 322; Evers 2011, 16-17).

The reference to 'completing' the 170 hides is often interpreted as meaning that the tanning process had been finished, and given as supporting evidence for the belief that there had been a tannery at Catterick. This theory is no longer supported for various reasons including the lack of excavated evidence (above), but the notion persists (e.g. Evers notes "what appears to be firm evidence of large-scale tanning activity" at Catterick (2011, 16)). Furthermore, the Latin word 'exple' that is translated as 'completed' refers to the "supplementation of the number of hides" rather than the finishing of any process such as tanning (Groenman-van Waateringe 2009, 213). Octavius simply indicates that he has the required number of hides to hand.

It is notable that there is a dearth of leather finds in Britain from the immediately post-Roman period (Cameron 2011, 86). Early historic leather finds are few. These include footwear (mostly fragmentary), leatherworking waste, a purse and a book satchel, and date to the mid/late sixth century at the earliest (Groenman-van Waateringe 1981; 2000, 128-33; 2001, 391; Crone and Campbell 2005; Alcock *et al.* 1989; DES 2013). Evidence for tanning is similarly scanty, and it may be that pseudo leather or rawhide was more commonly used (Cameron 2011, 91). Economic contraction in Britain in the fifth century saw the loss of a range of industries (bricks, tile, cement, wheel-thrown pottery) (Wilson 2006,232-34), and the lack of leather finds suggests that, even if tanneries were established in Roman Britain, tanning technology was not retained.

3.5.2 Arguments and evidence in favour of the establishment of tanneries in Roman Britain

The structures/facilities required for a tannery – pits, tanks/vats, drying frames, workshop space (van Driel-Murray 2011, 75) – are not particularly unusual or difficult to create, and on excavation such features might easily be misinterpreted as relating to some other occupation. However, tanning is in itself a lengthy process: it might take two years, from flaying to finishing, to turn cattle hides to leather. Therefore tanning was "a capital intensive, large scale industry, requiring considerable long-term investment in raw materials, structure and space" (van Driel-Murray 2001c, 61). Indeed, far from being an artisan craft or cottage industry, van Driel-Murray suggests that our failure thus far to identify the archaeological evidence of tanning in Roman Britain might in fact stem from an underestimation of the scale of the industry (*ibid*.).

The Roman presence north of Hadrian's Wall was intermittent, and the northern frontier supported significantly less Roman industry than central and southern England. This is aptly demonstrated by the relative scarcity of industrial sites such as pottery kilns. Nonetheless, significant industrial activity was undertaken on the northern frontiers: pottery kilns are known close to Hadrian's Wall at Brampton and Scalesceugh (Bellhouse 1971) and further north at Newstead, Elginhaugh, Bearsden, Bar Hill and perhaps Croy Hill (Breeze 1986; Hunter and Carruthers 2012b, 48-49). However, the lengthiness of the tanning process may reduce the likelihood of tanneries having been established in northern Britain, where the Roman presence was discontinuous and less secure than further south: any partially tanned hides would be lost, should the military have cause to retreat south.

Tanning is a smelly and unpleasant industry, and we might argue that our failure to identify Roman tanneries stems from a focus on excavation of urban and military sites, when perhaps tanneries were placed in more remote locations. For example, the fifteenth century tannery at The Green, Northampton, was established in an all but abandoned part of town (Shaw 2011, 120)) however, in the medieval period, tanneries were more commonly located in urban areas (Burns 2012. Indeed, the tannery at Pompeii is located on the southern fringes of the city (van Driel-Murray 2011, 71) – on the periphery, perhaps, but still within the city limits. It is likely that tanneries in Roman Britain would also have been established in urban locations.

It seems highly improbable that all untanned hides were exported from Britain and tanned elsewhere, and tanned hides imported. This would have been neither time- nor cost-effective. Tanning requires little in the way of construction/installation and can be carried out almost anywhere provided that there is sufficient space and time. The tannery in Pompeii, which is the only example to convince the most eminent expert on the subject, Carol van Driel-Murray, was not even in a purpose-built structure. Rather, it was established in what had previously been a house. This serves only to highlight our failure thus far to recognise any 'true' tanneries set up from scratch. The physical clues of tanning – numerous pits/vats, covered sheds/frames, knives, paired post-holes indicative of drying racks etc (see van Driel-Murray's comprehensive table (2011, 75, Table 1)) – might be fairly easily identifiable if viewed collectively, but could certainly be misinterpreted if only one or two elements were identified. The fact that a substantial structure or workshop is not necessarily required can only make identification of tanneries all the more problematic. It seems likely that tanning *was* taking place in Roman Britain. We are simply not recognising its signatures in the archaeological evidence.

3.6 Trade and availability of hides

The tone of the letter between Candidus and Octavius, quoted above, implies that Candidus has the upper hand in their relationship. That Candidus would have the authority to ask someone at Catterick to send the wagon and hides to Octavius (below) might suggest that Candidus is in the military but Octavius is not. The letter most likely represents a snapshot of dealings between the military and civilians, and gives an insight into the world of trade: "I hear that Frontinius Iulius has for sale at a high price the leather ware (?) which he bought here for five denarii apiece" (*Tab. Vindol.* II, 343). This translation is as it appears on Vindolanda Tablets Online[2] and in Bowman, Thomas and Adams (1990, 51-52), but the colloquial tone of the letter made translation and interpretation rather tricky. An alternative but less comprehensible translation might be "I hear that Frontinius Iulius has for sale at a high price for leather-making the (things) which he bought here for five denarii a piece" (Bowman 2003, 146; quoted as such in Evers 2011, 15). Whichever translation is preferred,

[2] http://vindolanda.csad.ox.ac.uk/

this comment indicates non-military-controlled sale of either leather items or tanning/leatherworking tools/supplies. Mention of six goat skins acquired by Metto on behalf of Advectus through the agency of Saco (*Tab. Vindol.* II, 309) might also represent non-military provision of goods, although a small quantity like this might be intended for repairs rather than manufacture.

The letter also gives some information on the availability of hides: "He was wanting me to allocate (?) him hides and that being so, was ready to give cash. I told him I would give him the hides by 1 March. He decided that he would come on 13 January. He did not turn up nor did he take any trouble to obtain them since he had hides" (*Tab. Vindol.* II, 343). Presumably Frontius' messmate had sourced hides elsewhere, despite having ordered some from Octavius. This suggests that there was ample supply to meet demand at the time that the letter was written.

The occurrence of stamped pieces of leather may help us build an idea of the supply networks along the frontier: pieces of leather from Carlisle and Newstead bear the mark 'SDV' (presumably S(*extus*) D(…) V(…), perhaps the name of the tanner/supplier), and suggesting that both pieces of leather had at some point been part of the same supply chain (Shotter 2009, 831). Similarly, numerous pieces of leather are marked with numerals, perhaps indicating the legion to whom the leather or completed item was designated. However, the limited body of available data makes it difficult to draw any firm conclusions (van Driel-Murray 1977, 162; 1985, 61-62). Inscriptions generally occur on offcuts, having been placed on the edge of the hide where they could be trimmed off before manufacturing, and are usually interpreted as tanners' or suppliers' marks (van Driel-Murray 1985, 61-62; Frere and Tomlin 1992, 28). The rarity with which such marks occur could in fact indicate that the military's leather supply was *not* centrally controlled (van Driel-Murray 1977, 161). However, applying stamps or other official marks to goods was not a requirement (Chapter 5) so their absence need not be taken as a definite argument against a centralised supply system.

3.7 Conclusions

Though goats are not thought to have been abundant in Roman Britain, their numbers are almost certainly underrepresented in analyses based on osteological evidence. Cattle were not only abundant but appear to have increased in size in Roman Britain, so increasing the dimensions of their hides. Hairy sheep could also have provided hides, although goat hides were probably preferred. British domesticates could therefore have represented a valuable source of hides for the Roman empire. It is clear from documentary evidence that hides were traded across northern England, and numerals and letters applied to leather hint at networks that we do not yet fully understand. The apparent lack of archaeological evidence for tanning should not be interpreted as evidence of the absence of tanning: this situation is mirrored across the empire, with very few confirmed tannery locations having been identified. A wide range of factors, from transportation costs to import/export taxes, would provide ample reason to tan hides as close to the source as possible. Despite the apparent lack of archaeological evidence, it seems probable that tanning would have taken place in Roman Britain.

4. Providing for a consumer society: evidence for leatherworking and repair of leather goods

While recognisable leather objects – shoes, parts of tents, even leather briefs – offer a tangible glimpse of Roman fashions and functionality, the offcuts produced during the manufacturing process can yield a wealth of information in their own right. These waste products were frequently overlooked in the past, occasionally noted in passing but rarely described (below). Modern excavation and reporting standards should ensure that they receive sufficient attention today. However, not all discoveries of fragmentary leather items can be interpreted as evidence of leatherworking (*contra.* Mattingly *et al.* 2009, 31; 35). Only identifiable leatherworking waste, i.e. the characteristic scraps created when trimming hides or cutting out leather components for composite objects, can be interpreted as evidence of the production of leather goods. In identifying this material, we might explore the manufacture of leather goods and its associated infrastructure in Roman Britain.

Wells suggests that while the provisioning of food across the Roman empire was overseen by the state, the supply of manufactured goods was not maintained via centralised production facilities. Rather, the military bought completed items from local craftspeople and those living and working in *vici* (1996, 6). This would seem to be supported by artefact distribution analysis applied to a range of forts in Europe, which Allison interprets as indicating a lack of military involvement in leather- and woodworking (2014, 290-91). However, these analyses relied on proxy evidence, mostly iron tools outlined by Manning as being possibly related to these tasks (1985, 15-29; 39-42). Proxy evidence for leatherworking is problematic since many of the tools used are identical to those used of crafts (see below). Moreover, it is clear that military-run *fabricae* were responsible for the production of a significant proportion of military equipment (Bishop 1985). Furthermore, based on pottery evidence, Higham suggests that in the north-east of England, the skills and capital required to keep up with the Roman military's demand simply were not available, and that this likely applied to other goods too: "artificers, be it workers in metal, leather, stone or glass, were attracted to the *vici*, but as yet it cannot be demonstrated that the local community provided a significant contingent" (1989, 163-64). Wells' argument is particularly problematic when considering leatherworking, since

current evidence suggests that vegetable tanned leather was not in use in Iron Age Britain, nor seemingly for some centuries after the Roman period.

Mattingly suggests that imports of manufactured goods such as pottery from the Continent to Britain decreased from the late first century onwards, becoming rare (2008, 500). Van Driel-Murray asserts that "military involvement with the spread of [tanning] technology is obvious" (2001c, 55-56): staple items such as nailed shoes were not worn prior to the Romans' arrival, and vegetable tanned leather was a newly introduced material, so the skills required to make nailed shoes, for example, would not be readily available within the indigenous population. It seems probable that the manufacturing of leather goods followed the same pattern as that of other specialist products such as *mortaria*, which were made by skilled potters, some of whom followed the military, producing the Roman-style goods to which they were accustomed (Hartley 1976, 81; 2007, 359).

A military report from Vindolanda lists twelve *sutores* (shoemakers) representing almost 3.5% of the 343-strong workforce in the *fabricae* (*Tab. Vindol. II,* 155). This shows that shoemakers were directly employed by the military. Leatherworking was a skilled craft. Baratta outlines a range of terms, from *calceolarius* (maker of *calceii*) to *tabernacularius* (maker of tents) (2008, 2-3), indicating that there were numerous specialisms within leatherworking.

4.1 Evidence for leatherworking

Leatherworking activity might be identified through its waste products or through the proxy record i.e. leatherworking tools and associated structures such as workshops. The significance of fragmentary leather from Roman sites is sometimes misinterpreted and overstated. The presence of shoes themselves are no indicator of shoemaking having taken place on site, as tentatively suggested at Burgh-by-Sands, where part of a shoe and numerous hobnails in a workshop area were interpreted as possible evidence of shoemaking in the vicinity (Mattingly *et al.* 2009, 31; 35). Rather, the manufacture of leather goods is directly evidenced in the

archaeological record by offcuts derived from cutting and shaping sheet leather into pattern pieces. A range of primary, secondary and tertiary leatherworking waste[1] occurs on twelve sites within the study area (Table 4), and is considered in more detail below.

Table 4: leatherworking evidence from northern Britain

Site	Context of leatherworking waste	Type of waste	Items in manufacture
Birdoswald	Fort ditch	Primary & Secondary	Footwear
Birrens	US	Secondary	?Footwear
Camelon	?Annexe ditch	Secondary	Footwear
Carlisle	Workshop(s) in fort, and in ?annexe ditch	Primary, Secondary, Tertiary	Footwear
Cramond?	Well in industrial complex to east of fort	?	?
Elginhaugh	Fort ditch	?Secondary	?Footwear
Haltonchesters	US	Secondary	Footwear
Housesteads	Workshop in *vicus*	Primary waste, Secondary waste	Footwear
Inveresk	Well in *vicus*	?Secondary, ?Tertiary	Footwear
Rough Castle	US	Secondary	Footwear
Stanwix	Earliest levels of *vicus*, associated with primary fort	Secondary	Footwear
Vindolanda	Within the fort, and in ditches relating to the *vicus*	Primary, Secondary, Tertiary	Footwear, tents, chamfrons

Birdoswald

289 pieces of leatherworking waste have been recovered from Birdoswald, the vast majority from the butt ends of the ditch to the south of the west gate of the stone fort in contexts spanning the site's chronology from the early wooden fort (early-mid 120s AD) through to the final use of the stone fort (perhaps up to the mid-fourth century). The assemblage is dominated by secondary waste, but a small amount of primary waste was present. The overall impression is of shoemaking activities on a modest scale (Mould 1997, 327; 2009b, 385). A leather workshop has not been identified at Birdoswald, although workshops not for metalworking have been identified, and one or more of these may have been dedicated to leather crafts (Wilmott 1997, 165).

[1] See Chapter 1 for definitions of these terms.

Birrens

A long, tapering piece of thin leather (Fig. 5) from Birrens (Robertson 1975, 108) represents secondary waste, perhaps from shoemaking (cf. van Driel-Murray 1993, Fig. 23; Winterbottom1991b, Fig. 282).

Figure 5: Secondary waste from Birrens

Camelon

Two pieces of leatherworking waste (Fig. 6) provide evidence of shoemaking at Camelon: a distinctive cut-out with notches, from the manufacture of a one-piece shoe (cf. van Driel-Murray 1985, Fig. 3; 2001d, Fig. 7), and another fragment of secondary waste (cf. Padley and Winterbottom 2010, Fig. 161, M179). These were recovered from innermost of three ditches running along the southern boundary of the southern annexe.

Figure 6: Secondary waste from Camelon

Carlisle

The most substantial published assemblage of leatherworking waste comes from Carlisle, which has yielded at least 2500 fragments of primary, secondary and tertiary waste indicative of significant leatherworking activities within the fort and perhaps the early fort's possible annexe.

The Millennium Project excavations, which took place within the footprint of the fort, yielded considerable evidence for leatherworking in the construction and initial occupation phases of both the first and second forts. A possible workshop for shoes and other leather goods dating to Period 3A (the construction and primary occupation of the first timber fort, AD72-3 to AD 83-4) was identified in Building 4654, which occupied the north-west angle of the two main roads crossing the fort, perhaps fronting onto the *via principalis*. A workshop in which repairs may have been carried out was identified close by, in Building 4658 (Zant 2009, 93; 99; 104-05). A small amount of waste indicative of leatherworking was also identified in Building 7391 within the *principia*, dating to Period 3B (AD 83-4 to AD 93-4), a period that began with extensive internal refurbishment perhaps associated with the arrival of a new garrison (Zant 2009, 137). A shoemaking workshop dating to Period 4A (the construction and primary occupation of the second timber fort, c. AD 105 to AD 125) was identified in Building 7396, which occupied the south-east angle of the junction formed by the two major roads (Zant 2009, 189; 200). Finds included fragments of leather which had been used for practice with roundel and C-shaped punches (Winterbottom amd Mould 2009,

1418-21). There is no evidence for the manufacture of sheet leather items on site, only of non-specialised repair showing varying degrees of skill. Scraps of stitched sheet leather in the possible workshop suggest that sheet leather was reused in shoemaking once its primary function was exhausted, and a number of sheets have had sections removed for re-use elsewhere (Winterbottom 2009, 820-21). Three pieces bore tanner's/supplier's stamps (Shotter 2009, 831), one of which ('SDV') also appears on a piece of tentage from Newstead (below), suggesting that both forts were part of the same supply network (see Chapter 3).

A fragment of leather described as an "irregular offcut" (RIB 2445.3) was discovered during excavations at Annetwell Street, within the footprint of the fort. It is stamped three times with CRA, and dates to the late first century. Also noted are "small wood objects associated with the treatment of hides for making leather goods" (Charlesworth 1977, 10). Nothing further is known about these artefacts as this excavation is not yet fully published.

Excavation of first timber fort's possible annexe ditch close to Annetwell Street revealed shoemaking waste. This was indicative of the manufacture of styles including (but not necessarily limited to) one-piece shoes in the late 70s/early 80s AD (Winterbottom 1992, 95; *et al* 1992, 104).

144 pieces of leatherworking waste predominantly deriving from shoemaking were identified during excavations at Castle Street, within the *vicus* and a possible annexe ditch. 75 of these are catalogued and 66 stratified i.e. dateable (Winterbottom 1991b, 318-28). The data displays evidence for a slight increase in evidence for shoemaking between AD 92/3 and again in the mid- to late-second century. Within this data there is twice as much evidence for leatherworking dating to the military periods (Periods 0-6, 43 catalogued finds) than the non-military periods (Periods 7-9, 21 catalogued finds[2]), suggesting that leatherworking may have been more intensive during military occupation of the site.

[2] Two finds dating to Period 6-7 are excluded from this data as they bridge the military/non-military phases.

The results of work in the Northern Lanes are not yet published, but leatherworking is clearly evidenced at the Southern Lanes, with 343 offcuts, an iron last and an antler anvil indicating that shoemaking was among the range of crafts undertaken in the *vicus* of Roman Carlisle (Padley and Winterbottom 2010, 293-300; Padley 2000, 111-112). The greatest concentrations, accounting between them for some 65% of the total, derived from contexts dating to between the AD 90s and the late 2nd century. However, much of the leatherworking evidence was recovered from contexts of mixed waste, and a leather goods workshop or similar was not identified (Padley and Winterbottom 2010, 295). Also, "off-cuts and small scraps" were among the fill of a pit relating to a building dating to the late second century at Blackfriars Street (Padley 1990).

Evidence for leatherworking in Roman Carlisle is widespread and varied. A number of workshops were identified within the fort, and although no specific structures were identified as leather workshops in the *vicus*, significant quantities of waste material indicate that leatherwork was taking place in the civil settlement too. Leatherworking waste in the possible annexe ditch might indicate that leatherworking was taking place in an annexe associated with the early fort. However, the waste may have come to be in the ditch by various means, and it would be difficult to state with any confidence that it definitely relates to leatherworking activities *within* the supposed annexe. Leatherworking waste in contexts dating to the early timber fort's construction phases indicates that this industry was rapidly established.

Cramond

A well within the early third century industrial complex in the *vicus* at Cramond yielded a modest assemblage of leather including offcuts interpreted as indicative of shoemaking (Holmes 2003, 32 and 153). The leather assemblage is held by City of Edinburgh Council Archaeological Service, and was examined at their stores. Neither the material illustrated or described, nor that held at the stores, can be confidently identified as leatherworking waste. Evidence of salvaging leather is given in the form of the removal of the upper from a shoe (only the lower edge with perforations from nailing and the bottom portion of the upper

remain), and a few fragments have knife-cut edges. Such material perhaps represents salvaging and/or small-scale repair activities making use of recycled leather rather than manufacturing on a significant scale. This frugal behaviour was not uncommon, and is apparent at numerous other sites, which might indicate the lack of a ready source of tanned leather. However, proxy evidence may add weight to the suggestion of leatherworking having taken place at Cramond. Significant quantities of hobnails were discovered as well as a furnace, perhaps indicating that hobnails were being made onsite. Recovered from the same well as the leather was a tool interpreted as a possible fleshing knife: a curved blade with rivets for handles (Holmes 2003, 114-15). However, Holmes does not note if the curved 'blade' was also concave in profile, and this example seems rather small at only 170mm in length and 23mm in width. The method of attaching the handles with rivets rather than rather than tangs also seems unusual. It is far from certain that Cramond had an established leather crafts industry. Nonetheless, the material would warrant further analysis to identify whether leatherworking might be deduced from proxy evidence.

Elginhaugh

One "triangular piece, offcut" was retrieved from the basal fill of the inner ditch, south of the east gate at Elginhaugh, (Groenman-van Waateringe 2007, 477). Although this fragment is not illustrated nor further interpreted, the author's choice of words suggests that it is intended to be interpreted as an offcut from leather craft activities. Triangular offcuts are a common by-product of shoemaking: for example, 123 triangular fragments were recovered from a leather workshop at Carlisle (Mould 2009d 1417, Table 113).

Haltonchesters

One fragment of possible secondary waste (Fig. 7) from shoemaking is among around 30 unstratified leather items held at the Great North Museum in Newcastle (cf. Padley and Winterbottom 2010, Fig. 160, M 126 offcut from nailed shoe manufacture).

Figure 7: Secondary waste from Haltonchesters

Housesteads

Around 70 pieces of leatherworking waste are known from Housesteads. Secondary waste indicative of shoemaking was recovered from three locations: just outside the northern defences (in mid-late second century deposits overlying what is thought to be a road leading to the fort's north gate); within the fort (in a deposit perhaps related to the construction phase); and in a workshop in the *vicus*, where the leather assemblage is typologically dated to the early/mid-third century (Mould 1988, 113-14; Mould 2009a, 483-85). Work in the *vicus* in 1961 saw the excavation of a workshop which yielded "scraps of unworked leather" (Birley 1962, 120-21), perhaps also leatherworking waste, although nothing further is known about this material.

Inveresk

A range of crafts are represented in the *vicus* at Inveresk, particularly metalworking and perhaps bone/antler crafts. The fill of a well also yielded a few offcuts deriving from shoemaking (van Driel-Murray 2004, 161).

Rough Castle

The leather assemblage from Rough Castle included an unspecified number of offcuts/scraps which are not described (Buchanan *et al* 1905; MacIvor *et al* 1980). The material was examined at NMS. Of particular interest here is a fragment of secondary waste, perhaps from shoemaking[3], marked twice with C F (Fig. 8). Both inscriptions are close to the edge of the fragment and may represent the beginning of a longer inscription.

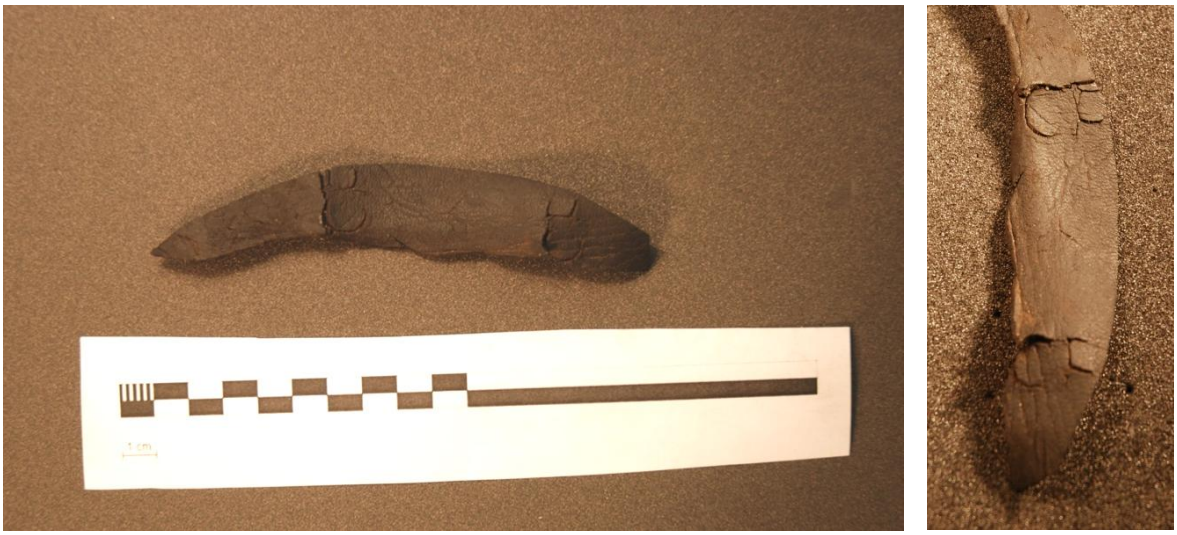


Figure 8: Inscribed secondary waste from Rough Castle

Two much smaller fragments (Fig. 9) might also represent the manufacture of shoes (cf. van Driel-Murray 1989, Fig. 3; 2001d, Fig. 7) although the item on the left could represent a fragment of upper with only the bottom stumps of radiating openwork like that of the 'Zwammerdam' shoe remaining (cf. Arkesteijn and van Driel-Murray 2015, Fig. 3).

[3] Thanks to Quita Mould for offering her advice on this fragment.

Figure 9: Shoemaking waste from Rough Castle

The fort at Rough Castle is not known to have had an associated *vicus* so crafts such as leatherworking were presumably taking place within the fort or annexe; buildings in the *retentura* close to the headquarters building are tentatively identified as storehouses and/or workshops (MacIvor *et al* 1980, 281).

Stanwix

Four unstratified shoemaking offcuts were recovered from the *vicus* to the west of Stanwix fort (Winterbottom 2000, 72). They and other organic remains are probably associated with the early development of the *vicus* believed to have been associated with the primary, Hadrianic, fort, about which little is known (Caruana 2000, 75).

Vindolanda

Publication over twenty years ago of a selection of the leather from Vindolanda (van Driel-Murray 1993) gives us a glimpse of what this exceptional site has to reveal about crafts on Hadrian's Wall. Documentary evidence noted above indicates that shoemaking was taking place on a significant scale. It is possible that the twelve *sutores* (*Tab. Vindol. II*, 155) noted

above represent just one subcategory of leatherworkers at Vindolanda. Indeed, the leatherworking waste published thus far indicates that chamfrons, tents and footwear were made onsite. However, even if there was a range of specialised leatherworkers at Vindolanda, it appears that they shared a communal workshop, making use of both new and salvaged leather in their manufacturing (van Driel-Murray 1993, 9-11; 54-58).

4.2 Long-distance supply of manufactured items

If leather goods were being produced at centralised factories or *fabricae*, we might expect to find other direct evidence of the *fabricae* themselves, or documentary evidence referring to the sale, supply and/or transportation of large numbers of these goods. However, there is little of either. One of the Vindolanda tablets records the sending of a package containing socks, underpants and at least four pairs of shoes – presents from various family members (*Tab. Vindol. II*, 346). The identities of the sender and recipient of the package are unknown, and it is not clear where it was sent from but identification to species of the wooden tablets has shown that they were made of oak, alder and birch, all native to Britain (Bowman 1994, 16). Another tablet, seemingly a list recording dealings between soldiers and a civilian entrepreneur, records the sale of items of footwear (*coturnum*) (*Tab. Vindol. II*, 184). Both of these references relate to only small numbers of goods, and further documentary evidence for the sending and receiving of manufactured leather goods, whether on an individual or industrial scale, is not forthcoming. However, evidence from Castleford might suggest that at least some specialised leather goods were produced in supply centres while basic equipment such as shoes was made locally (see below).

Despite the dearth of documentary evidence for centralised supply of leather equipment, similarities in completed items can occasionally enable the identification of items that were made in the same workshop, even perhaps by the same craftsperson. Identical stamps occur on the soles of two cork sandals, one from Vindolanda and the other from York. These were not standard-issue military goods, rather, high-end consumer goods produced by independent shoemakers. Indeed, it is suggested that York may have been a centre for the production/distribution of luxury footwear (van Driel-Murray 1993, 62). Parts of three

chamfrons from Vindolanda are so consistent in style and form as to suggest that they were made by the same person, and are almost identical to two further examples from Newstead, suggesting a link between the forts' garrisons (van Driel-Murray 1989; 1993, 9-11), either through trade or the units stationed there. Inscriptions suggest that a detachment of *Legio XX Valeria Victrix*, based at Chester, was in garrison at Newstead during the Antonine period (Curle 1911, 74; Keppie 2004, 117), and an inscription to the Twentieth Legion was also found close to Vindolanda (RIB 1708), suggesting that units from that legion were also stationed in the vicinity. However, further proof would be necessary to suggest with any confidence that the same unit(s) spent time at both forts.

Perhaps one of the most interesting insights into the supply chain has come from recent excavations at Camelon. A significant proportion of the footwear is noted to have undergone substantial repairs indicative of problems with provisioning (Arkesteijn and van Driel-Murray 2015). Were the people of Roman Camelon making do while awaiting a delivery of new shoes, or raw materials? The recovery of a few fragments of shoemaking waste (above) suggests the latter.

4.3 Evidence of repairs to leather objects

It is important to draw a distinction between manufacturing and basic repair activities. Leatherworking was a skilled craft which would be carried out by specialists with the support of less accomplished labourers (van Driel-Murray 2002b, 113). By contrast, repairs might be carried out on an *ad hoc* basis whether through choice or necessity. Evidence of repairs to nailed shoes through the replacement of lost nails is not considered in any detail here, as this might be considered quotidian and almost unavoidable. During an experimental alpine hike that saw five people walk between 400km and 530km over a five week period in replica Roman footwear, almost 80 hobnails were lost or replaced after becoming loose (Himmler 2008, 354). Such repairs are identifiable on archaeological footwear through the differing size, form and quality of the hobnails themselves, and deviation from the original nailing pattern. It is worth noting reference to the sale of 100 hobnails to an individual named Gracilis (*Tab. Vindol. II,* 186). Since a single nailed shoe of adult's size might feature between 90 and 160

nails (van Driel Murray and Gechter 1983, 21), the nails sold to Gracilis are more likely to have been intended for repairs, quite possibly for personal use. This section will consider only evidence for repairs to leatherwork, which is noted on footwear and tentage.

Very few shoes are recovered with signs of mending, which suggests that repair of footwear was not common (van Driel-Murray and Gechter 1983, 19). Shoes seem to have been a readily disposable consumer good and as such, occasional evidence of excessive wear and/or shoe repair, as at Camelon, Birdoswald, Vindolanda and Castleford, may be suggestive of problems with supply (Arkesteijn and van Driel-Murray 2015; van Driel-Murray 1998, 333; 1999a, 137; Mould 2009, 381-83), with people simply having to 'make do and mend'. 8% of footwear from Birdoswald showed signs of repair (not including replacement of hobnails), with the figure rising to 31% among one-piece shoes (Mould 1997, 340). One boot from Vindolanda was pieced together from parts salvaged from other boots, and was worn until it in turn was no longer serviceable. Combined, the evidence suggests that there were issues with maintaining the supply of footwear along Hadrian's Wall throughout the first century (such frugality at Vindolanda is noted among the leatherwork only in the first three periods (c. AD 85-106)). This strain on the supply of leather was previously thought not to be evident at all on the Antonine Wall (van Driel-Murray 2002b, 111). However, an assemblage of 78 items of footwear from Camelon displayed significant signs of wear, with some shoes being worn well beyond the point at which their owners would surely have been grateful for replacements. This need to make do is perhaps indicative of similar issues with supply further north in the mid-second century AD (Arkesteijn and van Driel-Murray 2015, 119). Cut-up shoe leather, from Mumrills (Fig. 10) and Cramond, for example, hints at salvaging of reusable materials, again indicating a degree of prudence, and a multilayer shoe featuring three marked pieces of leather is perhaps indicative of frugal shoemaking at Carlisle (see Chapter 5). 6% of the shoe assemblage from Birdoswald showed evidence of the uppers having been salvaged, removed from the soles for reuse in cobbling (Mould 1997, 340). In contrast, shoe and/or leather supply seems to have been abundant at Velsen, where shoes were discarded at the first sign of damage (van Driel-Murray 1999c, 185). Evidence for centralised military *fabricae*, like that at Vindonissa (van Driel-Murray 1985), is scant in Britain although Castleford may have been a hub for the production of military equipment (see below).

Figure 10: Upper from Mumrills displaying evidence of salvaging

It is possible that nailed shoes had only a limited window of use: over time, the multiple leather soles might compress and nails begin to protrude through into the insole, and ultimately into the sole of the wearer's foot. Experimental archaeology has shown that, when walking long distances, the hobnails do begin to protrude and become uncomfortable, with shoes with less dense nailing patterns being more prone to this flaw than those that were very densely nailed (Himmler 2008, 350). Evidence of this phenomenon might be seen in a child's shoe from Rough Castle, in which the insole has been damaged by the nails from below (Fig. 11). This shoe is decoratively but quite sparsely nailed, perhaps to allow a stamp on the outer sole to remain visible (see Chapter 5). The discomfort might have been lessened by the wearing of thick socks or the insertion of an additional leather insole to create a barrier between the protruding nails and the foot. There is little evidence for the latter, although a possible insole of child's size from the Northern Lanes, Carlisle is interpreted as such. Only the roughly shaped insole survives and it is not possible to know whether its function was to cover protruding nails or simply to improve the fit of a shoe that was too large for the wearer (Padley, forthcoming).

Figure 11: Front portion of a child's shoe from Rough Castle with nails protruding above the insole

Since nailed shoes became uncomfortable over time (Himmler 2008), it might not have been considered worth repairing them when damaged if replacements could be easily acquired. Indeed, the rapid discard of damaged shoes is noted at forts on the Rhine, where supply was seemingly plentiful. However, those stationed in Britannia seem to have been more frugal: evidence from both Vindolanda (van Driel-Murray 1993, 33-34) and Camelon (Arkesteijn and van Driel-Murray 2015) indicates that shoes were worn until they were no longer serviceable, suggesting that replacements were not necessarily easy to come by.

In contrast, one-piece shoes were seemingly repaired regularly, with at least 13 examples known within the study area compared with only one nailed shoe. With a single layer of leather between the foot and the ground, these light shoes would wear through quite rapidly, so clumps were thonged or stitched to damaged soles to prolong their life. These clumps consisted of additional soles, either partial, as evidenced by stitch-holes on a shoe from Carlisle (Fig. 12), or covering the whole sole (Padley and Winterbottom 1991, shoe 1001, Fig. 215).

Figure 12: Evidence of clump repairs to the seat and toe of a worn-out one-piece shoe from Carlisle (held at Tullie House; unprovenanced)

Analysis of leather from Carlisle has identified that shoes from the civilian area (the Southern Lanes) display less evidence of re-use than those from the military area (Castle Street and Annetwell Street), and the proportion of re-used tentage was lower. It is tentatively suggested that much of the material recovered in the Southern Lanes may have been through the recycling process once already, being reused military items (Winterbottom 2010a, 304-05).

Salvaging of reusable sheet leather is evidenced at a number of sites. For example, "a bundle of leather bindings and scrap material from tents" was discovered at Milecastle 50 TW, in one of two pits dating to the abandonment the site (Simpson and Richmond 1935, 10).[4] This material was interpreted as evidence of "boot-repairs" and "stitching the tents" having taken place at the milecastle (Simpson *et al* 1935, 227). However, the bundle appears to comprise mostly welt strips and other small strips marked with stitch holes, which would not be particularly desirable for repairs. This material may in fact represent the least useful material that had been cut away from an old tent and discarded; the remaining sheet leather could be transported elsewhere for reuse. Similar efforts to salvage only what would be useful and reduce unnecessary bulk are noted at Castleford (van Driel-Murray 1998, 334), and 31% of tentage from Birdoswald showed evidence of having been deliberately cut up prior to discard (Mould 1997, 340).

[4] This material is held at Tullie House in a bag marked 'Kirkbride, 1977'. However, the bundle does not match Birley's descriptions of the leather from Kirkbride (1982, PAGE), but *does* correspond with Simpson and Richmond's description of the bundle of scraps from Milecastle 50 TW (Simpson and Richmond 1935, 10), therefore, I believe that the bundle of leather at Tullie House is in fact from Milecastle 50 TW.

Figure 13: Bundle of scrap leather from Milecastle 50 TW

4.4 Proxy evidence of leatherworking

We might also turn to the proxy record to identify evidence of leatherworking having taken place. The discovery of bone and iron tools and equipment can contribute to the identification of areas of craft activity. Slickers, lunette knives, awls, punches and cobblers' lasts are included in Manning's catalogue of Romano-British iron tools at the British Museum (1985, 39-42). While some leatherworking tools (e.g. awls, punches, hammers) might be difficult to distinguish from those used for other crafts, including metalworking, the lunette knife is unique to leatherworking (van Driel-Murray 2001d, 339). Only one is known in Britain, from Kingsholm, Gloucestershire (Manning 1985, 39) although an implement "resembling a shoemaker's knife" with a crescentic blade was among the iron objects from Rough Castle (Buchanan *et al* 1905, 495). An awl from Newstead "probably belonged to a shoemaker" (Curle 1911, 281) and leatherworking needles have been identified at Vindolanda (Greene 2009, 137). Lasts, providing a stylised form of the human foot on which to shape a shoe, are specific to shoemaking, and a handful of Roman period examples have been recovered in Britain including one from Carlisle (Padley 2010, 211). This represents only a handful of items that might be associated with leatherworking, and further study of the proxy record would certainly merit attention.[5]

4.5 Conclusions

[5] A comprehensive assessment of the proxy evidence for leatherworking such as bone/metal tools was not undertaken here because of time constraints and the word limit.

Evidence for leatherworking in the form of waste is known from twelve sites within the study area, comprising 21.8% of all 52 sites which yielded leather. Leatherworking waste is present in seven (63.5%) of the eleven sites with significant leather assemblages (i.e. >50 items) as well as four sites with smaller assemblages (i.e. <51 items). One notable exception is Bar Hill. The remainder are sites which are not fully published – Balmuildy, Newstead and Castlecary.[6] Reassessment of the material from these three sites might lead to the identification of previously unknown leatherworking waste. However, it is striking that all four sites with significant leather assemblages but no leatherworking waste were excavated in the early 20th century, before the advent of modern archaeological standards including comprehensive cataloguing and reporting. Details of the leather finds are vague, and none of the antiquarian reports dedicate any space to examining evidence for leatherworking. It is likely that the significance of apparently mundane leather offcuts was not recognised. It is also possible that selective retention might have seen interesting-looking objects kept while scraps and offcuts were discarded.

Van Driel-Murray suggests that the Roman auxiliary forces in the provinces rapidly became self-sufficient in terms of leather manufacturing, with shoemaking in particular being undertaken in every fort (1985, 55). The haste with which leatherworking commenced on establishment of a new fort is apparent in the evidence from Hadrian's Wall, where leatherworking waste is present in deposits related to the construction phases at both Housesteads (Mould 2009a, 85) and the primary timber fort at Carlisle (Zant 2009, 93). This is to be expected, given that the construction phase might last some months depending on the size of the taskforce (Hanson 1987, 148; Shirley 1998, 473-74), and a single legion might get through 36,000 shoes per year (van Driel-Murray 2001d, 362). Thus the Roman military maintained an element of self-sufficiency with regards to their leather goods, producing or procuring footwear locally rather than importing goods from elsewhere in the empire. This is at odds with the apparent lack of evidence for tanning in Roman Britain – the raw material, leather, would have been in great demand. While tanning technology may not have been practised in post-Roman Britain, van Driel-Murray suggests that dissemination of leatherworking crafts at least was probable, with discharged military shoemakers forging new careers for themselves (2002b, 113). Indeed, leatherworking was certainly not limited to

[6] Castlecary was the subject of a useful undergraduate thesis (Martin 1983).

military sites: at least 15% of leatherworking waste from within the study area was recovered from civilian contexts.

The evidence for leatherworking within the study area points towards a significant focus on shoemaking, with only two sites – Vindolanda, and perhaps Birdoswald – yielding evidence for the manufacturing of other goods such as chamfrons and tents. However, it may be that the manufacture of other items is underrepresented in the archaeological record because it doesn't produce very distinctive and easily identifiable waste, as shoemaking does, and/or because more substantial pieces of leather leftover from the manufacture of larger items may have been used for other goods. Nonetheless, even shoemaking waste is not always recognised, such as material from Birrens and Rough Castle (above). The discovery of these new diagnostic fragments allows us to make more confident assertions about the probability of shoemaking having taken place at most, or even all, Roman forts.

Evidence of the production of leather goods other than footwear (e.g. horse gear, tents etc) is less forthcoming, and this may reflect the fact that diagnostic offcuts from such items would be more difficult to recognise. However, one site which might be considered as a possible base for the supply of leather goods to the northern frontier is the fort at Castleford, Yorkshire. Here, the leather assemblage was dominated by leatherworking waste (exactly what sort of items were being made was not easily specified) but it was notable that the assemblage lacked much of the characteristic waste relating to shoemaking. Shoemaking waste is found so commonly on military sites as to indicate that forts were largely self-sufficient in the production of footwear. While the dearth of shoemaking waste from Castleford might indicate that the relevant workshops were located elsewhere on the site and the waste accordingly dumped in a different, unexcavated, location, it has been proposed that Castleford might represent "a supply base or winter camp" (van Driel-Murray 1998, 334). Its location, around 100 miles south of Hadrian's Wall, means that Castleford was safely positioned in securely-held territory well behind the frontier. Nonetheless, Castleford's leatherworkers were as frugal as those on Hadrian's Wall, salvaging as much as possible, which might suggest that their supply of leather was not always reliable (*ibid*.). This is in direct contrast with Velsen, Holland, for example, where leather and leather goods were

seemingly so plentiful that shoes were thrown away at the first sign of wear, suggesting that replacements were readily available (van Driel-Murray 1999c, 185).

It is notable that there is no definite evidence for leatherworking taking place within annexes,[7] which are often interpreted as military-controlled industrial areas for workshops in which goods and equipment required by the military produced and repaired (e.g. Sommer 2012, 77). Indeed, evidence from Newstead suggests that each of the annexes served a different purpose, with metal-working carried out in the southern annexe, glassworks to the east of the fort and processes involving organic materials – perhaps including leather – to the west (Bailey 1994, 308). However, there is as yet no evidence to suggest that leatherworking was definitely taking places in the Roman annexes of northern Britain.

[7] Some of the leatherworking waste from Carlisle was recovered from the ditch of what is believed to be an annexe relating to the first Flavian fort, and is interpreted as suggesting that leatherworking was taking place nearby. However, the site's interpretation as an annexe is not certain (Caruana 1992, 105; 103) and any discussion of leatherworking within the possible annexe must remain conjectural – it is possible that the waste leather may relate to craft activities outside the defences, within the *vicus*. Similarly, the leather from Camelon was found in the ditch of an Antonine annexe, but the nature of the occupation of the annexes at Camelon is uncertain and this material cannot confidently be attributed to the use of the annexe itself.

5. Symbols and inscriptions on leather

5.1 Definitions

Symbols and inscriptions on leather take a variety of forms from decorative to informative, and were placed there for a range of reasons. Inscriptions (words or letters) might serve to indicate who made or owned an item, while symbols (representations of objects, flora, fauna, or astrological symbols) might be ornamental or emblematic, perhaps even holding talismanic properties. These markings occur on both finished leather goods and on waste material (offcuts).

Symbols and letters were applied to leather by a range of techniques. Stamped letters and symbols were created with the use of dies, employing three main methods: impressing an image into the leather so that it appears as a depression; impressing the surrounding area, resulting in an embossed effect, with shapes raised in relief on the surface; or sharp points would cut into the upper surface of the leather to form clearly defined letters or shapes, known as die-cutting.[1] Dies featuring letters/words might be created so that the writing appears in reverse on the die, but reads correctly on the stamped item, or vice versa.

Letters and symbols might also be incised on leather using a sharp implement such as the tip of a knife, cutting into the surface of the leather and sometimes penetrating through the full thickness. Others were formed using blunt tools to impress letters or symbols without piercing the leather's surface. While stamped inscriptions are often interpreted as being official in some way (see below), relating to a specific stage in the life cycle of either the raw

[1] Other terms are used to describe the marking of leather, including scoring or scratching. For clarity, the following terms will be applied throughout: stamped, referring to marks made using stamps; die-stamped, referring to marks made using sharp dies; incised, referring to marks made using a sharp implement, such as a blade; and impressed, referring to marks made using a blunt object (i.e. denting or scratching but not cutting into the surface of the leather). The term 'inscribed' will be used to denote an item that has been marked with words/letters, regardless of the method of application. Symbols/inscriptions applied using dies will be referred to as 'stamps'.

material or its finished product, incised inscriptions are frequently considered to be less formal, and some are interpreted as graffiti.

5.2 Inscriptions and information

There are least 160 known inscriptions on leather, originating from over 20 sites in the north of the Empire, particularly *Britannia, Germania Superior* and *Inferior* and *Gallia Belgica*.[2] The range of information contained within these inscriptions has been considered in detail by Baratta (2008). Her analyses considered the numerous points during the production process at which an inscription might be applied, as well the messages that they were intended to convey. The stage at which an inscription might be applied ranged from the marking or branding of a live animal, to indicate ownership, for example, to the application of an inscription on a completed item such as a shoe or shield cover. Many of these possibilities are represented within the material considered here. A schematic representation of the points during the supply process at which an inscription might be applied to leather, and the information those inscriptions might contain, is shown below (Fig. 14).

[2] Baratta identifies 154 inscriptions on leather (2008, 4-5) although the true total is at least 160 since Baratta's catalogue omits an inscribed shoe from Rough Castle (MacIvor *et al* 1980) and examples later published from Carlisle (Padley 2010). The total number of stamps (i.e. symbols rather than lettering) has never been calculated.

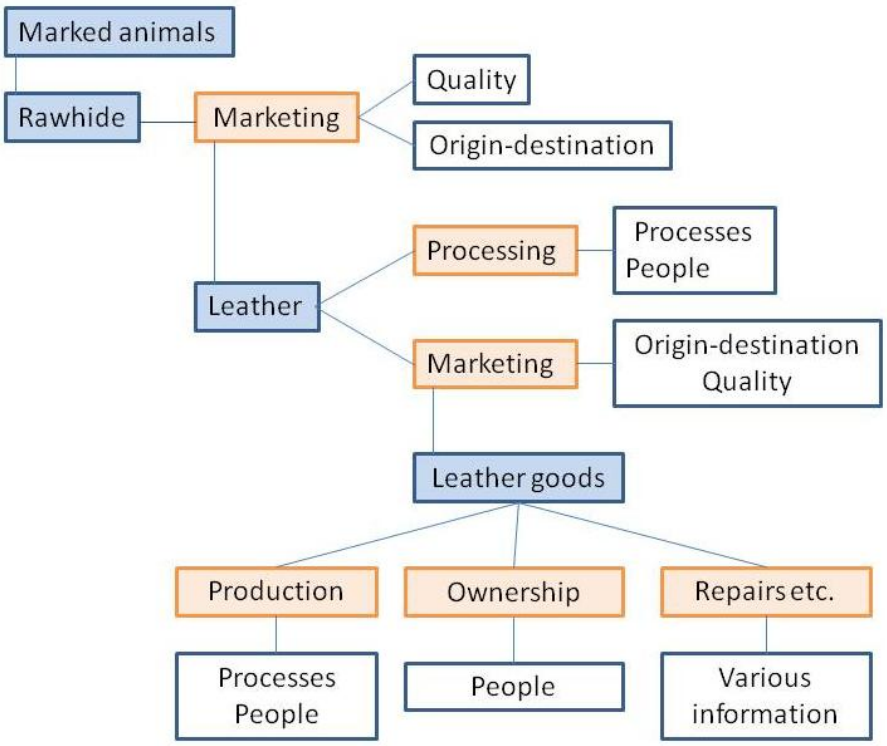


Figure 14: Schematic representation of the points during the supply chain at which inscriptions might be applied to leather, and their functions. After Baratta 2008, Abb. 22.[3]

5.3 Stamped symbols and inscriptions: trademarks or decorative?

Stamps were added to many manufactured objects, from barrels to bread. Tiles and bricks produced by the Roman military in Britain were marked with legionary stamps from end of the first century onwards, when the military began building more substantial stone structures. Stamps indicating the maker of an object, whether part of a military- or civilian-led production process, were added for quality control or as an advertisement for the maker, or to indicate ownership. In a military context, the latter also served to dissuade theft or appropriation for civilian use and to reduce any confusion should more than one legion use the same workshop/factory, such as the shared tilery at Scalesceugh (Frere and Tomlin 1992, 125-27). The amount of information supplied by stamps varies. Military bread-dies, for example, often impressed two or three lines of text onto the loaves, indicating the unit as well as identifying the baker (Stiebel 2011, *passim*). Similarly, stamps on pottery sometimes bear

[3] The original diagram appears in German. Any errors in translation/interpretations are the author's.

two names: at Arezzo in Italy, for example, some *terra sigillata* pots are inscribed with the *tria nomina* of a Roman citizen, probably the owner of the pottery, and a second name, often Greek, probably that of a skilled slave who made the item. On *terra sigillata* from Gaul, the pottery owner is often indicated through the inclusion of the letters OFF or OFI to indicate *officina* (workshop) e.g. OFF.IUSTI or ALBVCI.OFI, while stamps reading LABIO FECIT or PONTI.MAN ('Labio made this' and 'made by the hand of Pontius') denote the individual worker (Greene 1986, 159-60). However, many stamps on pottery comprise only a single name (e.g. Darling and Precious 2014, Appendix VII).

Not all stamps were intended to indicate the maker. While the majority of military bread dies were intended to identify the unit responsible for having baked the bread, Stiebel suggests that one reading PRIM, recovered from a late second/third century AD bakery in Jerusalem, might be interpreted as indicating 'premium/first', differentiating the white bread for the higher ranks from the brown bread that was served to the lower ranks (2011, *passim*).

Stamps on pottery are are frequently applied in highly visible locations so are often interpreted as trademarks. M*ortaria* were often prominently marked on the rim (Fig. 15), where the stamps might be seen regularly by the user, and stamps on Samian ware are more commonly found on the inside or within the decoration than on the base. Perkins argues that perhaps in these instances, the inscriptions were more than a trademark: they served an aesthetic purpose, forming part of the design. Not all of those using a stamped bowl, for example, would have been able to read the inscription, and furthermore, not all inscriptions are legible (Perkins 2000, 204-05). Some found on Samian ware are so closely crowded by the decoration that they are all but hidden from view (Fig. 16). Perhaps "the form and presence of the stamp are more important than the actual wording of it" (Perkins 2000, 204-05). In some cases, an inscription was omitted altogether in favour of a symbol, which acted as an alternative identifying motif: for example, a distinctive herringbone stamp was applied to *mortaria* from second century Roman Colchester, sometimes with lettering but frequently without (Hartley and Dickinson 2008, 17; Hull 1963, 112-13). In this way, the stamp becomes a design element, contributing to the overall appearance of the finished product. However, the practice of marking one's products was seemingly not universal nor a

requirement; evidence from pottery shows that stamps were not consistently applied to vessels across the empire (Hartley and Dickinson 2008, 8-9).

Fig 15: *Mortarium* from London with conspicuously stamped rim: informative label or design element? © Trustees of the British Museum

Fig. 16: 1st/2nd century Samian vessel from London with PATRNI stamped vertically, and in retrograde, within the decoration © Museum of London

5.4 Leather from northern Britain marked with both symbols and inscriptions

Symbols and/or inscriptions are found on 49 leather items or offcuts from sites within the study area. Some of those items feature more than one symbol or inscription, for example where the same symbol occurs numerous times on the same shoe, or the same inscription is repeated on an offcut. In these instances, the multiple stamps/inscriptions can be considered associated and are counted as one. However, a multi-layer shoe from Carlisle features three discrete inscriptions on different layers. Each of these inscriptions represents a separate event

on a different piece of leather, and the inscriptions are associated only in that the various pieces of leather have been used to make one shoe, so this example is considered to comprise three different inscriptions. This takes the total number of leather items marked with symbols of inscriptions to 51 (Table 5).

Table 5: items marked with symbols or inscriptions from sites in northern Britain

Site name	Total leather items (published)	Items marked with symbols/ inscriptions	%
Bar Hill	585	1	0.17
Birdoswald	717	2	0.28
Carlisle (Abbey St)	88	1	1.14
Carlisle (Annetwell St)	583	3	0.51
Carlisle (Castle St)	586	4	0.68
Carlisle (Millennium Project)	2709	3	0.11
Carlisle (Southern Lanes)	510	1	0.20
Newstead	450	1	0.22
Rough Castle	63	2	3.17
Vindolanda (van Driel-Murray 1993)	1400 (estimated)	33	2.36 (estimated)
		Total = 51	Mean = 0.85%

*Two multi-layered shoes are marked with inscriptions, one of which has inscriptions on three different layers

The majority of these 51 examples derive from just six sites, mostly from Vindolanda (33 or 64.7%) with a further 12 (23.5%) from Carlisle. Birdoswald and Rough Castle have yielded two (3.9%) each, and Bar Hill and Newstead one (2%) each. The majority (36, or 70.6%) of these items display inscriptions; 12 (23.5%) feature symbols; and three (5.9%) feature both symbols and inscriptions. Symbols and inscriptions are found most commonly on footwear and sheet leather (usually on leatherworking waste or on stitched sheet leather): 27 (52.9%) occur on footwear and 24 (47.1%) on offcuts (usually primary offcuts) and fragments of sheet leather such as tentage that had been cut up for reuse. Less than 1% of all footwear from within the study area is marked with symbols/inscriptions. The practice is better represented in Germania Inferior, for example at Zwammerdam and Cologne (van Driel-Murray 1977, 158). Inscriptions are also known on shields and shield covers, e.g. at Zwammerdam, where

they serve to indicate ownership (van Driel-Murray 1977, 151), but these are not paralleled within the study area.

The relatively small number of symbols/inscriptions on leather makes it difficult to say with any certainty what proportion of leather items might have been marked. For example, of the published material from Vindolanda, 33 items with symbols/inscriptions were recorded from "just over half" of more than 2600 leather finds which had been excavated at that time, with analysis of the footwear having only just begun when the preliminary report was prepared (van Driel-Murray 1993, 1). If we are to suppose that 1400 leather finds had been examined, pieces with symbols/inscriptions would represent just over 2%. However, it seems as though on average less than 1% of leather finds are marked with symbols/inscriptions.

5.5 Leather from northern Britain marked only with inscriptions

Of the 36 inscriptions on leather, 25 (69.4%) appear on scrap leather and leatherworking waste. Eleven are found on (30.6%) on items of footwear, three (8.3%) on tentage and two more (5.6%) on possible tentage. For clarity, leather featuring both symbols and inscriptions is considered separately (below).

5.5.1 Inscriptions on footwear

There are at least eleven inscriptions on footwear (Table 6): from Vindolanda, a stamped inscription on a heel stiffener, a sandal sole with impressed letters and five numeral inscriptions on sandal soles from Vindolanda (van Driel-Murray 1993, 69-71); from Carlisle, and inscriptions on parts of two shoes, one of which features no less than three discrete inscriptions.

Table 6: Inscriptions on footwear

Site name	Location of inscription	Inscription
Carlisle	On various inner soles of a multi-layer shoe	Three layers feature illegible inscriptions
	Sole of multi-layer shoe	SF
Vindolanda	Heel stiffener	CRS
	Sandal sole	III
	Sandal sole	III
	Sandal sole	IV
	Sandal sole	VIII
	Sandal sole	IX
	Sandal sole	X, SVIT, other illegible markings

A heel stiffener from Vindolanda is stamped with CRS. It was made from an offcut (van Driel-Murray 1993, 71). These structural pieces, invisible while the shoe was on the foot, are often roughly shaped (see example from Rough Castle, Fig. 17). The letters on the Vindolanda example are positioned upside down and at an angle, and the inscription is interpreted as a tanning mark applied to the hide, and not pertinent to the shoe itself (*ibid*.).

Fig. 17: Heel stiffener from Rough Castle, demonstrating how crudely shaped these items might be

Also from Vindolanda are numerals on five sandal soles: III (twice), IV, VIII, and IX. Some are stamped and others incised. The placement of numerals on soles was seemingly widespread but limited to sandals (van Driel-Murray 1993, 62). Baratta suggests that these marks might indicate shoe size (2008, 10). However, this is an unlikely explanation since two sandal soles which are identical in size and shape feature different numerals: one (LK71) is marked III and the other (120) VIII. A second sandal sole (2294) marked III is noted (van Driel-Murray 1993, 62), although the numerals are not seriffed like those on LK71. The sole's dimensions are not given so further comparison with LK71 is not possible. The dimensions of the numerals are smaller than those on offcuts, and they were intentionally added to these items of footwear, rather than representing incidental use of marked pieces of leather such as with the heel stiffener (above).

Sandal LK71 from Vindolanda, which is stamped with the numeral III, also has a small incised X close to the toe strap (LK71, above), which might be read as a numeral but is interpreted here as being related to the laying out the sole, indicating where the toe strap should be placed. Sandal 606 has a small cross impressed close to the toe (van Driel-Murray 1993, 69-70). These examples can be compared with examples from London, including a sandal with a large X incised close to the toe strap (RIB 2445.43) and at least four further shoes incised or scored with an X (RIB 2445.40-42; 2445.44). One of these Xs (RIB 2445.42) seems more likely to comprise part of an astrological symbol with chthonic associations (cf. van Driel-Murray 2001a, Fig. 2). An X also occurs on a shoe from Rough Castle stamped with a *pelta*-shaped frame containing a *tria nomina* and a small r (MacIvor *et al* 1980, see

below). The X might have indicated where the stamp was to be placed but its being located within the frame alongside the small r makes this seem less likely.

Four inscriptions are found on shoes from the Carlisle *vicus* (Castle Street excavation) within a small assemblage (five examples) of what are defined as "multi-layer shoes" – unnailed bottom units formed of numerous layers of leather secured by stitching and thongs (Padley 1991, 234). All were recovered from contexts dating to Period 4C (late first-early second century AD) and, where identifiable, were of modern adult sizes 1-3 (European 33-35/36),[4] falling within the boundaries of women's/adolescents' sizes (van Driel-Murray 2001d, 360; Greene 2011, 80). The first of these inscriptions occurs on a lone sole (1013) marked SF. A second shoe (1015) is more complete, with ten of its eleven layers being present (the eleventh, the outer sole, was not recovered). It has illegible inscriptions on the first, fifth and sixth layers. The inscriptions are interpreted as "relating to the leather before it was used to make up the shoes" (Padley 1991, 234). However, despite the fact that their presence on the finished articles might be considered an imperfection, the inscription on the inner sole of shoe 1015 would have been plainly visible to the owner. The bottom units of these shoes comprise an assortment of complete soles and partial/composite layers made up of irregularly shaped pieces. The bottom unit of shoe 1015 in particular seems to have been made entirely of offcuts and marked material, and it is possible that these multi-layer shoes represent the frugal use of leftover scraps and undesirable leather that the craftsperson would otherwise discard, producing an imperfect, 'budget' shoe. The use of scraps as packing material was commonplace and allowed for enhanced flexibility (van Driel-Murray 2001d, 350) but there are no other examples within the study area of shoes made entirely of scraps and marked pieces. This thrifty behaviour might indicate supply problems, with the shoemaker wasting nothing in the absence of a steady supply of leather. However, there are no other signs of straitened circumstances in Period 4C at Carlisle.

While the inscriptions on shoe 1015 from Carlisle are illegible as a result of their being distorted, others are simply unintelligible: the letters SVITIISI VTIIII / SVIITII SC appear on the sole of a sandal from Vindolanda. SVIT can perhaps be linked to the word *sutor*

[4] Padley's sizes presumably follow UK conventions i.e. Size 1 is 202mm in length. Shoe size conversions from: http://www.clarks.eu/help/fitguide

(shoemaker), but beyond that, the meaning is unclear. This shoe also has a small cross impressed close to the toe (van Driel-Murray 1993, 69-70).

5.5.2 Inscriptions on sheet leather and offcuts

There are 25 inscriptions on sheet leather and offcuts, including tentage and other stitched sheet leather, primary and secondary waste (as defined by Mould *et al* 2003, 3245; see Chapter One) and other unidentifiable offcuts. Seven of the inscriptions feature numerals (all from Vindolanda) (Table 7) and 15 are made up of letters (Table 8); one features both numerals and letters. A further two inscriptions (150 and 1427 from Vindolanda) are illegible and putative at best (van Driel-Murray 1993, 64). Lettered inscriptions include *tria nomina* and *duo nomina* as well as longer inscriptions, and some whose meaning remains unclear.

Table 7: Numerals inscribed on offcuts and sheet leather

Site name	Artefact type	Inscription(s)	Method of application
Vindolanda	Edge offcut	?I V (lightly impressed), C O (scored)	Impressed/scored
	Edge offcut	CIXB, with second partial stamp across the first at right angles	Stamped
	Edge offcut	CIXB	Incised
	Edge offcut	CIX, twice overstruck with beginnings of third stamp	Stamped
	Edge offcut	XI (or IX)	Slashed (same as incised?)
	Frag of stitched leather (seam I)	VIIII	Incised
	Frag of tentage (seam IIIa)	VI. II (ie VIIII?), second and third Is go right through the leather	Incised
	Offcut	Deliberately cut out hole, and score of a large X at one edge - doubtful	Scored

Table 8: Words/letters inscribed on offcuts and sheet leather

Site name	Artefact type	Inscription	Method of application
Carlisle Abbey St	Tentage	V E (or F) R E C (or G) S (or E) I	Incised/cut out

Carlisle Annetwell St	Tentage	[…]RVANDI	Incised
	?Tentage	(centuria)TV or A L C	Incised/cut out
	Offcut	CRA x 3 [CR] A	Stamped in relief
Carlisle Millennium Project	Offcut	? C C M and ? C C	Incised/stamped
	Offcut (shoe-making waste)	C C M	Incised
	Offcut (tentage)	S D V	Stamped
Newstead	?Tentage	S D V	Stamped?
Rough Castle	Secondary offcut	C F x 2	Stamped?
Vindolanda	Offcut	VIILDIIDII SPONDII	Impressed
	Offcut	M VER (retrograde)	Incised
	Edge offcut	A R	Incised
	Edge offcut	A R	Incised?
	Patch	SATTUO	Stamped
	Secondary offcut	C O	Incised

Numerals occur on six edge offcuts, a fragment of stitched leather and a fragment of possible tentage from Vindolanda (Table 8). These might have functioned as address labels, indicating the unit and, by extension, destination for which a batch of hides was intended. CIX/CIXB occurs on three cow-hide edges (van Driel-Murray 1993, 63-65) and probably denotes *Cohors IX Batavorum*, the Ninth Cohort of Batavians, stationed at Vindolanda under Flavius Cerialis in the late 90s/early 100s (Bowman 2003, 19). CIXB is paralleled on a child's shoe from London (RIB 2445.25). VIIII possibly occurs twice (the second being VI.II) and is perhaps an earlier practice of writing the number nine (van Driel-Murray 1993, 64).

The stamped inscription S·D·V, perhaps *S(extus) D(…) V(…)*, occurs twice: at Carlisle on a fragment of tentage that was cut up for reuse as a patch (Shotter 2009, 831), and at Newstead on a piece of tentage (RIB 2445.12) described as an "angle-patch" (McIntyre and Richmond 1934, 87-88). Though the stamps are similar in dimensions, only the Carlisle example has serifs, showing that the stamps were made with different dies. While it might be tempting to view the letters S·D·V as a label denoting for the tents' manufacturer, the stamp from Carlisle would offer little in the way of advertisement since it was was partially covered by the binding strip (Shotter 2009, 831). Similarly, the letters ƆTV or (inverted) ALC, perhaps *(centuria) TV* or *A(ulus) L(…) C(…)*, on a second fragment of possible tentage from Carlisle were covered by another sheet of leather, rendering the inscription invisible (RIB 2445.18).

Tria nomina on tentage were not prominently placed and probably denote the tanner or supplier of hides rather than relating to the tents themselves (Shotter 2009, 831).

It is likely that some inscriptions on tent leather were added later in the object's lifecycle, such as an incised graffito on tentage from Carlisle, not clearly legible but possibly reading VE(or F)REC(or G) S (or E) I, perhaps *Verec(undi) Si(…)* although VIRILIS is also possible (Winterbottom 1992, 96). Also, a further fragment of tentage from Carlisle is incised […]RVANDI, perhaps *(Ser)vandi* or *[$_7$ Ser]vandi* i.e. '(Property) or [century] of Servandus' (RIB 2445.36). This is paralleled by a fragment of tentage from York with the incised inscription >SOLLIIVLIANI, perhaps *(centuria) Soll(i) Iuliani* i.e. 'century of Sollius Iulianus' (RIB 2445.16). Marcus Sollius Iuliuanus is named also on a building stone at Hare Hill, and was centurion of the Sixth Legion (Allason-Jones 2011, 142). These incised names on tentage might represent an alternative means of indicating the military unit to which a batch of hides, or indeed a completed tent, was assigned, using the name of the centurion rather than the unit's number.

The word SATTUO, perhaps 'Satto', is stamped on two associated goatskin patches; in one instance the stamp was applied before tanning and the other after, implying either that Satto was "the overseer controlling a number of operations" or that "the same man was responsible for both pre-tanning operations and for finishing off (currying)" (van Driel-Murray 1993, 63; 65). It has been suggested that an O at the end of an inscription might indicate *officina* (workshop): two fragments of leather from Caernarvon inscribed GELLIO might be interpreted as reading *Gelli(us) o(fficina)* i.e. 'from the workshop of Gellius' (RIB 2445.4; Baratta 2008, 9), and a fragment of sole from London awkwardly marked SAMMICO, or perhaps an unusual ligatured form of SAMMIVS, could read *Sammi(us) o(fficina)* i.e. 'from the workshop of Sammius' (RIB 2445.35). Thus Sattuo might read *Sattu(s)*[5] *o(fficina)*, 'from the workshop of Sattus'. Van Driel-Murray draws comparison between this item and a piece of inscribed tentage from York (RIB 2445.16) bearing both stamped and incised inscriptions, describing the marks as "brands" suggesting that tents were marked by their occupiers (1993, 63); however, in this instance the stamps were seemingly applied before the tentage was

[5] The name Satto or Sattus is known from a dedication at Kreuznach, Germany, and is thought to be Celtic in origin (CIL 7532; Haeussler 1994, 82; 88).

stitched (RIB 2445.16), which would suggest that the inscriptions relate to the leather or the manufacturing process and not the finished article.

Further inscriptions on sheet leather from Carlisle include two pieces of shoemaking waste, one clearly marked CCM, perhaps *G(aius) C(...) M(...)*, and the second bearing two less well-made inscriptions, one reading either CVM or perhaps the same CCM, and the other a partial inscription possibly reading CC. These marks were seemingly made prior to tanning, as the lettering has opened up, and are interpreted as tanners'/suppliers' marks (Shotter 2009, 831).

The only retrograde inscription on leather from within the study area comprises the letters M.VER, neatly incised[6] on an offcut from Vindolanda. No interpretation is offered (van Driel-Murray 1993, 65), nor does Baratta attempt to decipher the inscription (2008, 15). It may denote *M(arcus) Ver(ecundius) or Ver(gilius),* for example. It seems incongruous that an incised inscription should appear in retrograde. Van Driel-Murray does not suggest that the letters were applied from the flesh side, which would result in their appearing in retrograde from the grain side. Retrograde inscriptions usually occur through the use of a die (see above). One possible explanation – conjectural at best – is that the inscription was applied by someone who could not read but was simply copying the shapes of the letters from a die.

Also discovered at Vindolanda was an offcut reading VIILDIIDII SPONDII, perhaps *Veldedius spondeo* i.e. 'pledged to Veldedius'. It lay within 10m of an almost complete chamfron and bears marks which suggest it had been held by the sort of vice that could have been used in chamfron manufacture. Veldedius is known from the Vindolanda tablets to have been an *equisio consularis*, or governor's groom (van Driel-Murray 1993, 65). The marked offcut is interpreted as having been used to label an item promised to him.

AR occurs twice on primary waste from Vindolanda and CO twice, once on primary waste along with the numerals IV, and once on secondary waste (van Driel-Murray 2003, 64). The letters CF are inscribed twice on a fragment of secondary waste from Rough Castle (Fig. 5,

[6] Van Driel-Murray describes the letters as "cut" (1993, 65) implying the use of a knife or other sharp implement.

not recorded in MacIvor *et al* 1980). In both cases the letter F sits at the right hand edge of the fragment, suggesting that the inscription may be incomplete. The edges of the lettering are very sharp, suggesting that they were die-cut, probably after tanning. These multiple marks are paralleled on offcuts from Carlisle, one stamped at least three times with CRA, perhaps *G(aius) R(…) A(…)* (RIB 2445.3), the other perhaps CCM (above). Further afield, a fragment of primary waste from London is stamped three times with SE·G·F, perhaps *Se(…) G(…) f(ilius)* i.e. 'Se… son of G(…)' (RIB 2445.13). These stamps were probably swiftly made during the tanning or manufacturing process, perhaps being applied more than once if the first strike was uneven.

5.6 Symbols and inscriptions on footwear from northern Britain

There can be no doubt that much of the leather footwear introduced to Britain by the Romans was crafted with aesthetics in mind. From elaborate fishnet uppers to decorative nailing techniques, even the most basic of shoes was designed to be both functional and pleasing to the eye. A range of decorative techniques was employed, among the most common being the application of rosettes, rouletting and pricked designs, which formed part of the basic decorative catalogue of the Roman shoemaker (van Driel-Murray 2001d, 342) and are found on everyday shoes for people of all ages and genders. These commonplace decorative techniques are not considered further here; rather, this section focuses on symbols and motifs applied to a minority of Roman footwear, seemingly with the intention of setting an object apart from the rest. While these symbols are certainly aesthetically pleasing, their function should be seen as more than decorative, perhaps aiming to raise the perceived value of a pair of shoes.

5.6.1 Official stamps and makers' marks

There are eight examples of symbols stamped on leather from within the study area. Of these, two seem likely to be trademarks: stamps on the sole of a cork slipper from Vindolanda (an almost identical shoe is known from York (see above)) and on perhaps the best-known shoe from Roman Britain, the Lepidina slipper. Sulpicia Lepidina was the wife of prefect Flavius

Cerialis (*Tab. Vindol.* II, 291-94), and a number of shoes are tentatively attributed to this family and their household (van Driel-Murray 1993, 44-46). The stamped sandal's insole is marked three times with an ansate frame containing the inscription L (lunette) AEB | THALES | T . F., interpreted as *L(ucius) Aeb(utius) Thales T(iti) F(ilius)*, presumably a maker of elegant and expensive footwear. What appears to be the same stamp occurs on an offcut of leather from Vindonissa (van Driel-Murray 1997, 57),[7] suggesting either that Aebutius Thales' business was based here and Lepidina's shoes had been imported over some distance, or perhaps that Flavius and his family had previously been stationed in Gallia Belgica (part of modern Switzerland). Four stamps, two each of two designs, add to the embellishment: a vine leaf and a device of two *cornucopiae* (horns of plenty, a symbol of abundance) interlocked across an ear of corn (van Driel-Murray 1993, 69).

Symbol stamps occur on a further eleven items of footwear within the study area, two of which display an inscription within a frame. The first occurs on the insole of a women's or adoloescent-sized[8] sewn shoe sole from Bar Hill, on which are incised the letters Q O A within an incomplete frame in the shape of an inverted *bulla* (Robertson *et al* 1975, 65). A number of shoes from Germania Inferior feature similar marks, with inscriptions within *bulla*-shaped frames. Two shoes from Cologne and Valkenburg are marked with a *bulla* stamp (the *bulla* is not inverted in this case) containing the letters PS | RPA (van Driel-Murray 1977, 154; Table 1). A number of other shoes are marked with inscriptions that include the letters PS within frames, and van Driel-Murray suggests that the use of these stamps on high-end cork slippers and occasionally sandals may be related to the authorised use of particular materials in their production, perhaps gold (2007, 338; Fig. 3).[9] Although on the Bar Hill example the *bulla* is inverted and the inscription does not feature the letters PS, it is nonetheless likely that the shoe is a continental import (Allason-Jones 2015, 241).

Another inscription within a frame occurs on an elegant child's shoe from Rough Castle, which has an incomplete stamp in the shape of a *pelta* on the outer sole containing the letters MAE (ligatured). The letters within the frame are off-centre and the full inscription may well

[7] In an earlier publication, the stamp from Vindonissa is read as L ALBI (van Driel-Murray 1977, 155).
[8] Robertson *et al* record the shoe as a woman's size (1975, 80) but at 22cm in length it falls at the top end of Greene's adult female category, and the width of the waist (6cm) suggests that it could be an adolescent's or a man's shoe (78-81).
[9] Gilded footwear has been recovered from Roman London (MacConnoran 1986, 225-26).

have been longer, but the remainder was lost along with the seat portion of the shoe. To the right of the *tria nomina* in an X and also a small ɾ, which could represent the Old Latin symbol for the letter P or perhaps more probably the Greek capital gamma.[10] Old Latin was replaced by Classical Latin towards the end of the Roman Republic and in the early years of the Empire, and linguistically the Roman empire was very diverse. Bilingualism was not uncommon (Clackson and Horrocks 2007, 232), and thus the occurrence of Greek lettering on Roman period material should not be considered unusual. Indeed, a child's shoe from London is incised with EKTOPI, 'for Hector' (RIB 2445.27). The *pelta* first appeared on objects in the first century, with the symbol becoming much more popular in the second half of the second century (Hoss 2015, 143), around the time at which Rough Castle was abandoned (AD 160s). The fashion continues on military items throughout the second and third centuries (*ibid*.), and Hoss considers this stylistic innovation a form of *bricolage* or cultural appropriation (2015, 143; 136), as fashions are adopted and adapted to create uniquely local/regional cultural identities.

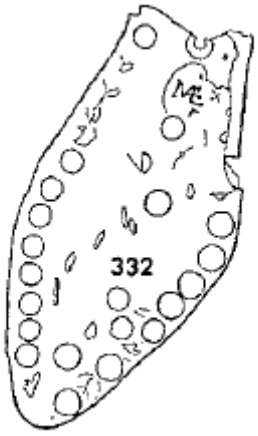


Fig. 18: stamped shoe from Rough Castle (after Macivor *et al* 1980, Fig. 16.)

It is notable that the inscriptions on footwear from both Bar Hill and Rough Castle are placed within a frame in the shape of an object that might be considered a symbol of protection, the *bulla* being the talismanic pendant given to Roman boys when they were eight days old, and the *pelta* being a crescentic, leather-covered shield of Thracian origin. *Bullae* were worn for their apotropaic qualities and as a signifier of freeborn status. The Thracian shield was

[10] The *tria nomina* is described as reading ME. The illustration (Fig. 18) is more accurate (Macivor *et al* 1980, 277 and Fig. 16), although the outline of the bulla is not clear in this interpretation.

adopted as a symbol in Graeco-Roman art and material culture, and *peltae* occur frequently on distance slabs and military dedications in northern Britain, particularly during the Antonine period (Keppie 1994, 41). Although the Romans' use of the *pelta* motif might be seen as military in origin, the symbol might also have taken on apotropaic qualities to ward off evil or bad luck (Thompson 1968, 49). It is most likely their apotropaic qualities that inspired the use of *bulla*- and *pelta*-shaped stamps on high quality goods.

5.6.2 Branding

A stamp reading QFIMCV | ESV | ORM is found on two almost identical shoes from Roman Britain: one from York (Frere *et al* 1987b, 374) and a partial stamp from Vindolanda, on the outer sole of a cork slipper that also features faint floral stamps (van Driel-Murray 1993, 70). Despite the similarities between the slippers from York and Vindolanda, it would appear that the stamps were made using different dies, as the angle of the descender of the Q differs and the York example lacks the serrated outer edge. Although the meaning of the stamp is not clear to us today, the decorative scalloped edging and unusual layout make it eye-catching, going beyond the requirements of a simple informative label. This is a more patent attempt at branding in the modern sense of the word: "to give a product a distinct identity by means of characteristic design, packaging, etc." (Collins English Dictionary 2003).

Fig. 19: Stamp on shoes from (L) Vindolanda (van Driel-Murray 1993, Plate XI) and (R) York (Frere *et al* 1987, Fig. 7)

5.6.3 Symbols or motifs on footwear

Symbol stamps occur on a number of shoes within the study area, taking the form of urns/vases,[11] florets, palmettes and eagles. Multiple urn motifs are found on the insoles of two nailed sandals, one from Carlisle (Padley and Winterbottom 2010, 288-89) and another from Vindolanda (van Driel-Murray 1993, 69). These can be compared with two stamped shoes from Roman London, one of which shows the urn within a circular border (Rhodes 1980, Fig. 60 and 66). The Vindolanda example also features at least five stamps of an eagle surrounded by a pelleted border (van Driel-Murray 1993, 69). This is paralleled on shoes from first-second century Roman London, which feature the eagle in the same stance but with plain borders (MacConnoran 2001, 104; M. Marshall pers. comm.). The eagle or *aquila* was the standard of the Roman legion and a symbol of power closely associated with Jupiter, so was a common decorative motif. The remainder of the motif stamps are found on footwear from Vindolanda, comprising a griffin or Pegasus on the sole of a sandal, and a number of motifs inspired by flora: palmettes on the outer sole of a cork slipper; flowers, florets and leaves on the soles of sandals (van Driel-Murray 1993, 70-71); and the *cornucopiae* and vine leaves on the Lepidina slipper (above).

Distinct from the decorative motif stamps considered above are astrological symbols. These occur within the study area on the soles of two broad-toed sandals from Birdoswald (Mould 1997, 337). One features a symbol relating to Saturn or Aquarius, and the other a symbol with chthonic associations. Cosmic imagery is not uncommon on third/fourth century footwear in the provinces, and a number of contemporary parallels are known, including a sandal from third century London featuring a similar Saturn/Aquarius symbol (MacConnoran 1986, Fig. 8.23). Unlike the swiftly-applied motif stamps, astrological symbols are usually lightly impressed by hand (van Driel-Murray 1999a, 134) but they occur too frequently to be interpreted as DIY-additions to shop-bought shoes. The limited range of astrological symbols found on footwear are linked to Hellenistic astrology, with predictive and therapeutic intentions, and van Driel-Murray suggests that the adoption of these symbols signals a significant change in thought and perception: "the introduction of the zodiac signs and the predictive horoscopes implied thus represent a clearly new element in provincial thought and perception of the role of the stars in human destiny on earth and after death" (2001a, 97-98;

[11] Two similar symbols are referred to as a two handled urn (van Driel-Murray 1993, 69) and a vase (Padley and Winterbottom 2010, 288-89); both will be referred to as urns here.

101-02). Both of the marked sandals from Birdoswald feature hobnails grouped in clusters of three, an arrangement specific to sandals, and van Driel-Murray proposes that it would be "inadequate to dismiss these solely as 'decorative patterns'. Something in the nature of protection is certainly indicated" (1999a, 132). This is linked to a wider tradition of incorporating more patently propitious symbols in nailing patterns, such as good luck symbols like Neptune's tridents, swastikas and circles. While they may have been partly decorative, these symbols may have been intended to invoke the protection of the associated deity, for example. Though invisible to the wearer, these shapes depicted in hobnails would have quite literally made an impression, leaving their mark in the footprints of the wearer (*ibid*.).

With the exception of overtly luxurious goods such as the gilded footwear known from Roman London (MacConnoran 1986, 225-26), footwear was fairly homogenous in the Roman period. There was little variation between everyday styles for men, women and children. Using a child's shoe as an example, Greene points out that an "an ordinary shoe belonging to a child with no markers of economic or social status, such as elaborate leather working or a high-end makers stamp, could belong to the child of a slave, a soldier, or even still an officer" (2011, 59). Symbols on footwear are prominently placed and easily visible – usually found on the inner soles of sandals and on the outer soles of cork slippers (van Driel-Murray 1993, 158) – and we might consider their visibility to the buyer a factor in their placement: the use of decorative stamps might be seen as an overt attempt to enhance the desirability of a shoe by differentiating an otherwise ordinary item from the competition.

5.7 Conclusions

Inscriptions were applied using a range of methods, from stamping to incising, and it might seem logical to consider these to represent different categories of information. However, numerals – interpreted as denoting the regiment for which a consignment of leather/hides or goods was destined – were stamped, incised *and* impressed on leather, and they occur on both offcuts and on finished items (shoes). We might assume that stamped inscriptions are official – the creation of a die, presumably for the sake of speed/efficiency in the application of

information, indicates that the stamp would be applied to many items. What then of the incised or scored numerals? With nothing else to distinguish them from the stamped numerals, it seems unwise to try to interpret them differently, and it is still unclear exactly what information these numerals were intended to convey.

Perhaps more easily interpreted are the inscriptions featuring *tria nomina*, which denote an individual. The simple requirement to mark one's property to prevent theft or confusion, particularly in a busy barrack room, for example, should not be underestimated (Allason-Jones 2015, 244). However, this theory seems unlikely to apply to the marked leather considered here, much of which comprises offcuts. These inscriptions may well relate to the tanning process, indicating where a hide was processed, or by whom. The rather official-looking stamps bearing *tria nomina* neatly contained within frames, on shoes from Rough Castle and Bar Hill, seem more likely to relate to the manufacturing process. These and the Lepidina slipper hint at the importation of luxury footwear from the continent, giving clues to trade networks in footwear that we do not yet fully understand.

The discovery of previously unrecorded inscriptions on an offcut from Rough Castle is a reminder of the importance of carefully examining even the least inspiring scraps within any assemblage. Further stamps and inscriptions may be revealed through the reassessment of unpublished assemblages. Adding to the body of data will help to elucidate how we might interpret the letters, words and symbols that are found on leather items and offcuts in northern Britain.

6. Footwear as an indicator of the presence of women and children on Roman military sites

It is generally understood that soldiers in the Roman army could not marry because of a law forbidding legitimate marriage, or *matrimonium iustum,* which is attributed to Augustus. It was relaxed by Hadrian in AD 119 and repealed by Septimius Severus in AD 197. While soldiers might form long-lasting relationships and start families, these *de facto* marriages were not formally recognised: any children born as a result were considered illegitimate and therefore not entitled to citizenship, and a woman could not claim back her dowry on her husband's death (Phang 2001, 2-3). Evidence indicative of the presence of women and children in forts was in the past frequently disregarded and attributed to the presence of prostitutes, slaves, local people or camp-followers. It is clear that women did move with the army over long distances (van Driel-Murray 2012). While *de facto* marriages are generally understood to have taken place and families to have lived in *vici* nearby, even before the marriage ban was lifted, the notion of the families of ordinary soldiers living with the forts' walls has been less popular, not least because identifying conclusive proof has proved difficult. However, based on artefact distribution analysis, it has recently been asserted that families lived not only in the officers' quarters, as was widely accepted, but within the barracks of ordinary soldiers. What is more, female innkeepers and barmaids are attested on writing tablets from Vindonissa, so women might also be present on Roman military sites as business people in their own right (Allison 2006, *passim*). Thus, it is suggested that, far from being camp-followers or hangers-on, families were an established element of the military community. Despite the considerable problems involved in 'sexing' artefacts (see below), the analysis of footwear can facilitate estimation of the age and/or gender of the wearer linked to shoe sizes, and as such provides an opportunity to test these assertions and explore the communities of Roman forts in more detail.

Gender studies have been a research interest in archaeology for some decades. In 1984, Conkey and Spector asserted that archaeology had "substantiated a set of culture-specific beliefs about the meaning of masculine and feminine, about the capabilities of men and women, about their power relations, and about their appropriate roles in society", being

"neither objective nor inclusive on the subject of gender" (1984, 1). Van Driel-Murray suggests that within this field, "it is in Roman military studies that the exclusion of women is most extreme" (1995, 55). When writing up the footwear assemblage from Bonner Berg in 1980, van Driel-Murray herself made what she later described as "ridiculous attempts to explain the smaller sizes away" (1997, 60). This reluctance to consider that women and families might have resided within forts is nothing new. Interpreting the material from Newstead in the early 20th century, Curle acknowledges that the presence of women *"*in the fort or its annexes is revealed quite plainly by their own and their children's shoes, worn out and cast aside into pits and ditches*"* (1911, 137) but interprets the shoes as having belonged to local people (*ibid*.; 1932, 342) rather than soldiers' families. Around 32% of the footwear from Bar Hill was of women's/youth's or children's sizes, representing "a considerable number of civilians" (Robertson *et al.* 1975, 80-82), but Macdonald and Park concluded that they "cannot, of course, have dwelt within the gates; that would have been a grave breach of military law. They must have been housed outside, with traders and others, in an annexe or civil settlement" (1906, 533-34).

Greene suggests that the notion of an entirely masculine military was part of a literary trope

> "adopted and promulgated by medieval and early modern political leaders such as Machiavelli, who in his Art of War applauded the 'celibacy' of Roman soldiers. This trope worked particularly well for a highly class structured Victorian society that simply could not admit a female presence in military affairs, and from there the misconception of an all-male Roman military world entered scholarship" (2011, 262).

However, that women were an important and visible part of frontier life is not disputed. The issue is the visibility in the archaeological record of women and the spaces in which they lived and worked. Those who dispute the suggestion that families were living within forts in the early centuries AD do so largely on the basis of space constraints and suitable provision of accommodation. This issue is explored more fully below.

6.1 Marriage while in the military

Phang's study of the marriage of Roman soldiers, which examined contemporary papyri, inscriptions, tablets, diplomas, and various literary and legal sources, concludes that the army did not try to control the moral or sexual behaviour of its recruits. Rather, the marriage ban prevented the army from having to "administer legal disputes arising from marriage and inheritance by soldiers' children, nor… increase pay to support soldiers' wives and families" (Phang 2001, 386-87). Moreover, the ban was a policy "marked by severe principle and a lack of enforcement". Flouting the ban did not result in punishment (Phang 2008, 289), only inconvenience: children born to serving soldiers were considered illegitimate; on a soldier's death, his wife could not claim back her dowry; and illegitimate children might find it hard to prove their identity if named in their father's will (Campbell 1978, 154). Haynes all but dismisses the ban, since even in the early first century soldiers' families were a standard part of military life (2013, 49-50).

However, it remains unclear just how many serving soldiers might have married and started families, and, more significantly, what proportion of families were accommodated within forts. James suggests that perhaps only around 20% of serving soldiers were married: while "we may accept that soldiers' wives were a normal component of military communities, we need to be careful not exaggerate their numbers" (2006, 32). Roxan indicates that evidence from *diplomata* suggests that, before AD 140, up to 50% of auxiliary soldiers may have married while in active service (1991, 465), and Greene proposes that up to 70% declared a wife or obtained citizenship for existing children on leaving the army in the first half of the second century (2011, 258). Clearly this issue remains open for debate.

Carol van Driel-Murray was among the first to express with confidence, and with the support of archaeological evidence, that women might form a significant proportion of a fort's population, with *de facto* relationships perhaps seeing soldiers' families living inside the fort with them even before the marriage ban was lifted (van Driel-Murray 1987, 33; 1997, *passim*). Her ideas were rejected by many at first (James gleefully notes the "outraged reaction of some conservative practitioners of Limesforschung" (2006, 31)) but it is now

accepted that the perceived "former hard line on the separation of soldiers and civilians has become blurred" (Breeze 2015, 225). It has become increasingly difficult to ignore the broad range in shoe sizes that is sometimes evident among footwear from military sites. Current research on the distribution of other gendered artefacts within forts suggests that the presence of families in forts may have been more commonplace than once thought (Alison 2013, 343).

6.2 Space restrictions and military organisation: was there room for families in forts?

Phang suggests that the military did not attempt to control its soldiers' moral or sexual behaviour (above). Hodgson concurs that adherence to the marriage ban was probably fairly flexible, but suggests that "within the fort walls the soldier was expected to live in an idealised and celibate state" (2014, 26), and that the ban was directly reflected in the layout of Roman forts, which, in the first and second centuries AD at least, allowed no space for cohabitation of soldiers and families (*ibid*.). Indeed, he queries whether the early second century building on which so much of van Driel-Murray's work was focussed is even a barrack block at all, as the reconstructed plan is based on fragmentary evidence (2014, 19). However, it is notable that Hodgson does not reference Greene's thesis (2011), which represents the most up-to-date analysis of the material.

The traditional image of standard soldiers' accommodation in the first to third centuries AD is of barrack blocks comprising ten rooms (*contubernia*) with eight men to a room, so each barrack block accommodated a century (eighty men). In reality, the layout of barrack blocks was less regular than this, with the number of *contubernia* per block varying from fort to fort. In the third century at Vindolanda and South Shields we see barrack blocks begin to comprise only five rooms. Work at Wallsend and Housesteads seems to identify a late fourth century phenomenon, 'chalet' barracks, and there may be some evidence for barracks becoming more open-plan while the blocks are laid out rather irregularly, perhaps signalling the breakdown of the *contubernium* unit, a reduction in the overall numbers of troops, and the accommodation of soldiers' families within forts. However, analysis of artefacts shows no increase in 'female' artefacts in the later periods at South Shields, for example. We do not yet

understand the way in which these barracks were used, and the suggestion that 'chalet' barracks are indicative of a sea-change to the size and underpinning values of the military is not accepted unreservedly (Hodgson and Bidwell 2004; Hodgson 2014). While these more spacious units would ably provide accommodation for a soldier and his family, such a move would see a decrease in size of the fort garrison by up to 85%-90% , with serious implications for the military's strength and effectiveness on Hadrian's Wall and the frontier zone (Bidwell 1991, 9). Nonetheless, the adoption of a new form of barrack block has been largely accepted as an indication that the framework of military accommodation, and the parameters within which soldiers lived, saw significant change in the later Roman period in Britain.

6.3 Identifying gender through material culture: methodological issues

Artefact distribution analysis is used to investigate the activities that were taking place on an archaeological site. In applying this methodology to explore demography, it is necessary to identify distinct artefact types that might represent the presence of men, women or children. When attempting to categorise an artefact type as 'male' or 'female', we are inherently subject to bias based on our own social mores. Brooches were long considered to be a female dress accessory in the Roman period (e.g. Clayton attributed the "trinkets" – brooches, rings and beads – among the finds in Coventina's Well to "lovesick damsels" and "interesting ladies" (1880, 31)) but they are now considered to have been worn by both sexes (Allason-Jones 1995, 22-24).

More recent attempts at assigning gender to artefacts have explored the issue more sensitively, examining which artefacts might be considered to be associated with males or females based on supporting factors such as epigraphy. Allison has suggested that "women and children were likely to have made up over 5%" of the population within Roman military bases, and perhaps as much as 18-20% of the population of a supply fort such as Oberstimm (2013, 319-39), with up to 80% of this material likely being associated with the families of ordinary soldiers rather than officers.

However, Allison's research has met with criticism. For example, she acknowledges that melon beads might be either a women's/children's dress accessory or associated with cavalry (2013, 83-85). However, her categorisation has been queried, particularly with regard to Oberstimm (Campbell 2010, 52-53), where melon beads were interpreted as an indicator of female presence since she considers a cavalry presence "improbable" (Allison 2013, 285). However, elongated pits in one of the barracks at Oberstimm were not considered significant at the time of excavations (Schönberger 1978, 110-15), but are now interpreted as urine pits/soakaways indicative of a cavalry presence (W. Hanson, pers. comm.). Alison's research also considered human remains, including a number found within the fort at Ellingen. The burial of human remains on a Roman settlement was illegal and therefore very unusual, so Hodgson warns against using infant burials as evidence to support the theory that women were present at all periods at Ellingen, particularly given the dearth of definitely 'female' artefacts from this site (2014, 23).

Further criticism was levelled at Allison's analyses because the dismantling/abandonment process that took place on departure from a fort inevitably affects the distribution of finds: "the archaeological site plan shows only the remains of the carcass after it has been picked clean, rather than the living, breathing beast in the midst of its daily routine" (Campbell 2010, 52-53). However, this last observation can surely be applied to all archaeological sites which were subject to an intentional abandonment process, with only sites which were swiftly abandoned or destroyed, such as Pompeii, being exempt. Nonetheless, Roman forts do have the added complication of rubbish being collected and redeposited across the site (e.g. Elginhaugh, Vindolanda, Bar Hill, Newstead, to name but a few) before either remodelling or dismantling/destruction of the site, increasing the potential for artefact redeposition and so divorcing material culture from its original context in which it might be better understood and interpreted.

The deposition of artefacts was among Andrew Birley's considerations when using artefact spatial distribution analysis to investigate the nature and significance of extramural occupation at Vindolanda in the third and fourth centuries, although in this case the site was not 'picked clean' but repeatedly modified and remodelled. For example, organic material laid down as flooring might contain small items that were dropped or discarded. When this

material was either removed and replaced or reused as fuel, any artefacts contained within the flooring would be redeposited with it (2010, 119-22). The fact that shoes are very rarely recovered in pairs serves as a reminder of how such artefacts are usually divorced from their context of use when recovered, often found in contexts of discard such as rubbish pits or midden material. Birley's analysis of the distribution of 'female' artefacts such as bracelets, hairpins and spindle whorls demonstrated that women were present within the fort at Vindolanda in the third century but in relatively low numbers, with much more evidence for women in the extramural settlement (2010, 193-95).

The entire artefact assemblage from Birdoswald was analysed according to Allason-Jones' suggested criteria for 'sexing' small finds (1995), to try to gain some idea of the population's demography and to try to determine whether it was possible to identify changes within the population, for example an increase 'female' artefacts during later phases, when the presence of women might be expected. Although some of the footwear could be associated with women/adolescents or children, the total number of objects that could be confidently associated with a specific gender was very small (6/7 'male' and 21 'female' items among around 3000 small finds), rendering meaningful analysis difficult: "the evidence from Birdoswald warns that one cannot make assumptions as to who is or is not on the site at any particular period, or how the space was used, as the finds can not be 'sexed'" (Wilmott 1997, 360-61).

Thus artefact distribution analyses are of limited utility when exploring the demography of past populations, and van Driel-Murray asserts rather than we should turn to the analysis of artefacts that can be 'sexed' based on body size measurements, such as footwear.

6.4 Looking to indicators of body size to explore demography

Van Driel-Murray has criticised attempts at 'gender awareness' for their reliance on artefacts such as beads and bangles as indicators of female presence: the application of gender-

distinction is undoubtedly subjective, and she suggests instead that indicators of body size might be a more accurate way to explore demography (1992, 3).

Roman shoe styles displayed little variation for sex or indeed for age: shoes of all sizes were made in the same styles until towards the end of the second century, when certain types appear to have been worn only by men or women (van Driel-Murray 1987, 34). Children's shoes were essentially smaller versions of adult's shoes (Greene 2014; van Driel-Murray 2005). There are only a few shoe styles that might be 'sexed' based on typology. Sandals initially had a naturalistic shape, often with toe indents, and were worn predominantly by women. In the later second century a broad-toed version became an acceptable choice of footwear for men, while women's sandals became narrower and straighter (van Driel-Murray 2001b, 194; 2001d, 355). *Caligae* were worn predominantly by soldiers in the first centuries BC and AD, falling out of fashion in the AD 80s (van Driel-Murray 2001d, 362). Recent analysis of the size distribution of footwear from Camelon suggests that a closed style known as the 'Zwammerdam' may have been worn only by women, although this hypothesis has not yet been tested against footwear from other sites (Arkesteijn and van Driel-Murray 2015, 119)[1] and examples of both children's and men's sizes occur elsewhere (van Driel-Murray 2001d, 365).

In the 1970s, Groenman-van Waateringe explored the possibility of using footwear to examine the demography of a population, measuring each shoe to estimate the foot size of the wearer, and calculating the proportions of men's, women's and children's footwear from first to third century military sites in Holland (as well as a range of medieval sites) and comparing the data with that gained from the excavation of burials. Her research suggested that populations on Roman sites were made up of "few women… and children and many men", and although many questions remained, she concluded that the analysis of the dimensions of footwear across an assemblage might be a fruitful means of identifying the demographic composition of a society (1978, *passim*).

[1] Due to time constraints, a comprehensive assessment could not be carried out to verify if the totality of material from northern Britain would support or challenge this proposition (see also note 3).

Greater understanding of average foot sizes in Roman Britain would make much contribution to this discussion. However, no major osteological study into Roman foot sizes has been conducted. Bioarchaeologist Kristina Killgrove has performed an informal study based on calcaneus length in an Imperial-era cemetery population from east of Rome. She estimates average male and female foot length at 26.5cm and 25.9cm respectively. However, she suggests that the female average seems too large, and concedes that more research is needed (Killgrove 2014).

6.5 Identifying men's, women's and children's shoes: methodology

Since the limitations in 'sexing' artefacts limit the utility of artefact distribution analyses in exploring demography, we turn to footwear as an indicator of body size, and so age/gender. In assigning age and sex based on shoe size, Greene built upon Groenman-van Waateringe's (1978) and van Driel-Murray's (1995) identification of distinct peaks in size distribution to estimate cut-off points between categories. Allowing for 0.5cm-2cm shrinkage, she used the following criteria in her analysis:

> 22cm = adult male

19-22cm = adult female/adolescent male probably under the age of 14

<19cm = child

Measurement should be based on the insole wherever possible, which "most effectively reflects the actual size of the wearer" since the outer sole can be 2-3cm larger than the insole. The style and width of a shoe can also contribute to its categorisation, particularly regarding shoes that are around 22cm in length i.e. on the cusp between female/adolescent and male. However, recent analysis of the footwear from Camelon identified the probable cut-off point between male and female sizes at 26cm, perhaps indicating a healthy, thriving population, demonstrated by their larger feet (Arkesteijn and van Driel-Murray 2015, 119). This highlights not only the importance of assessing each assemblage of footwear in a thorough

and comprehensive manner, but also that these criteria will become more accurate as more data is gained and a clearer overview of shoe sizes in Roman Britain can be created. For the purposes of this thesis, Greene's (2011) criteria have been used.

Some styles throw up problems concerning dimensions: one-piece shoes can be adjusted to fit, and cannot accurately be measured to represent foot size, so unless a shoe is so small as to fall well within the boundaries for a child's size, it cannot be assigned to a particular age/sex with much certainty. Similarly, the 'extra' few centimetres of length comprising the toe of a tapered/pointed shoe must be discounted (Greene 2011, 77-84).

Ideally it would have been possible to analyse all material according to Greene's criteria so that everything could be compared based on the same standards. However, in many cases, descriptions and/or illustrations are not comprehensive enough to permit this level of analysis. With these limitations in mind, a reassessment of all data has not been attempted. In most instances, categorisations are as published in excavation reports. Where interpretations are considered questionable, or items have been newly identified as having possibly been of women's/children's sizes, these have been highlighted below.

6.6 Women's and children's shoes from Roman sites in northern Britain

Shoes of women's/children's sizes are known from 13 sites in northern Britain. The exact quantity is unknown as data availability is patchy, particularly for large assemblages from Newstead and Vindolanda. This renders statistical analysis problematic. However, the total reaches at least 422, representing 14.5% of the 2917 items of footwear from within the study area.

Leather from within the study area was categorised as either military or civilian in nature (or military/civilian where no firm conclusions could be drawn) according to context of

discovery (Chapter 2). At least 30 (7.1% of 422) items of women's/children's footwear have been recovered from civilian contexts (i.e. within *vici*) and 198 (46.9%) from military contexts (i.e. within forts). A further 194 (46.0%) item have been discovered that cannot confidently be categorised as either military or civilian in nature. The recovery of women's/children's shoes from civilian settlements is to be expected, but the same from sites with no known civilian population is more unusual, therefore material from military sites is considered separately to that from civilian and military/civilian contexts.

Table 9: sites that have yielded women's and/or children's shoes

Site name	Site type	Number of women's/children's shoes	Categorisation of women's/children's shoes
Balmuildy	Fort	Limited data available	Military
Bar Hill	Fort	100	Military
Birdoswald	Fort + *vicus*	25	Military/civilian
Camelon	Fort + ?*vicus*	52	Military/civilian
Carlisle	Fort + *vicus*	At least 34	Military/civilian; civilian; military
Castlecary	Fort	7	Military
Corbridge	Fort + ?*vicus*	2	Military/civilian
Cramond	Fort + *vicus*	1	Civilian
Elginhaugh	Fort	2	Military
Housesteads	Fort + *vicus*	2	Military/civilian; civilian, military
Rough Castle	Fort + *vicus*	2	Military/civilian
Newstead	Fort + *vicus*	Limited data available	Military/civilian
Vindolanda	Fort + *vicus*	At least 220	Military/civilian; military
		Total = at least 422	

6.7 Women's and children's shoes from sites with a civilian element

Birdoswald

The 300+ shoes discovered at Birdoswald during excavations in 1987-92 comprise men's, women's and children shoes "indicative of a 'normal' balanced population". 39 shoes were complete enough to allow size to be estimated "using modern English shoe-size scales with a

10% allowance for shrinkage". Almost all of the leather from Birdoswald came from the fort's ditches (Mould 1997, 327-28).

To assess this data according to Greene's criteria, anything catalogued as being larger than size 5 is considered to be of adult male size. Items in sizes 3-5 are considered to be women's/adolescents', and sizes 2 and below are of child's size (all allowing for 10% shrinkage). The assemblage therefore includes seven shoes of child's size and 18 that may have belonged to women/adolescents.

Camelon

Excavation of one of the Flavian fort's ditches in 1978 yielded the remains of five shoes. Among these were two shoes that may have belonged to women/adolescents or children: one 162mm in length and another 198mm in length (Thornton, forthcoming).

Excavation in 2011 of a section of the southern annexe ditch of Antonine date produced an assemblage of leather including 78 shoes spanning from 13cm (suitable for a child of three/four years old) to 30cm in length (adult male size). Analysis of the footwear revealed a gap in the distribution of sizes at around 26cm, making that the cut-off point between male and female sizes. This differs to the cut-off point of 22cm offered by Greene (2011) for the material from Vindolanda but the authors suggest that the footwear from Camelon is larger than average, perhaps indicative of a "relatively well-nourished population." 70 shoes are represented in a graph demonstrating foot size (Arkesteijn and van Driel-Murray 2015, Figure 6), 48 of which fall below the cut-off between men's and women's sizes. A further five lie on the cusp at 26cm in length. If we consider half of these five as women's and half as men's, the total of women's/children's shoes in this assemblage comes to 49.5, or 70.7% of the 70 shoes for which size data is available. In addition to analysing the sizes of the footwear, the styles were categorised and assessed, and one style known as the 'Zwammerdam' was identified as seemingly having been worn mostly by women, although

corroboration with material from other sites is required to strengthen this assertion (Arkesteijn and van Driel-Murray 2015, 118-19).[2]

The nature of the extramural remains at Camelon remains uncertain, although buildings in the northern annexe of non-military type (McCord and Tait 1980, 156) leading to the suggestion that this area represents a defended civil settlement (Cook, forthcoming). Antonine footwear from the ditches of the southern annexe, of which around 70% is of women's/children's sizes, most likely relates to a substantial civilian population. However, the shoes from Flavian deposits are of particular interest here: it is unlikely that a substantial civilian settlement would have been established at Camelon during this short-lived period of occupation, so we might consider these shoes to relate to the community living within the fort.

Carlisle

The fort at Carlisle is bounded to the south by a substantial civil settlement. As a probable *civitas*, it is entirely expected that Carlisle should have yielded a significant assemblage of Roman footwear representing a mixed population. However, only around 30 shoes of women's/children's sizes can be identified from over 400 items of footwear discovered in the *vicus* (this figure incorporates material published in: Padley in prep.; Padley 2010; McCarthy 1991b; Padley 1991). A few more are among unpublished material at Tullie House. It is not standard practice to categorise footwear by size, and as such, little of the material from Carlisle has been subject to such analysis. Moreover, this analysis is only valid where the full length of the shoe can be measured. Padley notes that at Castle Street only 20 bottom units from 126 nailed shoes survive complete (1991, 230), rendering accurate recording of dimensions impossible. Despite these limitations, analysis of the footwear from Carlisle contributes to the overall picture of a growing civilian population in the 70s and 80s AD (Greene 2011, 142).

[2] I am most grateful to Carol van Driel-Murray, who kindly provided an advance copy of the interim report. Relevant information has been incorporated into this thesis as far as within the time constraints of its submission date.

Corbridge

Among leather from Corbridge held at Chesters Museum are two soles from children's shoes, one of which was nailed (catalogue kindly provided by curator Frances McIntosh).[3] The dimensions are not given, and no contextual information is available.

Cramond

The "complete sole of a child's right shoe" with sparse nailing on the sole was discovered in a well within an industrial complex in the *vicus* at Cramond (Holmes 2003, 129).

Housesteads

Excavations in the *vicus* at Housesteads in 1961 yielded "52 boots and shoes in a fragmentary state" from a rubbish deposit spread across the floor surface of a workshop. These items were not described further (Birley 1962, 120-21). However, the sole from a nailed shoe interpreted as being of child's size (dimensions not given) is held at Corbridge Museum (see footnote 3), and believed to be from Birley's excavations in the *vicus*.

None of the shoes from more recent work at Housesteads are identified as having possibly belonged to a women or children, but based on illustrations, at least one shoe from the *vicus* is small enough to be of women's, even perhaps of child's, size (Mould 2009a, 484, Fig. 12.26, No. 1). Analysis of the entire artefact assemblage suggests the presence of women in the centurions' quarters "at all periods of the fort's history" but yielded no evidence for women living elsewhere in the fort. All other evidence for the presence of women (e.g. hairpins) can be associated with those living in the *vicus* (Allason-Jones 2009, 431).

[3] F. McIntosh kindly provided data on leather held at Coprbridge Museum, comprising finds from Corbridge, Housesteads, ?Chesters and Coventina's Well.

Newstead

At Newstead, the presence of women *"*in the fort or its annexes is revealed quite plainly by their own and their children's shoes, worn out and cast aside into pits and ditches*"* (1911, 137). However, Curle swiftly accounts for the shoes' presence by suggesting that they belonged to local people (*ibid*.; 1932, 342), an assumption that would no longer find favour. This material is unpublished but includes "significant proportions" of women's and children's shoes (Greene 2011, 149).

Rough Castle

The catalogue of the leather from Rough Castle omits interpretation, and does not include dimensions for all items. However, the material is held at NMS and was assessed as part of this study. Two of the shoes from Rough Castle are of probable child's size. The first is a nailed right shoe. Only the front portion is present, but it measures just 66mm wide at the tread and its proportions suggests that it was of child's size. A stamp on the sole suggests that this may have been a luxury import from the continent (see Chapter 5). The second example is a right sole of child's size, rather warped but measuring around 170mm in length and no more than 60mm wide at the tread.

MacIvor *et al* refer to a "sole, fragment, possibly child's shoe, most of the forepart missing" (1981, 278). The warped sole noted above as being of child's size does show some wear at the front, but survives almost to full length and could not be described as having most of the forepart missing. The only item at NMS that matches this description is a partial sole that is much too large to be of child's size.

The leather from Rough Castle is, unfortunately, unstratified. Buchanan *et al*'s report (1905) offers no clue as to what area of the site the leather came from, although a few of the more complete items are noted as having come from the main ditch (MacIvor *et al* 1981, 275). Rough Castle is believed to have had an associated civil settlement, so it is not possible to

conclude whether the child-sized shoes relate to the community living within the fort or that of the *vicus*. The stamped shoe is of above-average quality and may have belonged to the child of an officer.

Vindolanda

At least 270 shoes, including 132 (48.8%) of women's/children's sizes, have been recovered from the fort's ditches (van Driel-Murray 1993; 1997).

6.8 Women's/children's shoes from military sites

Over a quarter (109 of 422, 25.8%) of the known examples of women's and children's shoes identified in this study come from military contexts, from sites with no known associated civilian settlement (Bar Hill, Balmuildy, Castlecary and Elginhaugh) and from contexts within the fort at Carlisle and Vindolanda. As such, these examples can be interpreted as being associated with those dwelling within the fort.

Balmuildy

Leather from the ditches outside the west gateway at Balmuildy included an assemblage of shoes or shoe parts with "a few… of youths' or women's size, one only of child's size"

(Miller 1922, 98-99). This material is not catalogued or described further. It is stored at the Hunterian and would merit further study.[4]

Bar Hill

The presence of women's and children's shoes in the material from Bar Hill was acknowledged by Macdonald and Park, who concluded that these members of the population could not have lived within the fort, as this was against military law (1906, 131). As noted above, the reality was likely less clear-cut. Robertson *et al* interpret the original report to suggest that shoes were recovered "indiscriminately" from the pits inside the fort as well as the defensive ditches (1975, 82), so we might surmise that women's and children's shoes came from both the interior and the defences. The site yielded around 520 items of footwear, of which 322 shoes could be assessed with a view to identifying the gender/age of the wearer. The criteria used are not outlined in detail, but are understood to have taken into account the dimensions, in particular the width of the shoes, as well as the nailing patterns. The footwear was categorised as follows: 176 men's (54.7%), 67 women's (20.8%), 46 men's/women's (14.3%), 10 youths' (3.1%), women's/youths' (2 or 0.6%) and 21 children's (6.5%). Women's/youths'/children's shoes therefore represent 31.1% of the material that could be categorised. [5]

Robertson *et al* concluded that men's shoes tended to feature close-set parallel lines of hobnails while women's featured less densely packed hobnails arranged in circular or diamond patterns (Robertson *et al* 1975, 80). This postulation would warrant further analysis as nailing patterns seem to have changed over time (van Driel-Murray 2001d, 350-52) rather than according to whether the shoes were men's or women's (see above re. conformity in styles for men, women and children).

[4] It has not been possible to find a mutually convenient time to gain access. Funding will be sought to assess and publish this assemblage.

[5] Only those shoes categorised as women's, youths', women's/youths' and children's, totalling 100 examples, are included in the statistical analysis conducted here. Those categorised as men's/women's have not been included since the definition is too vague.

Greene suggests that the shoes from the ditches at Bar Hill might be associated with those living in the civil settlement (2011, 155). However, the existence of a *vicus* at Bar Hill is not confirmed. Pottery, hearths and an altar found to the east of the fort are suggestive of an associated settlement and/or annexe (Macdonald and Park 1906, 132) but geophysical survey has failed to provide confirmation (Stephens *et al* 2008). It would be an oversimplification of the data to suggest that, since 31.1% (100 of 322) of the footwear from Bar Hill is of sizes that could represent women and/or children, they must have made up a third of the fort's population. Unless a *vicus* is identified at Bar Hill, the data does suggest that women and children represent a larger proportion of the fort's community than previously assumed.

Carlisle

The results of excavations at Annetwell Street, within the footprint of the fort at Carlisle, are as yet unpublished but 122 items of footwear were recovered (Padley 2010, 380) including the insole of a child's shoe, from a second century deposit (Mould 2009c, 840).

The Millennium Excavations, also within the footprint of the fort, yielded an assemblage of footwear comprising at least 69 shoes dating mostly to the first or early/mid second century. However, this included only ten shoes with complete insoles, so "no valid analysis of shoe size and its implications for gender was possible". However, the assemblage is interpreted as being generally dominated by adult male sizes with some women's/adolescents' sizes also present, particularly in late first/early second century contexts, perhaps suggesting an increase in the female population around this time. There were no shoes of children's sizes. These findings are broadly in line with assemblages from previous excavations within the fort (Mould 2009c, 832; 840).

Castlecary

The leather assemblage from Castlecary includes 87 complete or partial items of footwear. A range of sizes are represented, from adult males' to those interpreted as children's shoes.

Catriona Martin catalogues the leather from Castlecary in her undergraduate thesis, and suggests that "some of the shoes are so small that they could only have belonged to women or children", identifying three shoes of women's/youths' size, two of women's/children's size, and two of children's size (1985, 27-47), representing 8.0% of the footwear. The criteria on which Martin made these analyses are not specified. The material is stored at NMS, and a small amount was assessed as part of this study, confirming that a number of shoes are of women's/youths' size. Martin's thesis provides a useful baseline record, but this assemblage would merit further analysis.[6]

Elginhaugh

Most of the footwear from Elginhaugh was too fragmentary to permit detailed analysis but the assemblage included two fragments of a child's shoe, recovered from the basal fill of the ditch outside the fort's east gate, and a shoe from the well within the *principia* that is interpreted as possibly having belonged to a woman, perhaps the wife of one of the officers (Groenman-van Waateringe 2007, 474; 477-78). There is no known *vicus* at Elginhaugh.[7] This material suggests that at least one woman and one child were among the community living within the fort.

Vindolanda

Thousands of items of footwear, including those belonging to women and children, are among the leather items that have been discovered at Vindolanda to date. Just over half of more than 2600 items of leather recovered during excavations between 1985 and 1989 was summarised by van Driel-Murray (1993). At least 793 shoes were recovered (van Driel-

[6] The leather from Castlecary and Newstead is held at NMS and was assessed and catalogued with a view to publication a number of years ago. Though this data is not yet available, given the time constraints of this thesis, it was decided not to create a new catalogue and undertake a full assessment as these are substantial (c. 122 and 450 items respectively) assemblages, which hopefully will see publication in the not-too-distant future.

[7] The presence of a local mortarium potter (Hartley 2007, 359) might hint at the presence of a significant, i.e. civilian, population in the vicinity, and it has been suggested that there might have been "a civilian component" to the annexe (Hodgson 2009c, 368).

Murray 1993, Table 1), of which at least 220 (27.7) are of women's/children's sizes.[8] 181 shoes, including 88 (48.6%) of women's/children's sizes, were recovered from the *praetorium*. Analysis of a discrete group of shoes, supported by evidence from preserved writing tablets, enabled hypothetical reconstruction of a household based on their footwear: commander Flavius Cerealis, his wife Lepidina, their children, and associates and slaves of various ages and sexes (van Driel-Murray 1993, 32; 45).

Van Driel-Murray's work at Vindolanda has been built upon by Elizabeth Greene, whose PhD explored the presence of women and families in military communities, focussing on samples of footwear from different periods as well as looking to documentary evidence in the form of tablets, military diplomas and epigraphy (2011). Footwear dating to Period 1 (c.AD 85-90/92) was recovered from a closely-dated, sealed deposit within one of the early fort's ditches. Footwear from Period 2 (c. AD 90/92-97) came from within the *praetorium*, as did footwear from Period 3 (c. AD 97-105), some of which was interpreted by van Driel-Murray (1993, 44-46) as possibly having belonged to Flavius Cerealis, his wife Lepidina, their children and other members of their household. The Period 3 footwear represents domestic refuse and was sealed by a standard demolition deposit. Material from Period 4 and beyond (c. AD 105-120) came from a barrack block (although Hodgson queries this interpretation, see above), and is perhaps the most provocative. Footwear of women's and children's sizes was recovered in material from all samples selected for study by Greene, but the material from Period 4 is interpreted as domestic refuse relating to *pedites* (infantry) and those living in the barracks with them. Clusters of women's and children's shoes in certain rooms are considered to be suggestive of "spaces being set aside specifically for cohabitation of soldiers and their family members". Greene acknowledges that the status of theses non-combatants cannot be confirmed – they may have belonged to slaves or servants – but her research nonetheless opens a new dialogue in the study of domestic arrangements in Roman forts (Greene 2011, 82-103).

6.9 Conclusions

[8] Information drawn from shoe size graphs (van Driel-Murray 1997, Fig. 1). At the point of overlap between men's/women's shoes (size 34), half have been counted as women's and half men's. Any errors in interpretation of sizing or contextual information are the author's.

13 sites in northern Britain have yielded footwear indicating the presence of women and children. This represents almost a third (32.5%) of all 40 sites that have yielded footwear. Larger assemblages, which can generally be interpreted as representing the shoes of many people, have the greatest potential to offer information about past populations. The 13 sites comprise all 11 sites within the study area which have assemblages of >50 items and include footwear, as well as two sites with smaller assemblages (Cramond and Corbridge). Sites with large assemblages and great time-depth have the greatest potential to reveal demographic changes over time. This has been carried out in particular on material from Bar Hill (Robertson *et al* 1975), Vindolanda (van Driel-Murray 1993; Greene 2011) and Camelon. Footwear from Carlisle also indicates an increase in the numbers of women and children in the later periods of Roman Carlisle, reflecting the site's change from a military base to a significant settlement or perhaps *civitas*. Recent work on footwear from Camelon has shown that the cut-off points between male and female sizes might vary from site to site (Arkesteijn and van Driel-Murray 2015). More work along these lines will contribute to our gaining a fuller understanding of demographies of past populations.

Potentially 'female' material from forts is rarely discovered in contexts that can confidently be associated with those definitely living within the fort. Much of the footwear considered here, and indeed much of the leather preserved on Roman sites in general, was discovered in contexts of discard, preserved in waterlogged pits (sometimes dug for the express purpose of rubbish collection on abandonment) and ditches, and as such it is very difficult to be sure of where it has come from and who owned and used it. The Roman army's practice of redistributing rubbish prior to both remodelling or comprehensively dismantling their forts on abandonment leads to significant redeposition of material. The majority (8 of 13, or 62%) of the sites from which women's and children's shoes have been recovered are known or at least thought to have had associated civil settlements in the vicinity, so even material found within forts may have originated from a nearby civil settlement. However, Balmuildy, Bar Hill, Castlecary and Elginhaugh have thus far yielded no evidence for *vici*, so we might assert that all footwear from those sites, including the shoes of women and children, belonged to the population living within the fort.

Analysis of footwear proves beyond doubt that women and children were present in the military communities of Roman Britain, and indeed suggests that they may have been present in greater numbers than previously thought. The presence of significant numbers of women's and children's shoes from the northern edge of the empire is perhaps even more intriguing than those from Hadrian's Wall. The Antonine Wall was occupied for no more than a few decades, and represented a relatively unstable environment for the growth of a civil population compared to Hadrian's Wall. Moreover, shoes dating to short-lived Flavian occupation at Camelon (Thornton forthcoming) and Elginhaugh (Groenman-van Waateringe 2007) indicate that there were women and children living on the northern fringes of the empire long before the Antonine Wall and its civilian communities were established.

While the analysis of footwear has great potential to shed light on the communities of Roman Britain, it has often been limited by recording practices that we would now consider to be inadequate. A lack of contextual information makes fuller interpretation of footwear almost impossible beyond assigning age/gender, as the most useful information is often closely tied to the location from which an artefact was recovered. Thankfully, accurate recording of the location of small finds is now standard practice, so rigorous analysis of Roman footwear with the benefit of supporting data such as contextual information will only continue to progress. As more material is recovered we may look forward to continuing to learn about the communities of Roman military sites through the analysis of their occupants' shoes.

Footwear remains one of the most useful artefact types in the exploration of the demographic make-up of Roman communities in Britain. Despite the fact that Roman-style footwear made little concession for age or sex, with the most common styles being worn by toddlers and soldiers alike, analysis of size data can help us to piece together the foot sizes of a community, thus yielding information about the age and sex of the wearers. While there will inevitably be some accepted degree of error – crossover between the size of women's and youths' feet, men and women with unusually large or small feet whose shoes will inevitably be misidentified – analysis of footwear nonetheless offers an exceptional window on past populations.

7 Conclusions

The aim of this thesis has been to draw together all of the data on Roman-period leather from northern Britain and conduct a cohesive assessment of past research, current questions and future possibilities. It explored how leather and leather goods were resourced, processed, manufactured and supplied across northern Britain. It considered the potential of inscriptions and stamps to provide insights into the leather trade, and the contribution that the study of footwear might make to our understanding of the demography of Roman settlements, shedding light in particular on military communities, which may have been more diverse than previously thought.

The recovery of an organic material such as leather is heavily influenced by taphonomy. It survives almost exclusively within the study area in waterlogged contexts. Despite this limitation on leather's survival in the archaeological record, over 14,000 individual leather finds are known from northern Britain, confirming leather's status as a plentiful resource for meaningful investigation of the Roman period.

7.1 Limitations

There were a number of circumstances that limited the scope of this thesis. Firstly, availability of data. Several substantial assemblages discovered during antiquarian excavations have not seen modern cataloguing, reassessment and/or publication, particularly those from Newstead, Castlecary and Balmuildy. Modern excavations in the Northern Lanes and at Annetwell Street, Carlisle, remain unpublished. Most significantly, somewhere in the region of 6600 leather finds have been discovered at Vindolanda so far, representing almost half of the Roman-period leather from northern Britain. Work at this complex site continues, with more leather frequently being discovered. Upon publication, we might expect the range and quantity of leather goods discovered there to transform our understanding of the leather goods that were produced in or imported to, and leatherworking in, Roman Britain. However,

the archaeological record is never static and future excavations will continue to produce leather. This thesis assesses the current state of play, working with the data available.

Secondly, a lack of standardisation in terminology used in publications has rendered comparison between material from different sites difficult. The term ‘sole’ is often used without specification of whether the sole represents an insole, outer sole or one of the inner layers of a shoe. The length and width of the insole is most useful in estimating the foot size of the wearer since the outer sole can be significantly larger than the foot, so basic distinctions between sole types should be used as standard. Typological information is essential where no illustrations are provided since, for example, the bottom unit of a shoe with a pointed toe will have been significantly longer than the foot of the wearer. Also, some specialists categorise nailed shoes according to the arrangements of the nails while others give no consideration to this typological distinction. Standardisation of terminology employed and presentation of data would be of great assistance to researchers working only from publications.

Bearing in mind the word limit of this thesis, it was not possible to explore certain subjects as fully as hoped, for example nailing patterns on footwear, or continental parallels. Further work considering material from northern Britain with that from further afield would be a great benefit to the study of roman leatherwork. Some of the footwear from Carlisle has been assessed and categorised by nailing patterns as developed by Padley (e.g.) but this is not standard across the board. A comprehensive study of the nailing patterns employed across northern Britain and beyond would be of great interest.

7.2 Key findings

One of the key questions tackled by this thesis was the supply of leather in Roman Britain. The leather needs of the Roman army were enormous, and it had been suggested that Britain’s ability to help meet this requirement would have been limited (Groenman-van Waateringe 2009, 211). There are two main reasons behind this assertion: Britain’s capacity

to provide hides, particularly goat, is believed to have been limited; and a lack of evidence for tanning facilities, suggesting that leather could not be produced within the province. A range of evidence might be considered to counter this assumption.

It is known from Strabo's *Geographica* that Britain exported hides to Rome during the Iron Age (IV, 5), indicating a surplus that could be capitalised upon. Moreover, agricultural practices intensified during the Roman period and in some parts of Britain osteological evidence attests an increase in the size of cattle (Albarella 2007, 396-97; Albarella *et al* 2008, 1841-42). Larger and more numerous cattle would result in larger and more numerous hides, meaning Britain would have been all the more able to provide Rome with a substantial number of hides. The number of goat hides that could have been produced in Roman Britain is unconfirmed. Goats have not been the subject of a great deal of archaeological research, and distinguishing sheep from goats (the latter producing a superior leather to the former, and so being a more useful producer or hides) from osteological evidence remains difficult. As a result, current analyses of Iron Age and Roman period animal populations almost certainly underestimate of the number of goats present (Halstead *et al* 2002). While the goat population did decline in the medieval period, it is likely that this was related to the increased importance of sheep, as wool-producing breeds superseded hair-sheep (Salvagno 2014, 101-02). Up until this time, it seems probable that goats played an important role in the economy of Britain. Britain's capacity to produce goat hides for leather is probably greater than has previously been assumed.

A lack of excavated examples of true (i.e. tanned) leather from prehistoric contexts suggests that tanning was not taking place in pre-Roman Britain, so those hides noted by Strabo must have been temporarily preserved for export, and tanned elsewhere in the empire. However, once significant Roman settlements had been established, it seems unlikely that Rome would have continued to export hides and import leather. Roman taxation is not well understood, but it clear that this practice would have incurred substantial – and ultimately avoidable – costs. Thus we can deduce that tanning is very likely to have taken place within Roman Britain. Although no Roman tanneries have been identified in Britain, very few are known across the empire and it is clear that we have, as yet, failed to established secure methodologies for confidently identifying these sites.

The trade and transportation of leather or leather goods was also considered in detail. Very little documentary evidence exists to help us understand whether leather was transported over wide distances, or whether the leather industry was fairly local in nature, with hides being tanned and turned into leather goods fairly close to their source. It has previously been asserted that all forts would have had leatherworkers, shoemakers in particular, onsite (van Driel-Murray 1995, 55). This is supported by documentary evidence from Vindolanda recording the employment of *sutores* (*Tab. Vindol. II*, 155). Leatherworking waste is recovered frequently, representing over 20% of the leather finds from northern Britain, and is present in the assemblages of over 20% of the sites that have produced leather. Over 70% of leatherworking waste is drawn from military contexts, and while this supports van Driel-Murray's assertion, it should be borne in mind that the data is skewed by the vast amount of material from within the footprint of the fort at Carlisle.

It is clear that leatherworking also took place in *vici*, with over 15% of leatherworking waste coming from civilian settlements. However, it is notable that none of the leatherworking waste identified within the study area was recovered from contexts within annexes. The exact function of these enclosed spaces associated with forts remains the subject of some debate (e.g. Bailey 1994), but they frequently display evidence for the presence of workshops and some believe them to have been industrial spaces. If the Roman military was self-sufficient in terms of production of leather goods, and footwear in particular, we might expect to find evidence of leatherworking in annexes. Further research into this question would be worthwhile.

Another of the key issues considered within this thesis was the potential to explore the demography of past populations through the analysis of footwear as an indicator of foot size, and so an indicator of the gender and/or age of the wearer. This is particularly central to the development of our understanding of the communities living within Roman military sites. It has long been accepted that officers might be accompanied in the provinces by their wives and children, but ordinary soldiers were officially forbidden from marrying, and forts were believed to have been almost entirely male spaces – soldiers' families were assumed to have lived in the *vici* outside forts. Artefact distribution analysis, including a consideration of 'male' and 'female artefacts, has been used to assess the likely use of space in forts (Allison

2014; Birley 2010; Lorant 2010), but has been met with significant criticism (e.g. Campbell 2010 re. Allison 2014). 'Sexing' small finds is notoriously difficult, and an element of bias is inevitable as interpretation is always coloured by current social mores. The analysis of artefacts that are closely linked to body size is considered to be a more reliable way of estimating the age and/or gender of the owner (van Driel-Murray 1995, 3-4). Roman shoes display little variation in style for age or gender, but their sizes are inextricably linked to the size of the foot of the wearer. Thus the rigorous examination of substantial assemblages of footwear can yield important information about the demographics of a community.

This methodology has been applied to the analysis of data from closely-dated contexts within the fort at Vindolanda, and used to assert that the wives and children of officers were not the only families living with the fort: ordinary soldiers might cohabit with their families too (van Driel-Murray 1993, 1995, 1997; Greene 2011). This interpretation has been queried (e.g. Bidwell 1991, 9; Hogdson 2014), in particular with regards to the use of space within forts and the implications for the garrisoning of Roman sites if families were to take up valuable space. However, significant numbers of shoes of women's and children's sizes from Bar Hill, an Antonine fort with no known civilian settlement, suggest that women and children represented a larger proportion of Roman military communities than has previously been assumed.

Examination of assemblages in Tullie House, Great North Museum and National Museums Scotland has yielded a significant amount of new data, from the simple assessment of unpublished material (various items from Carlisle; Haltonchesters) to the identification of previously unrecognised examples of leatherworking waste (Birrens, Rough Castle), reassessment of a misinterpreted stamp and identification of a previously unpublished inscription on leatherworking waste (both Rough Castle). Reassessment of antiquarian assemblages will be a priority for the future, as these hidden assemblages have great potential to add to our understanding of the leather industry and supply chain in Roman-period northern Britain.

7.3 Looking to the future

Assessment of footwear from Camelon has revealed a cut-off point between men's and women's sizes (Arkesteijn and van Driel Murray 2015) which differs from that previously suggested based on material from Vindolanda (e.g. Greene 2011). This highlights the need for continued study, and reassessment of assemblages not previously analysed in this manner, so that methodologies for associating shoe size with age/gender, and so exploring past populations, can be refined. The results of such work could be complemented by osteological research into average foot size from cemetery populations, as highlighted by Killgrove (2014). A combination and comparison of data from artefactual (footwear) and osteological (calcaneus length) evidence of foot size has great potential.

Reassessment of unpublished material languishing in museum stores, notably assemblages from Castlecary, Balmuildy and Newstead, has the potential to contribute a great deal to our understanding of Roman-period leather in northern Britain, and will be a priority for the future.

Bibliography

Abbreviations

AA	*Archaeologia Aeliana*
BAR	*British Archaeological Reports*
DES	*Discovery and Excavation in Scotland*
GAJ	*Glasgow Archaeological Journal*
JAS	*Journal of Archaeological Science*
JRA	*Journal of Roman Archaeology*
JRMES	*Journal of Roman Military Equipment Studies*
JRS	*Journal of Roman Studies*
PSAS	*Proceedings of the Society of Antiquaries of Scotland*
PSAN	*Proceedings of the Society of Antiquaries of Newcastle upon Tyne*
TCWAAS	*Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society*
TDGNHAS	*Transactions of the Dumfriesshire and Galloway Natural History and Antiquarian Society*
TLMAS	*Transactions of the London and Middlesex Archaeological Society*

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Site Reviews

Leather items recovered from bogs

Although the practice of depositing items (or people) in bogs and other watery places is characteristic of the Iron Age (Cunliffe 2005, 566-70), it is certainly not limited to this time period, as attested by the range of bog bodies dating from prehistory to post-medieval times (Cowie *et al* 2011, 10-13). That vegetable tanned leather was a Roman introduction to Britain has been suggested elsewhere, and the difficulty of ascertaining whether a supposed leather item found in a peatbog was vegetable tanned prior to its entry into the bog has also been outlined previously (see Chapter 1). As such, any 'leather' recovered from a bog must be dated typologically or scientifically – its being tanned cannot aid the dating process in itself. Typological dating has its limitations; there are, for example, typological similarities between prehistoric one-piece shoes and pampooties/rivelins, a traditional shoe worn throughout the post-medieval period in the rural Highlands and Islands of Scotland (Cowie *et al* 2011, 11). However, a handful of bog bodies have been found with associated footwear that appears to be typologically Roman e.g. Grewelthorpe Man, Yorkshire, and Amcotts Woman, Lincolnshire (Turner 1995), and a number of leather items that can be dated to the Roman period, some associated with human remains, have been recovered from bogs/marshland within the study area.

Callander

The Scottish History and Archaeology Department, NMS, obtained radiocarbon dates for four leather shoes within the museum's collections. Among these was a shoe recorded in a list of antiquities purchased for the Society of Antiquaries of Scotland: "Fine specimen of Ancient Celtic Shoe, curiously wrought in ornamental openwork, found six feet beneath the surface, near Callander, Perthshire" (Anon 1851-54, 9). Nothing further is known of the shoe's provenance. It is typologically comparable to van Driel-Murray's style 19, having tabs drawn together over the toes. However, the heel tab seems to have been an earlier fashion, corresponding with styles 11-13 (2001, 188). The tabbed toe is certainly in use by the third century (cf. van Driel-Murray 2001d, 355). This shoe is held at NMS and radiocarbon dating confirms a date of 1810+35 BP (120 cal BC-cal AD 330) (*DES* 2012).

Fig. 1: Unprovenanced shoe from Callander © National Museums of Scotland

Shoes from wetlands near Carlisle

The Society of Antiquaries of London's Catalogue of Drawings and Museum Objects includes an illustration of a shoe of Roman type, "Drawn from an original roman Sandal, found in a peat Moss near Carlisle, about fifty years agoe [sic]. July 23rd. 1765." This shoe can be likened to van Driel-Murray's style 19 (2001b, 188), with its tabbed toe. What looks to be the same shoe is depicted in Pennant (1774, Plate XXXV), captioned 'Antiquities at Netherby': "a species of shoe in all probability belonging to the natives of the island; and was found in a moor in Cumberland. It is formed of one piece of leather; and nicely adapted to the foot" (ibid., 269-70).

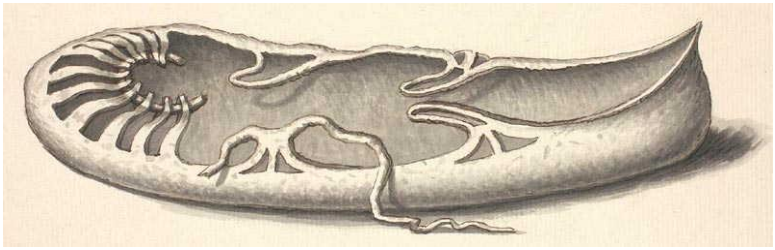

Fig. 2: Unprovenanced shoe from Carlisle area © Society of Antiquaries of London

Noted in *Britannia Romana* is "a Roman shoe or sandal" (Horsley 1733, xxi). A drawing was sent to Horsley by its owner, Mr Gilpin of Scaleby, but was not reproduced. This illustration may relate to two

Roman shoes that Gilpin showed to Stukeley when he visited Scaleby Castle, the shoes having been "found in the bog hereabouts" (Stukeley 1776). The shoe's location is not known.

Culloden shoe

NMS holds the record of a shoe apparently retrieved from the battlefield of Culloden (i.e. understood to have been recovered in 1746) and believed by its then owner to be a "Highlander's brogue" (T. Cowie, pers. comm.). However, this shoe appears Roman in style: the photo shows a shoe of one-piece T-seam construction with neatly tooled edges, tabs at the toes and openwork at the latchets. It is not dissimilar to the shoes from bogs near Callander and Carlisle (above). The shoe is privately owned and its location is not known.

Fig. 3: Unprovenanced shoe from Culloden © National Museums of Scotland

Lochar Moss shoes

Lochar Moss in Dumfriesshire has yielded three bog bodies over four centuries. In 1871, human remains were discovered (Lochar Moss 1) complete with shoes and the remains of clothing. One shoe was found to contain a toenail, and both it and the shoes were deemed to be female in size. The shoes are dubbed both boots and sandals within the same source, but the description is useful nonetheless: "...a kind of boot or sandal, formed out of a single piece of leather, and which had been fastened on the feet with thongs. The sandals had a seam in front and another at the heel, the stitching of which was neatly done. The size was under the ordinary length of a male's foot, and appeared more fitted for a female. The sandals had

apparently been little worn." (Cowie *et al* 2011, 37-39). Heel and toe seams appear together on some c*arbatinae* and eyelet boots (van Driel-Murray 2001d, 343; 366-67), although these options do little to elucidate the shoe/boot confusion; the bog body and its footwear are categorised as prehistoric or Romano-British (Cowie *et al* 2011, 12).

The shoes were later exhibited at a meeting of the Dumfries and Galloway Antiquarian and Historical Society, and are listed in the society's Letter Books 1, apparently erroneously, as coming from Lochmaben (Cowie *et al* 2011, 38). However, a different shoe was certainly discovered at Lochmaben (see below).

In 1789[1], a pair of shoes was discovered accidentally at Lochar Moss, of which one was recovered complete (the other "cut in pieces with the peat spade") and an illustration made (Riddell 1792, 243; Anon 1789, 482, Plate XL). While Wilson believes the shoe unlikely to be Roman (2003, 150), the illustration shows a shoe of typical Roman one-piece, T-seam construction. The location of the shoe is not known.

[1] This shoe is noted as having been found in 1709 in Wilson (2003), referencing Riddell 1787 (referenced here as Riddell 1792, as this manuscript was collated 1787-92). However, both Riddell (1792) and *Archaeologia* X (1792) give the date as 1789.

Fig. 4: Shoe from Lochar Moss © Society of Antiquaries of London

That both shoes were found together is suggestive of intentional deposition rather than accidental loss, and they may have been deposited by "former auxiliaries, possibly 'offering up' their Roman identity on return home following completion of their service" (Cowie *et al* 2011, 38-39).

Lochmaben shoe

Listed on futuremuseums.co.uk is a replica shoe, catalogued as Iron Age in date, from Lochmaben. The shoe was exhibited in Dr Thomas Boyle Grierson's museum in Thornhill (Black and Bissett 1894, 85). The shoe was apparently of one-piece construction with a seam at the heel and tabs at the toe, secured with a thong running through the tabs and across the foot. With its open sides, however, it is unlike known prehistoric comparanda (c.f. Groenman-van Waateringe 2001), and is not directly comparable to either Roman *carbatinae* or more modern pampooties/rivelins. It seems probable that the replica slightly misrepresents a standard Roman one-piece shoe of T-seam construction.

Hoards

Hoards of Roman coins were deposited in a wide range of vessels, containers and/or wrappings including ceramic pots/urns/jars, wooden boxes, arm purses, and bags or wrappings of cloth or leather. Over half of the 45 (at time of Hunter's writing) known hoards from Scotland and north of Hadrian's Wall are recorded as having no surviving container, so Hunter (2007b, 214) suggests that most hoards were probably deposited in cloth or leather bags: traces of cloth are occasionally noted in corrosion products, and sometimes the shape of the hoard is suggestive of deposition within a flexible pouch or purse (e.g. Chesterfield Hoard (Robertson 2000, 97)).

Related to Hunter's suggestion that many hoards may have been contained in leather/cloth pouches is recent research on Roman seal boxes. Wax seals were used in the Roman period to prove that a document or package had not been tampered with in transit; seal boxes were long believed to have been tied to closed stylus tablets in transit, protecting the wax seal from damage. However, the shape of many seal boxes suggests that they would not be suited to being attached to a flat surface and Andrews suggests that they were in fact used to seal pouches/bags containing documents or money, being either stitched or tied on. Adding weight to the argument, two coin hoards from Germany have been found in leather pouches with associated seal boxes (Andrews 2012, 1; 80-82).

Included in this section are hoards not directly associated with known Roman sites. At Housesteads, a leather purse is recorded from the same context as a coin hoard, and the two may have been associated (Brickstock and Casey 2009, 376). Traces of leather also survive in association with the Corbridge Hoard – see below for full site reviews for Housesteads and Corbridge. However, as noted previously, the deposition of hoards was by no means the preserve of the Romans, with hoards known from native sites such as Birnie and Traprain Law; leather survives with both hoards (below).

Birnie

Two coin hoards, deposited in leather pouches within pottery vessels, were discovered at Birnie in Morayshire, where a late Iron Age unenclosed settlement sits on a sheltered gravel terrace above the River Lossie. The hoards were discovered and excavated separately in 2000 and 2001, although they lay less than 10m apart (Hunter 2007a, 31).

The hoard discovered in 2000 was deposited in a leather drawstring pouch within an Iron Age pot; the hoard of 2001 was in an Iron Age pot, the coins split between two pouches of skin tied with twisted leather cord. These pouches had not been vegetable tanned. This difference is important, as it suggests that the coins of the 2000 hoard were in a Roman-made pouch, while the 2001 hoard made use of locally-(and the supposition is, native-) made pouches. Both hoards contain a little over 300 *denarii*, ranging from Neronian (AD 54-68) to mid-190s AD, putting their deposition at very late second/early third century AD (Holmes 2006). Although Morayshire remained beyond the grip of the Roman empire, the rich assemblage of Roman artefacts at Birnie attests the connections and relationships that existed between peoples across the borders of the empire (Hunter 2007a).

Castle Greg

Castle Greg fortlet, usually thought to be Flavian in date (Frere 1989, 271), lies close to West Calder in West Lothian. Its rampart and ditches are well preserved but little is known of the fortlet as it has not been excavated in modern times. Trenching in 1852 yielded much Roman material, and gave rise to a verbal account that forty years previously, "a "bull's hide" was got out of the well, filled with silver coins" (Wilson 1855, 59). However, Macdonald discounts the tale as an exaggeration of an earlier, similar story (1918, 221). If the hoard ever existed, its location is not known.

Possil Marsh

"A leather bag containing two hundred silver Roman coins" was apparently found in Possil Marsh, near Bishopriggs, Glasgow (Eyre-Todd 1911, 106). No further details are known (Robertson 2000, 428).

Thorngrafton

In 1835, during quarrying at a site previously worked in the Roman period, a worker found a bronze arm purse which has been reported both as tucked into a crevice (Clayton 1859, 271) and beneath stone-chippings (Bruce 1957, 141), although the earliest account (Gentleman's Magazine, December 1837, 637) does not provide an exact location. It contained a hoard of 63 Roman coins, including three of gold; "each of the gold coins was wrapped up in a separate piece of greenish leather or vellum, which was still quite

tough and strong" (*ibid*.). From the numismatic evidence, the hoard was deposited in the early Hadrianic period (Bruce 1957, 142). The wrapping is stored at Chesters Museum (Birley 1963, 12-13); the location of the coins is unknown (Robertson 2000, 27).

Traprain Law

The hillfort on Traprain Law is perhaps most famous for its 'Hacksilber' hoard of around 250 items, discovered almost a century ago during Curle's excavations of the site (Curle 1920). The settlement occupies a high volcanic intrusion 30km east of Edinburgh, with clear views on all sides and north to the sea. The prime location was first enclosed and intensively settled in the Bronze Age. Although perhaps abandoned through the Iron Age, the site was reoccupied in the Roman period. The complex and extensive defences enclosed an area of at least 16ha. The unparalleled collection of late Roman finds suggests that the site was a local seat of power during the Roman Iron Age, and points towards strong connections with Rome; however, the site's status had waned by the seventh century, if not before (Hunter 2013).

The site was excavated in 1914-15 and 1919-23 by Curle and Cree on behalf of the Society of Antiquaries of Scotland. Their work focussed largely on the western side of the hill, between the two main sets of ramparts (Hunter 2013, 4).

Excavations were taking place on the floor level of a building late in the day on Friday 12th May 1919 when a pit containing items of Roman silver was discovered in the south-west corner. By the time Curle arrived, on Tuesday afternoon, "bowls, cups, spoons and a miscellaneous collection of pieces of plate, tarnished and soiled, but obviously of silver, lay spread on the ground" (Curle 1920, 103). Much more remained *in situ* and was promptly excavated. The stratigraphy of the site was complex, however, it seems as though the hoard was associated with a yard complex – buildings clustered around a central open space. It is unclear whether the hoard was deposited during the buildings' occupation or on abandonment (Hunter 2013, 5-6). Some of the items, however, could not have been made before the fifth century, proving that by the time the objects were deposited, Scotland was well beyond the reach of the Roman empire (Painter 2013, 228-9).

Alexander Curle refers to the "barbaric treatment that [the hoard] had received at the hands of its last possessors" (A. O. Curle 1923, 5); the practice of cutting up objects for Hacksilber is now better understood, and is related to the idea of portable property. Examples are known from across Europe from the second to sixth centuries. The increased use of Hacksilber from the third century onwards is related to financial crises within the Roman empire that affected public confidence in coinage; gold and silver plate became an alternative means of exchange. Painter interprets some Hacksilber hoards as "bounties paid to tribal leaders and their followers on completion of their service" (2013, 229) in the Roman army; the Traprain Law hoard may be one such example. Recent analysis of crucibles confirm that silver-working was taking place onsite, suggesting silver plate was melted down for reuse, either for currency or by being turned into high-status objects such as the thick double-linked chain also found at Traprain Law but probably of post-Roman date (Hunter 2013, 7).

Of interest here is a short length of narrow leather strap fitted with 23 silver-gilt studs: 16 small domed studs set in pairs between seven larger lozenge-shaped studs which feature decorative niello inlays (A. O. Curle 1923, 84). Although its function is not clear, this ornamented strap is included in a small group of dress accessories found with the hoard, including a strap terminal, belt buckles, brooches and an earring (ibid., 84-91). This is the only example of leather decorated with silver studs within this study; its closest parallels here would be the chamfrons from Newstead (above) and Vindolanda (below). It is possible that the Traprain Law find is in fact related to horse-gear.

Leather recovered from Roman/Roman Iron Age sites

Balmuildy Fort

The 1.6ha fort just north of Glasgow, on the south bank of the River Kelvin, is one of only two stone built examples on the Antonine Wall (Leslie *et al* 2007). Balmuildy Fort was excavated in 1912-14, with the onset of the First World War bringing any plans for further work to an end. Miller's excavations explored both the fort and its annexe, and revealed, unusually, two bath-houses, one within the fort and the other within the annexe. His work demonstrated two clear phases of mid-second century occupation (Miller 1922; J. Curle 1923). The fort's interior has not been explored since. In 1999, limited excavations were carried out over Balmuildy's southern defences as a result of improvements being made to the A879 Balmore Road/Balmuildy Junction. This work yielded well-preserved organic material from the

waterlogged ditch to the west of the southern gate, producing a mid-second century date (Leslie *et al* 2007, 147).

The leather recovered during Miller's excavations comprises "a good deal" of leather including shoes and pieces of sheet leather: "much of it had no doubt formed part of the leather clothing of the soldier" and a scalloped-edged fragment was interpreted as part of a tunic, and it may benefit from reanalysis as very few leather garments are known. All was recovered from the west ditches at the western gateway during Miller's excavations (Miller 1922, 98). It is not clear if the leather was recovered from all three of the western ditches, or if it came from a specific area, if indeed the contents of the ditches varied to any great degree. Miller noted the dearth of shoe uppers in comparison to soles, but attributed this to the shoes' original form being "little more than a sole strapped to the foot" (ibid, p99); we know now that this imbalance may be due to a range of reasons including the use of other materials (textiles and/or non-tanned skin products) for the uppers (Rhodes 1980, 100-101). The Balmuildy assemblage is held at the Hunterian, with the accessions books recording 28 finds numbers relating to leather, representing almost 90 items/pieces. The Hunterian's online catalogue (www.huntsearch.gla.ac.uk) lists 35 separate leather finds, mostly parts of shoes.

Bar Hill Fort

An Antonine fort is located on the summit of Bar Hill, near Twechar in East Dunbartonshire. Bar Hill reaches 150m above sea level, permitting good views from the fort to the north, east and west. The remains comprise a 1.4ha fort built in c. AD 142, overlying an earlier fortlet or construction camp associated with the building of the Antonine Wall. The fortlet/camp may overlie a native site (ibid. 57-58). The fort has double V-shaped ditches around three sides, and a single ditch on its northern side, which lies within 30-40m of the Wall (Keppie 1985, 57-58; 73).

The entire site of the fort was excavated in 1902-05 by Macdonald and Park, using the popular 'wall-chasing' method of the time (1906; Robertson *et al* 1975). This strategy invariably leaves archaeological deposits *in situ*, and the site was excavated again in 1978-82 by Keppie, focussing on the bath house, *principia*, and examining the defences and part of the interior of the earlier fortlet/camp. The bath house and *principia* were consolidated and left open for public viewing (1985, 49). There is no definite evidence for an annexe or *vicus*, although limited excavations and chance finds to the south and east hint at their existence (Robertson *et al* 1975, 23).

560 items of leather were recovered, mostly from the fort's ditches and refuse pits, with just twelve small pieces of leather and two boots being recovered from the well, and one shoe from the ditches of the fortlet/camp (Macdonald and Park 1906, 133; 13). Macdonald and Park's publication dedicates only six pages to the hundreds of leather items recovered during their excavations, but the results of their work were published more fully by Robertson *et a*l (1975). This assemblage is housed in the Hunterian Museum. It is not noted whether the leather from the fort's ditches was recovered from any specific area, or if it was distributed across all of the ditches. It is also unfortunate that it is not known which of the shoes was recovered from the ditches of the fortlet/camp as opposed to the fort.

Nine refuse pits, Macdonald and Park's Hole Nos. 1-9, were excavated in 1902-05. Six of these (Nos. 4-9) were located in the *retentura* of the fort; one (No. 3) was found close to the *principia* in what was probably the *praetorium*, and the last two (Nos. 1 and 2) in the *praetentura*. The leather was recovered from Nos. 1, 2, 6, 8 and 9 (Macdonald and Park 1906, 61-62).

The leather assemblage comprises a wide range of artefacts including straps, a scalloped-edged fragment, part of a bag/satchel, shield coverings and 520 parts of footwear or complete shoes, ranging through children's and adults' sizes. One sole included an iron plate in the heel interpreted by Macdonald and Park as a support "to correct some slight lameness" (1906, 104). No iron parallels are known to the author, but there are a few examples of leather heel wedges (Mould 2009a, 485; Rhodes 1980, 103-05). Stamped on the sole of one shoe are the letters Q, O and A, within an incomplete inverted bulla shape placed somewhat off-centre towards the tread and outer edge (Robertson *et al* 1975, 65 and Fig. 21; RIB 2445.10). No leather is noted in the report on Keppie's excavations (1985) but four fragments of *calcei* are noted in the Hunterian's accessions books.

Bearsden Fort

The 1.68ha second century fort at Bearsden is located on a plateau above the Manse Burn, on land now developed and comprising a residential area in the north-west of Glasgow. The defences consist of one, two and three ditches to south, east and west respectively, and enclosed interior buildings mostly of timber, some of which were unusual form. Within an annexe, added the fort during its early years, are a bath house and latrine. The buildings were demolished and burnt on abandonment (Breeze forthcoming, 1; 288; 247-48).

The fort's location has been known since the late 17th century, but the first extensive excavations took place in 1973-82, in response to development of the site (Breeze forthcoming). In 2002, small-scale excavation was conducted within the annexe and across the fort's eastern rampart, ascertaining the alignment of the rampart (Duncan and Leslie 2003). Evaluation in 2008 confirmed that archaeological deposits were present only in the west and south area of the annexe (Hunter 2010). Analysis of the botanical remains from the latrine has yielded a wealth of information about the military diet (Knights *et al* 1983).

Seventeen pieces of leather were recovered during Breeze's excavations. Where noted, they all came from the fort's west ditches, among material dating to the fort's occupation (i.e. rather than its abandonment). Where identifiable, the fragments derived from footwear (Gallagher forthcoming, 244).

Birdoswald Fort

The Hadrian's Wall fort at Birdoswald sits on a high spur with the River Irthing to its west; on this side, the archaeology is suffering from the effects of erosion. The remains of the stone fort overlie a timber fort, which overlies an earlier polygonal enclosure. The polygonal enclosure is interpreted as a construction camp for the builders of the Turf Wall and turret. The fort is surrounded by extensive extramural settlement, which has seen limited investigation. A cremation cemetery lies to the far west, beyond the *vicus* (Wilmott *et al* 2009, 203-06).

Birdoswald has been excavated on a number of occasions over the last two centuries. Various fairly small-scale excavations were conducted in the 19th century (e.g. Norman 1860; Hodgson 1899; Haverfield 1897 and 1899), focussing on the fort's defences, the Turf Wall and the *Vallum*. From 1927-32, consecutive seasons of research explored the defences and *Vallum* further, identifying a polygonal enclosure to the south of the fort and confirming the *Vallum*'s short period of use; some of the central buildings were also excavated (Richmond 1929; Richmond *et al* 1930; Richmond 1931; Simpson and Richmond 1932, 1933, 1934).

Gillam conducted excavations that explored the main eastern gateway and towers on the eastern and western sides of the fort (1950). In 1987-92, excavations were undertaken under the auspices of Cumbria County Council and English Heritage, aiming to examine the relationship between the Turf Wall and the

fort, and establish the original layout of the fort (Wilmott 1997, 15). Further work took place the Centre for Archaeology: in 1996 in response to erosion; in 1997-98 in response to development; in 1999 in the western *vicus* for TV progamme Time Team; and in 2000 a supposed native hearth was excavated for the Housesteads Ware Project (Wilmott *et al* 2009, 206-09).

From excavations in 1897 came a well-worn, one-piece leather shoe, or *carbatina*, recovered from the fill the Turf Wall's ditch (Haverfield 1899, 183-4). Shoes and a short-sword scabbard were recovered from a rubbish spread to the south of the fort (Simpson and Richmond 1932, 141), and shoes from the east ditch in 1930 (Richmond 1931, 122). In 1931, pieces of sheet leather discovered in a ditch pre-dating the fort and *Vallum* were interpreted as "large fragments of a Roman soldier's calf-skin jerkin and trousers"(Simpson and Richmond 1932). These were later re-interpreted correctly as tentage, and the ditches identified as forming the polygonal enclosure (Simpson and Richmond 1933, 24; McIntyre and Richmond 1934) now interpreted as a construction camp (Wilmott *et al* 1997, 51). The enclosure dates to c. AD 122-126 (Hadrianic), and the leather was deposited during this period (Wilmott *et al* 2009, 388).

Almost 700 items of leather were recovered during excavations undertaken in the 1980s and 1990s. These can be categorised briefly as comprising 44% shoe components, 41% waste leather, 6% tentage and 9% scrap leather. 98% of this material was recovered from the ditch to the south of the western gate of the stone fort. 19% of the leather was recovered from second century deposits, and 79% from third and fourth century deposits. The waste leather was predominantly secondary waste indicative of shoemaking on a small scale, but included some primary waste indicating that whole hides were being received onsite. The range of styles and sizes of shoes represented in this assemblage was varied, and corresponded broadly with Carol van Driel-Murray's findings at Vindolanda, indicating a balanced population of men, women, youths and children/infants (Mould 1997, 327-28).

Leather recovered in 1996-2000 comprises a minimum of seven shoes, tentage, and some secondary waste indicative of shoemaking and perhaps the construction of tent panels (Mould 2009b). The remains of shoes and some waste material were recovered from the backfill of the *Vallum* and in the primary fill of the central ditch of the stone fort, representing both pre-fort and fort-period phases of activity. The shoes in the pre-Stone Fort ditch may date to the construction of the Stone Fort, having been disposed of by the construction team before they backfilled the old ditch, rather than being the waste of those actually using the pre-Stone Fort. The shoes that had previously been nailed were found to lack those nails, either because they had been intentionally removed for re-use, or because the shoes had been worn for so long

that none remained. This is noted on shoes from both Vindolanda and Hardknott also, and may relate to supply problems along Hadrian's Wall. The nine pieces of tentage are mostly discarded seam pieces, all of sheep/goatskin, coming from the same contexts as the shoes but some also from the same context as Simpson and Richmond's tentage of the 1930s (Wilmott *et al* 2009, 213; Mould 2009b, 380-81).

Birrens Fort

The outlier fort of Birrens, in Dumfries and Galloway, sits on a plateau above the Mein Water. Pottery evidence suggests that the site was first occupied by the Romans in the Flavian period, but it was not until the development of the Hadrianic frontier that a fort was built: of around 1.68ha, in AD 122-28. This fort was destroyed and abandoned, and later replaced with a slightly larger (1.97ha) fort during the Antonine period (Robertson 1975, 277-80).

The 2.1ha fort has been subject to a series of excavations, first being explored by Miller with the Society of Antiquaries of Scotland in 1895. Much stone had been robbed for wall-building prior to these first excavations (Christison 1896, 89), and stonework that may have come from Birrens was discovered a few miles away at the early monastic site of Hoddom, with yet more having been buried to raise a road at Hoddom Castle during the second world war (Maxwell-Irving 1987, 213). The Society's excavations ran over the course of almost eight months and explored both the defences and the interior, establishing at least two phases of use (Christison 1896). Birrens was excavated again in the 1936 and 1937 by Eric Birley (1938), using funds raised by the Dumfriesshire and Galloway Archaeological Society. Birley, having studied Macdonald and Barbour's (1897) work, was convinced that there must have been at least three phases of use. Birley's work in 1936 in fact identified up to five structural periods (Birley 1938, 283), and he returned with I. A. Richmond as co-director in 1937. Robertson excavated extensively at Birrens in 1962-67, establishing a Hadrianic date for the first fort on the site; this was replaced by a larger fort in the Antonine period with six ditches on the north side, one to east and west, and perhaps two on the southern side. This fort was abandoned in turn, and reoccupied and the interior radically altered in the mid second century (Robertson 1975, 277-87).

"Some shoe leather" was found in the well located in the bath-house, along with the remains of an oak ladder and some pottery (Christison 1896, 112). The stone-lined well was almost circular at the top and square at the bottom, and around 17 ft (5.18) deep (Smith 1975, 274). Following Christison's report (1896), a monograph was published which specifies "three soles of sandals of leather, studded with iron

nails" (Macdonald and Barbour 1897, 44). No leather was recovered in 1962-69, but Robertson's report details six leather soles and three further fragments (a heel piece, a tapering piece and a circular ?patch) from previous excavations (1975, 108). 11 items are stored at NMS, comprising six shoe soles (two partial), a heel stiffener, a circular patch, a tapering piece, a fragment of thin leather (perhaps tentage) and a bag containing a number of small fragments. These presumably represent the leather catalogued by Robertson, and an additional fragment of possible tentage. Fragments representing two nailed shoe soles, retrieved during Miller's excavations of 1895, are at Dumfries Museum. These are perhaps the remains of the three shoes noted by Macdonald and Barbour (1897, 44)

Bochastle

This Flavian fort near Callander is one of the so-called glen-blocker forts. It lies on low ground close to the River Leny, between the forts at Malling to the west and Dalginross to the east. Traces of its defences on the east and west sides are visible on the ground today, and a temporary camp is known to its west. The fort at Bochastle was first excavated in 1949 by Anderson, Taylor and Sommerville (1956), who assigned a Flavian date and provided evidence for two structural phases within the defences. More recently, the Roman Gask Project has conducted geophysical survey and excavation at the fort and camp, and analysis of aerial photographs has also contributed to what is known of this site. Little excavation has been carried out within the fort's interior. The defences comprise a double ditch and rampart. The fort was previously believed to be around 1.92ha in size, but geophysical survey has proved its area to be around 2.2ha internally - 3.4ha including the defences (Woolliscroft and Hoffman (undated)).

A few scraps of leather were noted during excavations in 1949; these were recovered from a deposit of burnt clay that overlay an oven behind the west rampart near the south-west corner of the fort (Anderson *et al* 1956, 53). These are not listed the finds catalogue, but the Hunterian's accessions book lists a piece of leather shoe sole.

Bothwellhaugh

Bothwellhaugh Fort, near Motherwell, Lanarkshire, is Antonine in date and 1.65ha in size. It sits high on a plateau above the Clyde and the South Calder Water, on the line of the main Roman road between Carlisle and the Clyde (Keppie 1981, 46). It was first excavated in 1938-39 by Davidson (1952), whose

work focussed mostly on the defences and established two phases of use. The fort was excavated again in 1967-68 by Maxwell (1975), who was able to gain a more accurate idea of the layout of the fort as a whole. The fort is not quite rectilinear due to the constraints of the topography. Close to the fort is a bath-house, which Maxwell also put some trenches across in 1973. It was excavated extensively in 1975-76 (Keppie 1981) before being dismantled and rebuilt on higher ground.

No leather was noted by either Davidson (1952) or Maxwell (1975). However, the Hunterian holds a piece of shoe (GLAHM F.1981.39) listed as coming from the fort ditch.

Burgh-by-Sands

There are in fact three features interpreted as Roman forts: Burgh-by-Sands I, II and III. The exact nature of the Roman remains at Burgh-by-Sands is unclear due to a lack of excavation and detailed publication (for comprehensive summaries of previous work: Symonds and Mason 2009, 95-96; Breeze and Woolliscroft 2009, 4).

Excavations were undertaken in the presumed *vicus* by the late Barri Jones in 1980 and 1982. The remains of up to 17 buildings of timber or stone were revealed, dating to the second and third centuries, with strong evidence for metal-working in the third century. Within a possible yard area, a context interpreted as rubbish yielded part of a leather shoe sole and numerous iron hobnails. It was tentatively suggested that these finds may hint at possible shoemaking in the vicinity (Breeze and Woolliscroft 2009, 31-35) but the lack of any actual secondary waste leather or proxy evidence does not support this interpretation.

Camelon

The Roman features at Camelon make up an extensive, multi-phase (Antonine and Flavian) military complex of numerous temporary camps and two large (4ha and 3.2ha) forts, overlying an Iron Age homestead. The site was strategically located at the lowest crossing-point of the River Carron (Breeze *et al* 1976, 74-5).

Excavations were conducted in 1899-1900 by the Society of Antiquaries of Scotland, in advance of industrial development affecting the southern annexe. The excavators were also granted permission to investigate the northern area, although it was not threatened by the building works, but due to the restrictions imposed by the development work, produced only a basic plan of the 'south camp' with its multiple ditches on the south and west sides, and the outline of a few buildings either side of the railway cutting through the site from west to east. Exploration of the 'north camp' was more comprehensive (Buchanan 1901). Quarrying work had obliterated much of the northern annexe by the early 1960s, and excavations were conducted in 1961-63 by the then Ministry of Public Two cist burials and a probable grave have been excavated at the site (Breeze *et al* 1976). Excavations took place at Camelon from 1975-79, again in response to development. Trench placement was largely determined by modern buildings, but this work allowed a more detailed examination of the site's chronology where previously it was assumed to represent a single period (Maxfield 1979; forthcoming). Most recently, excavations took place in 2011, examining parts of the Antonine fort as well as evidence related to the earlier Flavian occupation (Cook forthcoming). The nature of the extramural remains at Camelon remains uncertain although an element of industry is certain to the south, and land to the east seems to have been used for agricultural purposes (M. Cook, pers. comm.).

During excavations in 1975-79, the remains of at least five shoes, including one of child's size, were recovered from the lower fill of a ditch of Flavian date (Thornton forthcoming). The most recent phase of works at Camelon has yielded the largest assemblage of Roman leather to have been found in Scotland in over a century. The assemblage of 78 items of footwear (including four pairs) and around forty non-shoe finds, mostly very fragmentary but including shoemaking waste, binding strips and a substantial piece of possible tentage. All of the leather was recovered from slots across what have preliminarily been interpreted as the southern ditches of the southern annexe. The shoes are currently being assessed and written up by Carol van Driel-Murray and the full excavation report is in preparation, but an interim report on the footwear has yielded a great deal about demography and footwear fashions at the site (Arkesteijn and van Driel-Murray 2015).

Cappuck

The 0.53ha fort at Cappuck, near Jedburgh, has been excavated on three occasions: in 1886 by Walter Laidlaw (Laidlaw 1894); by Stevenson and Miller in 1911-12 (Stevenson and Miller 1912); and most

recently by I. A. Richmond in 1949 (Richmond 1953). The north-eastern corner of the fort has suffered badly from erosion caused by the Oxnam Water, and there is little visible on the ground today.

Laidlaw's work confirmed the existence of Roman buildings and granary, but neither the excavation nor reporting was particularly comprehensive. Stevenson and Miller "felt that a more systematic exploration of the site was called for", and their work expanded greatly on Laidlaw's, investigating the interior as well as the defences. They were able to ascertain a more complete plan of the fort as a whole, establishing the existence of a clay rampart encircling the site, and a double ditch around the north, west and south sides, with the double ditch flanked by further interior and exterior ditches on the eastern side, through which was a causeway to the fort's only entrance. They also identified a bath-house, and ovens in the south-western corner (Stevenson and Miller 1912, 447; 454-57; 462-64). Richmond's work was commissioned following the examination of aerial photographs showing not two but four ditches on the east, south and west sides of the fort (Richmond 1953, 138-39). A single trench was excavated over the southern defences, revealing more clearly the multi-phased nature of the site, including evidence of a pre-Roman palisade.

The only leather known from Cappuck are some fragments of shoe leather including a complete sole (Stevenson and Miller 1912, 476). However, the leather was not fully described or illustrated in the publication and its context was not recorded in the publication. Its whereabouts are unknown.

Carlisle

The Roman remains at Carlisle are extensive and complex, and for clarity are best separated into their separate sites as defined by modern excavations, each with their own different depositional stories. The fort at Stanwix, which lies within the boundaries of modern Carlisle, is considered separately (below).

Modern-day Carlisle occupies the site of *Luguvalium*, the most north-westerly town in the Roman empire and third century *civitas* centre – the principal town of a distinct people (Mattingly 2007, 261). It was strategically located at an important crossroads in the Roman road network (Zant 2009a, 1). The fort at Carlisle sat on a low bluff that had previously been farmed (Howard-Davies 2009, 483-484); its first incarnation was constructed of timber and turf in AD 72-73, as the Roman army pushed northwards through Britain. The fort was massively modified in both the 80s and 90s before being demolished in AD

103-105. Construction of a second timber fort began in AD 105; this fort was in turn demolished in the mid-second century. Rebuilding began again on the same site in the early third century – this time in stone, although the exact nature of this new development is not clear. The site was occupied until the end of the Roman period, certainly into the fifth century, although the fort space may have come to function as a market area by the late fourth century, and much of the stone fort was demolished in the early fifth century or later. Extending south-east from the fort is a large *vicus*, the earliest phases of which date to the 70s AD i.e. the first few years of the Romans' arrival (McCarthy 2002, 69). The *vicus* was occupied throughout the Roman period, but if it was occupied beyond, into the fifth century, it appears to have been greatly diminished. A possible annexe to the south of the fort appears to have been absorbed into the expanding *vicus* in the Hadrianic or Antonine period. There is slight evidence for early medieval occupation of the site between the abandonment of the fort and the eleventh/twelfth century (Zant 2009a, 9; 29-30; 466-67).

A number of significant excavations have resulted from development in Carlisle since the 1970s, and they have provided massive amounts of information about life in Roman (and medieval) Carlisle. Furthermore, widespread waterlogging with the historic core of the city (Zant *et al* 2013) has permitted the preservation of much leather, and the site's urban nature permits great time-depth within the stratigraphy. A rough total from the excavations outlined below brings the number of known items and fragments to at least 2000. Many excavations across Carlisle have encountered Roman material. For the sake of brevity, only excavations yielding Roman leather have been included below.

Abbey Street 1990

Excavations were undertaken in 1989-90 at the site of Carlisle's Tullie House. Of particular interest here is the excavation in 1990 of a lift shaft: 2m of deposits beneath the then-basement floor level were removed. The trench cut through a section of a ditch that was probably part of an annexe associated with the earliest Flavian fort (Caruana *et al* 1992, 45), although the small area excavated makes the features difficult to interpret with confidence. A wealth of organic material was preserved in the ditch including a wooden ?cage and a good deal of leather (45 small finds numbers allocated). The majority of the leather was tentage but the assemblage also included the remains of a saddle cover, parts of three nailed shoes, shoemaking off-cuts, a shield cover, and an unparalleled drum-shaped object (Winterbottom 1992). The contents of the ditch were most likely deposited in AD 84 or 85 (Caruana *et al* 1992, 104).

Annetwell Street

The exact location of the fort was not clear until excavations at Annetwell Street (1973-90) revealed its northern rampart (Charlesworth 1980). The results of this work are not fully published but a shoe sole and "quantities of leather" are mentioned (Goodburn 1976, 311). Snippets of information can be garnered from the publication on work in the Southern Lanes: 122 shoes and 460 stitched leather objects are noted (Winterbottom 2010a, 301), and offcuts are noted but the quantity is not given (Winterbottom 2010b, 293). Three inscribed pieces are noted (RIB 2445.3, 2445.18 and 2445.36).

Blackfriars Street

The development of a department store car park saw excavations take place in 1977-9 at Blackfriars Street, within the Roman *vicus*. A range of structures dating from the Flavian period through to late fourth/fifth century were excavated, with a break in occupation noted in the mid/late second century. Medieval and modern interference had disturbed the Roman remains in some areas but they are interpreted as domestic buildings. A few pieces of leather were recovered: a left insole 230mm in length and some off-cuts/scraps. These were in a late first century pit which was not fully excavated (McCarthy 1990, 158).

The Lanes

Over thirty small excavations took place in The Lanes, in the eastern area of the *vicus,* in 1978-82. The area was split in two for publication, and only the Southern Lanes has been comprehensively published thus far (McCarthy 2000; Zant 2010) although wider information can be gleaned from various overview publications (McCarthy *et al* 1982; McCarthy 1984 and 2000). A range of timber buildings were excavated, and the northern and southern areas were found to have different functions, initially at least – "the northern end being set aside for official use, and the southern end for a mixture of farming and craft-working" – although during the Antonine period this distinction becomes less pronounced (McCarthy 2000, 15).

From the Southern Lanes, 104 shoes and/or parts were recovered (Padley 2010, as well as 63 pieces of stitched sheet leather. 343 offcuts from shoemaking, along with an iron last and an antler anvil, indicate that shoemaking was among the range of crafts undertaken in this part of Roman Carlisle (Padley and Winterbottom 2010; Padley 2000, 111-112).

The results of work in the Northern Lanes are not yet published. However, information on the 166 shoes and shoe parts was kindly provided by Chris Howard-Davies of Oxford Archaeology North. Given the area of the excavations, the amount of footwear recovered is not large (Padley forthcoming); a similar situation is noted in the Southern Lanes, where the leather assemblage is dominated by leatherworking waste. "A large quantity" of shoes were found, along with a skeleton, in a rubbish-filled well associated with minor ancillary buildings (McCarthy, 1984, 70); of 88 late Roman period shoes from the Northern Lanes, "most" were from this well (Padley forthcoming) although none were directly associated with the individual in question (C. Howard-Davies, pers. comm.).

Castle Street

Excavations were undertaken in 1981-2 in response to plans to demolish buildings at 32-40 Castle Street. The development site was located to the south of Carlisle fort, within the *vicus*, although the structures relating to Periods 2-6 are "almost certainly closely related to the fortunes of the adjacent Roman fort… and may lie within an annexe" (McCarthy 1991b, 185). Sixteen successive periods of occupation were identified, of which Periods 2-10 represent Roman activity (McCarthy 1991a, 1-5). Waterlogging throughout Periods 2-6 in particular preserved a good deal of organic material, including around 600 leather finds spanning Periods 2-8 i.e. early AD 70s to mid/late second century AD (McCarthy 1991a, 53). The leather is categorised as shoes, sheet leather and waste from leatherworking (details below). The proportions of each of these categories was analysed and the number of shoes represented increases over time, while the amount of sheet leather diminishes (Winterbottom 1991a, 245), in line with the site shifting from military to non-military in nature.

172 shoes or shoe pieces were recovered. The majority (126) were nailed and 25 were of one-piece T-seam construction. As is often the case, most of shoes survived only partially so it was rarely possible to ascertain the shoe's original size; where sizing was possible, a range of sizes from children's through to adult males' were represented (McCarthy 1991b).

The 270 pieces of sheet leather comprised mostly tentage (around 80%) as well as shield covers, and also some horse gear including a partial chamfron lining. An unusual object was a decorated panel interpreted as an item of dress - perhaps a shoulder panel forming part of a composite leather/textile garment. A small pouch may have been for carrying writing tablets. Two triangular pieces were unidentifiable (Winterbottom 1991a).

Much of the 144 pieces of leatherworking waste was positively identified as shoemaking waste (Winterbottom 1991b) using van Driel-Murray's three-part categorisation (1985), suggesting that shoemaking on an industrial scale was taking place.

Leather tentage from 5-11 Castle Street is also noted in the Museum records of 1965 (Charlesworth 1978, 130).

Millennium Excavations 1998-2001

Excavations were undertaken in 1998-2001 at five different locations within the footprint of the fort as part of the Gateway City (Millennium) Project, "a heritage and leisure-related development focused on the area around the medieval castle at the northern end of the modern city centre" (Zant 2009a, 27).

The total number of leather finds comes to over 2,700. Leather was recovered from contexts relating to Periods 3A-6, spanning most of the lifetime of the forts at Carlisle, from the first to third centuries AD, with the highest concentrations of sheet leather dating to Periods 3B, 3C and 4B i.e. late first and early second centuries AD (Winterbottom 2009, 817). Some residual first-third century shoes were recovered from ditches of fourth and fifth century date (Mould 2009c, 831-832).

The leather from the Millennium Project is divided into stitched sheet leather (comprising horse gear, tentage, bags/pouches, shield covers etc) and shoes. Of the 586 items of stitched sheet leather, around 60% was tentage, 14% horse gear and 6% "shield covers, bags, and items judged likely to come from an individual soldier's equipment" (Winterbottom 2009, 817); the remaining 20% is uncategorised. Most was made of sheep/goat skin. The sheet leather was recovered from a variety of contexts: Building 4654 (Period 3A) is interpreted as a shoemakers' workshop, and part of what may be a wooden saddle tree was

discovered in the adjacent building. A great deal of discarded leather, some showing rudimentary attempts at repair, was associated with barrack buildings (Periods 3A-3B). A shallow pit in Building 4657 (Period 3C) yielded a range of objects discarded before the building was abandoned. A concentration of five of the seven shield covers may indicate the location of an armour/weapons store, and some fragments of leather were recovered in association with armour (cf. Carpow, below). There was no evidence for the manufacture of sheet leather items onsite; only of non-specialised repair showing varying degrees of skill. Scraps of stitched sheet leather in the possible workshop suggest that sheet leather was reused in shoemaking once its primary function was exhausted, and a number of sheets have had sections removed for re-use elsewhere (Winterbottom 2009, 818-21). Three pieces bore tanner's/supplier's stamps (Shotter 2009, 831), one of which ('SDV') also appears on a piece of tentage from Newstead (below), suggesting that both forts were part of the same supply network.

At least 69 different shoes, and perhaps as many as 97, were recovered, of which at least 65 were nailed. Most of the footwear showed heavy signs of wear and there was some indication of repairs. A range of styles were represented and, as at Castle Street, a minority (four) were of one-piece, T-seam construction. A wooden shoe sole for use in the bath-house was also recovered, and a possible leather toe-strap. A range of sizes was represented but shoes were predominantly of adult male size; no shoes suitable for small children were present. The shoes from the late first-early second century deposits were predominantly military in style, with the second century shoes being worn by both the military and civilians (Mould 2009c, 832-40).

Other finds from Carlisle

Devonshire Walk

"A large quantity of leather" associated with second century waste disposal from the fort was recovered at Devonshire Walk in 1987 (Frere *et al* 1988, 438).

English Street

Leather is noted from English Street "64.37m north of Citadel Row" in the Museum records of 1955 (Charlesworth 1978, 131).

Scotch Street

Leather is noted from Vasey's premises in the Museum records of 1959 (44.1959) (Charlesworth 1978, 133).

Carpow

The legionary fortress of Carpow sits in open farmland on the southern side of the River Tay, just east of its junction with the River Earn, Perthshire. The Roman nature of the site had been suspected since the 18th century but formal excavations did not take place until the 1960s: Birley revealed and investigated much of the interior including the *principia* and *praetorium*, and also put some trenches across the defences (Birley 1965). Further work took place under Leach and Wilkes across the 1960s and 1970s which narrowed down the fortress's use to a single phase of Antonine/Severan occupation (between AD 180 and AD 220) (Dore and Wilkes 1999, 481).

The only leather recovered from Carpow is associated with fragments of scale armour (*lorica*) discovered in 1979. The armour was recovered from a shallow pit within the *praetentura* and is interpreted as having been damaged and awaiting repair, suggesting that it was not considered worth retaining on abandonment of the fortress. Leather (? goat/sheep) was used along the edges, to give a smooth finish, and for the laces (?calf) that fastened front to back when worn (Coulston 1999, 561; 563). The armour deteriorated greatly following excavation; it is now extremely fragile, and the leather edging is detached from the scales and backing. It is stored at the McManus, Dundee.

Carrawburgh

The (1.52ha) fort of Carrawburgh lies on a prominent platform near the head of Newbrough Burn, attached to the rear of Hadrian's Wall in Northumberland. The fort is somewhat overshadowed by the

fame of the religious sites nearby: a Mithraeum lies around 40m to its south, included here, and Coventina's Well (below) 75m to its west. The fort's interior has seen little exploration. Antiquarian reports suggest the presence of a cemetery around 100m to the east of the fort, and a possible funerary building is also known (although this may be part of a *vicus*). A regimental bathhouse lies to the west of the fort. Clayton conducted excavations in 1873 at the bath house, confirming its nature and layout (Bruce 1874). Excavations were undertaken at the fort to ascertain the relationship between the fort and the *Vallum* in 1896 (Haverfield 1897), but this point was not clarified until Birley's excavations of 1934, which confirmed that the *Vallum* had been carefully filled and the fort built on top (Birley 1961, 176). In 1964, excavations were conducted north of the fort in advance of the creation of a new visitors' car park, which revealed the possible *vicus* or funerary building (Charlesworth 1967). Excavations took place within the fort itself in 1967-69. Trial trenching in the *praetentura* identified two barrack blocks, and two seasons of work on the *principia* revealed that numerous repairs/modifications took place in the late third/fourth century (Breeze 1972). The Mithraeum was excavated in 1949, and was found to have been built in the early third century and used until the early fourth century (Richmond and Gillam 1951). In 1977, a drainage trench was excavated southwards from the Mithraeum, revealing a few finds and a flagged road/path leading to a building platform (Northumberland HER 7879).

From excavations on the *Vallum* in 1896 came "sewed leather (now in the Chesters museum)" (Haverfield 1897, 417). During the drainage works in 1977, "parts of two shoes and other pieces of leather" were recovered (HER 7989), but conservation was not successful (A. Keith Elliott at Northumberland HER, pers. comm.). The Great North Museum holds one piece of stitched sheet leather, too fragile for examination, and unidentifiable fragments of brittle leather. It is not clear during which excavations these were recovered.

Carvoran

The 1.65ha fort at Carvoran sits just south of Hadrian's Wall, close to the junction of the Stanegate and the Maiden Way. Following agricultural activity and stone robbing, the site appears today as a turf-covered platform. The interior of the site has seen little excavation but geophysical survey has indicates the layout of the barracks and a possible *vicus* running alongside the Stanegate, to the south/southeast of the fort. Trial trenching across the defences has yielded early second century pottery. Burials are known to the east of the fort (Birley, A., 2009).

A single leather shoe was recovered from the waterlogged innermost eastern fort ditch (A. Birley, pers. comm.).

Castlecary

The Antonine Wall fort at Castlecary, Falkirk, sits at the end of a low ridge close to the Bonny Water. The site was damaged by the construction of a railway line in the 19th century, which bisects the fort from west to east, before being excavated in 1902 (Christison 1903). The 1.55ha fort is protected on three sides by a double ditch and rampart, and on the north by the Antonine Wall (Buchanan 1903, 286); numerous trenches were placed across the defences, but the interior buildings are less well understood.

A deep (7.3m) pit was discovered close to one of the central buildings; within the fill of this and the eastern ditch were the remains of an unspecified number of leather shoes. A range of sizes are represented, from adult male (the largest being 273mm) to those interpreted by Anderson as children's shoes, although the smallest complete sole described is 222mm long (Anderson 1903, 341-342), placing it in Greene's female/adolescent male category.

Most of the leather from Castlecary is housed at NMS, comprising 119 numbered items or collections of items; three more pieces are held at the Hunterian. Catriona Martin's unpublished undergraduate thesis (1983) catalogues the material, indicating that it comprises around 70% footwear and 6% tentage, the remainder being miscellaneous or unidentified.

Chesters

Chesters fort sits astride the line of Hadrian's Wall on the west bank of the River Tyne, near Chollerford, Northumberland. Close to the fort are the remains of a Roman bridge that crossed the river. Since the 19th century its remains have been managed as a visitor attraction with associated museum.

Comprehensive excavations over a period of a hundred years have left little in doubt as to Chesters' layout. It was examined first by the landowner, John Clayton, who focussed on the eastern gateway

(1876). The southern gateway was explored in 1879 (Bruce 1880b) and later the bath-house (Holmes 1887; Bruce 1889). The relationship of the fort, the Wall and the *Vallum* has been tested more than once (Haverfield 1901, 1902; Simpson 1921-1922), and in 1945, Simpson and Richmond showed that the fort overlay the course of the Wall and the remains of a turret (Anon. 1946, 274). In 1960, the south-westwern part of the *praetorium* was explored, revealing three phases of use (Harper 1961). In 1990-91, excavations were conducted by Tyne and Wear Museums for English Heritage in response to riverine erosion that had exposed masonry associated with the western side of the bridge (Bidwell 1999, 119-20). Aerial photography and geophysical survey confirm the existence of an associated *vicus* (Mason 2009, 77). The fort was in use from the Hadrianic period to the late 4th century, with several phases of re-building taking place.

During excavations in 1900, a narrow trench was placed just north of the north-east corner of the *principia*, across the extrapolated line of the *Vallum* that runs along the southern side of the Wall. The ditch contained organic material including leather, perhaps a bag and strap (Haverfield 1901, 87; 1902, 16). His excavations showed that the ditch pre-dates the current fort, and was filled prior to its construction (Haverfield 1902, 15-17). Budge, in his catalogue of Chesters Museum, records the finding of the bag, but there is no mention of a strap and he does not note the bag's location within the museum; he also lists three fragments of leather, perhaps shoe soles, believed to be from Chesters (Budge 1907, 92; 370). Also noted within the museum collection is a "light shoe" (Collingwood 1926, 42) but its provenance is not clear. A rubbish deposit including shoes was revealed during excavations at the bridge (Bidwell 1999, 119). Corbridge Museum holds five items known to be from Chesters and a further 17 believed to be from Chesters.

Corbridge

Roman Corbridge has been investigated extensively since the 19th century, and the central portion of the site is open to the public as a visitor attraction with an associated museum. The fort and its associated *vicus* lie on the north bank of the Tyne, at the junction of Dere Street and the Stanegate, 4km south of Hadrian's Wall (Bishop 2009, 22). Corbridge was, with Carlisle, one of the main urban centres along the Hadrian's Wall frontier (Hodgson 2009a, 3).The fort's occupation spanned the period c. AD 86 to AD 163 (Bishop and Dore 1989, 128). Three successive turf and timber forts of various sizes were finally replaced with a fort comprising at least some stone components in c. AD 139.

Considering the extent of the excavations at Corbridge, its leather assemblage is not large, perhaps because the underlying geology of sand and gravel (Bishop and Dore 1989, 7) ensures the site is well-drained. “Some pieces of leather”, assumed to be tentage, were recovered from one of seven rubbish pits excavated in 1907 (Forster 1908, 245) and in 1910 more were recovered from the inner ditch on the eastern side of the fort (Forster and Knowles 1911, 167; Richmond and Gillam 1952, 264). This leather was lost by the time Richmond and Gillam were writing in 1952.

From excavations in the second half of the twentieth century came two fragments of leather, both from Site 44, within the fort itself. Site 44 lies immediately to the east of the remains of three temples and to the south of the Stanegate, and features a circular stone structure with associated paved stone surface. The remains encountered in Site 44 are not well understood but the contexts from which the leather was recovered date to the post-fort phase i.e. towards the end of the second century AD (Bishop and Dore 1989, 110-115; 125; 139; 218).

Corbridge Museum holds the leather catalogued in Bishop and Dore (1989) as well as at least 32 further catalogued finds, some comprising multiple items. 20 of these catalogue numbers represent leather associated with the Corbridge hoard (below). The remainder comprises mostly parts of shoes. In 2014, four boxes of leather from Corbridge were identified at Durham University Museum and are now at Corbridge Museum (F. McIntosh, pers. comm.).

Also stored at Corbridge Museum is the Corbridge Hoard, including the leather components of the leather-covered wooden chest. The chest was discovered during a student training dig in 1964, while the Phase I *principia* was being investigated. It was hidden beneath the floorboards in the corner of one of the earliest buildings on the site, possibly a hospital or workshop. The hoard was discovered in Phase I deposits, but was most likely placed there during Phase II or perhaps III (Allason-Jones and Bishop 1988, 5-6) e.g. between AD 122 and 138. Very little of the chest itself survives; that it was covered in leather is known only from traces adhering to the iron elements of the chest, and as such this find falls beyond the confines of this study. However, it is worth mentioning here as it illustrates the wide range of uses for leather, despite the survival of leather in archaeological contexts being generally limited to a fairly narrow range of artefact categories. The leather is stored at Corbridge Museum.

Coventina's Well

Situated close to Carrawburgh fort is Coventina's Well. Excavations were conducted here in 1876 by the landowner and local antiquarian, John Clayton, after the accidental discovery of Roman stonework at the site of a natural spring. The well was broadly square in plan, around 2.5m by 2.2m, and extending down to the natural gravel 2.2m below the ground level. The well lay within a rectangular enclosure 12.2m by 11.6m internally, which is interpreted as a shrine or temple. The structure is believed to have been dedicated to Coventina (a nymph, or goddess of wells and springs), as various spellings of this name were inscribed on the carved stones recovered from the well (Allason-Jones and McKay 1985, 2-3). The spring supplied water for the fort at Carrawburgh, and the construction of the shrine and deposition of items (see below) is interpreted as demonstrating a desire to gratify Coventina (Mattingly 2007, 215), perhaps for fear the spring should fail.

The well contained a mass of material including coins, carved stone altars, bones (animal and human), pottery, glass, bronze, lead, wood, jet, shale and horn as well as leather shoe soles. Some objects were placed in carefully, others were already broken when deposited, and the contents can be seen as a mixture of votive deposits, items hidden in the cistern for protection from desecration, and potentially rubbish thrown over the wall, although it is not possible to estimate the proportions of one to the other. Use of the temple peaked during the late second and early third centuries, and the structure was demolished in the late fourth century (Allason-Jones and McKay 1985, 8-9;12).

"Portions of leather shoes" are listed in Budge's catalogue of the Roman finds in Chesters Museum (1907, 392). The surviving material comprises four shoe soles ranging in length from 170mm (the smallest example being incomplete) to 230mm. Their deposition in the well could be interpreted as a votive deposit, "a request to Coventina to cure some malady of the foot" (Allason-Jones and McKay 1985, 37).

Cramond

The fort at Cramond is situated at the mouth of the River Almond, on the southern shore of the Firth of Forth, on the north-western fringes of Edinburgh. It is the central fort of a line of three (together with Carriden and Inveresk) that extend beyond the eastern end of the Antonine Wall, controlling movement along the estuary (Holmes 2003, 1). The site comprises a 2.43ha fort with large defended annexe to the east, an industrial area to the south-east and a bath house to the north. The fort has long been supposed to have been located so as to protect a harbour/port in the Roman period, although this is as yet unproven. The site of the fort now lies under housing, woodland, a church and its manse, with Cramond Kirk lying

almost in the centre of the fort. The Cramond lioness, discovered in 1997 (see below), has become an iconic symbol of the area's Roman past.

The presence of Roman remains at Cramond had long been suspected, with reports of Roman masonry, coins and other artefacts beginning to appear in the 18th century (Wood 1794, 3-12) before the first formal excavations took place in the 1954-66. The fort's rampart, gateways, roads and parts of the internal layout were revealed, and an extramural settlement identified to its east. The fort was constructed of stone in c. AD 140, and at least three phases of occupation were identified, including a period of abandonment from 160s AD until the early third century, and possible non-military re-use of the fort in the fourth century (Rae and Rae 1974, 163; Holmes 2003, 147-51). The remains of a bath house were accidentally discovered to the north of the fort in 1975, and excavated in 1976, showing major reconstruction in the late second century before the bath house fell out of use in the third century. Excavations in 1977-78 identified ard-marks indicative of pre-Roman cultivation on the site, and double ditches were identified beyond the rampart to the east of the fort. An industrial complex was also explored to the south-east of the fort, yielding evidence interpreted as representing a range of crafts including metalworking, carpentry, shoe-making (but see below) and leather-working. The complex was destroyed at the end of the Severan occupation phase (Holmes 2003, 2-9; 12-27; 151-52). Excavations at the Kirk Hall in 1998 and 2001 identified a possible third defensive ditch at the north-eastern corner of the fort, associated with the encroachment of the extramural settlement onto the fort's defences in the Severan period, during which time the site changed in nature to become a supply base (Masser 2006, 17). Excavations at the site of Cramond Campus in 2000-01 revealed two sections of Roman road and the defences of the annexe to the east of the fort (DES 2001). Work in 2008 investigated two of the fort's barrack blocks, the granary and the eastern gate and entrance previously excavated by the Raes (Cook and Clements 2008); *in situ* deposits were encountered, highlighting the potential worth of re-examining sites excavated only decades before. An archive of material gathered by local enthusiast Charlie Hoy is currently being prepared for publication, along with the work from 2000-01 and 2008.

A well excavated within the industrial complex in 1977-78 yielded a modest assemblage of leather items including six shoe soles, the complete examples measuring from 137mm to 286mm in length. Ten further fragments showed stitching/hemming, including two pieces of possible tentage, and many show evidence of having been cut from a larger item; a number of smaller fragments are not described/illustrated. Many hobnails were also found, some retaining their original patterns, showing that the shoes (or soles at least) had decayed *in situ*. This material is interpreted as indicative of leather-working and even shoe-making, but the material in City of Edinburgh Council's stores contains no leatherworking waste, only evidence of

reusable leather having been salvaged from shoes and stitched sheet leather items. The "enormous numbers of iron boot-studs", supported by the presence of a furnace, may relate to the production of hobnails (Homes 2003, 31-32; 128-30; 153), although this in itself is not evidence for shoemaking, as a steady supply of hobnails would be required for *ad hoc* repairs (see Chapter 4 re. hobnail replacement). The shoes that decayed intact, leaving hobnails in their original patterns, perhaps represent waste although the hobnail patterns were seemingly not recorded so it is not possible to deduce whether they represented new shoes with all hobnails present or old worn-out shoes with missing hobnails, nor is it specified whether the many loose hobnails were old and bent, or new and unused.

Cramond Lioness

A carved Roman memorial stone in the form of a lioness was discovered by a local ferryman at low tide near the ferry steps in the River Almond (Keppie 1998, 380), close to the fort at Cramond. When excavation was carried out to remove the lioness in 1997, a piece of leather tent gable was also recovered (F. Hunter, pers. comm.). In 2000, further excavation was carried out close to the findspot of the lioness, in advance of work to repair the Cramond ferry steps; midden material including a leather shoe was recovered (Keppie 2001, 321). These items are unpublished but the remains of a shoe and tentage are available for study at NMS. Although conserved, neither has survived well and both are reduced to brittle fragments.

Crawford

The fort at Crawford sits at the confluence of the River Clyde and the Camps Water in South Lanarkshire, and would have sat at the junction of the Annandale and Nithsdale Roman roads. A temporary camp lies nearby, across the Clyde. The fort was identified from the air, and confirmed by trial excavation in 1938 (St Joseph 1952, 113-14). Excavations from 1961-66 demonstrated occupation in the Flavian and Antonine periods, with a break between the two phases of occupation, and significant rebuilding and enlargement during the latter (Maxwell 1971). The final fort was around 1.6ha in size, with defences comprising a double ditch and rampart.

In the peaty fill of the earliest Antonine period outer ditch on the western side was a left *calceus.* At 244mm in length, Maxwell judges its size to be indeterminate but under Greene's (2011) classification it

would fall into the adult male category. Also recovered was a strip of leather c. 300mm long with stitch-holes along one side. The leather and other organic items are interpreted as "the waste material from building operations at the beginning of the third period" (Maxwell 1971, 188; 158), i.e. mid-second century. The Hunterian's accessions books record eight items of leather from Crawford from these excavations, including five fragments of a left *calceus* and three further strips of leather from footwear.

Croy Hill

The fort on the east shoulder of Croy Hill in North Lanarkshire occupies one of the highest points on the Antonine Wall, and overlies and earlier enclosure. A fortlet lies 80m to the west, and a *vicus* may have been located on a plateau below the fort. The fort's ditches range from just one at the northern end of the eastern defences, to three on the west and in front of the entrance on the south. The Antonine Wall runs along the northern side. Croy Hill is unusual in that its ditches were cut directly into the bedrock, except around the south-east corner, which is without ditches (Hanson 1979). This anomaly was among the features targeted when Macdonald conducted excavations in 1930-31 (Macdonald 1932). A number of other excavations were conducted at Croy Hill, particularly in the 1970s in response to the threat posed by quarrying operations (Hanson 1979).

Listed under Macdonald's miscellaneous finds are "three or four fragments of the sole of a nailed shoe" (1932, 268). Their location is unknown.

Denton Hall (Turret 7b)

Situated west along Hadrian's Wall from Benwell Fort, Turret 7b was comprehensively excavated in 1929, confirming three periods of use: AD 122-96, 205-95 and 300-67 (Bruce 1947, 54). From floor deposits associated with the first period came "part of a hob-nailed boot" (Birley 1930, 148).

Drumquhassle

The double ditch and rampart of Drumquhassle Fort in Stirlingshire enclose an area of around 1.3ha. The Flavian fort occupies a low hill to the east of the Endrick Water, around 5km south-east of Loch Lomond. Drumquhassle is one of the most southerly of the so-called glen-blocker forts. It was first identified and excavated by Maxwell, whose work confirmed a first century date and established the fort's basic form. The fort's layout and chronological phasing are not well understood, but it is believed to have been abandoned in the mid/late 80s AD (Maxwell 1979, 36). The fort was subject to a study by Headland Archaeology at the request of Historic Scotland. Limited excavation was conducted in 1997 in response to quarrying activity nearby, during which a fragment of a shoe sole and a hobnail were recovered from a midden deposit located just outside the fort (Masser *et al* 2002, 162; 151).

Elginhaugh

Elginhaugh Fort lies near Dalkeith in Midlothian, just a few miles south of the fort of Inveresk, and is believed to have been abandoned in Inveresk's favour during the Antonine period. The fort was discovered from the air during the dry summer of 1979; modest excavations that winter confirmed the Roman nature of the site. Comprehensive excavations ahead of development in the 1980s confirmed that the 1.4ha fort saw a single period of occupation in the Flavian period, concluded by deliberate demolition with the withdrawal of troops from the Forth-Clyde isthmus in around AD 88 (Hanson 2007, 1; 646-653).

Almost all of the leather from Elginhaugh was recovered from the waterlogged basal and lower demolition fills of the inner ditch outside the eastern gate; the only exception is a single shoe from the fill of the well in the *principia*. The catalogue includes twenty small finds numbers, some comprising multiple fragments representing shoes, tentage and at least one offcut. The leather included cowhide, calfskin, goatskin and deerskin. The identifiable shoe fragments from the ditch deposits were all from *caligae* (standard military shoes) of first-century form. There were 43 fragments of lattice-worked uppers and the remains of at least two shoe soles. Most of the shoe remains were too fragmentary to permit much detailed analysis but there were two fragments of a child's shoe. The shoe from the well, possibly a *calceus*, is interpreted as possibly having belonged to a woman (Groenman-van Waateringe 2007, 470-478), although at 230mm in length, it falls within Greene's (2011) adult male category.

Haltonchesters

The 1.95ha fort of Haltonchesters sits on high ground 8.5km east of Chesters, astride Hadrian's Wall. Parts of the fort platform and its defences are visible on the ground today.

The earliest excavations were in 1823-7, when the bathhouse was "laid open" and "cleared of rubbish" (Hodgson 1840, 179). Excavations in the 1930s by Simpson and Richmond (1937) explored the east and west gates and the *praetentura*, including barracks and stableblocks. In 1956-8 Jarrett investigated the defences, revealing a ditch between the fort and the *Vallum* to its south. The fort is unusually assymetrical in plan, an extension having been added to the southern side (Jarrett 1959). Gillam's excavations of 1960-61 focussed mostly on the north-western corner of the *retentura*, with two strip trenches exploring the defences on the eastern side of the fort and the west side of the fort's extension (Dore 2010). Geophysical survey in the 1990s has helped create a more detailed plan, particularly in the southern half of the fort (Berry and Taylor 1999, 105-109), and confirming the existence of a *vicus* to the south (Taylor *et al* 1999, 109-110).

A shoe or boot was recovered during the 1958 excavations (Northumberland HER 8635) although it is not noted in Jarrett 1959, and from Gillam's excavations came a "strip of leather with one edge folded over and held by a copper-alloy rivet" (Dore 2010, 157). The item was too fragmentary to permit identification but the use of the rivet suggests that it could be a component of armour, horse gear or perhaps a belt/strap similar to that from Haltwhistle Burn, which also features rivets (below).

The Great North Museum in Newcastle holds around 30 leather items in a box marked 'HUNNUM 1927', comprising predominantly parts of footwear but also a few items of stitched sheet leather and one piece of secondary waste from shoemaking. The folded, riveted fragment (above) is not included in this assemblage, and it is not clear from which excavations these finds derive. There is no record of excavations at Haltonchesters in 1927.

Haltwhistle Burn

The 0.31ha stone fortlet at Haltwhistle Burn in Northumberland is one of the "best established Stanegate fortlets". The defences comprise a single ditch and rampart, and there are gates on the south, east and west sides. Within the fortlet are metalled roads, paved areas and a range of stone buildings. Fortlets such as this are believed to have functioned as control points, guarding points at which the Stanegate crossed a

river[2] – in this case the Haltwhistle Burn, as the name suggests (Hodgson 2009a, 13). The fortlet was partially excavated in the early 20th century, with work focussing on the ditch, the gates and roads, as well as exploring the interior, mostly in the northern half of the site (Gibson and Simpson 1909).

Leather items from Haltwhistle Burn are few. A thick textile case containing a brass chain, discovered "near the south-west angle… in the clay backing, [which] may have been dropped during the dismantling of the fort" was tied with a leather lace down one side. Also recovered was "a small hollow piece of iron containing the remains of leather, attached to the iron by rivets. One piece of leather retains four square rivet-holes. It appears to be a portion of belt buckle, or other article of similar nature" (Gibson and Simpson 1909, 272). Preserved by corrosion, the latter falls outside the confines of this study but is interesting nonetheless due to the rivets, which may be comparable with the item from Haltonchesters (above).

High House / Milecastle 50 TW

This milecastle on the Turf Wall just west of Birdoswald was excavated in 1934. It was constructed of turf with a timber barrack-block, and was intentionally demolished after a short period of occupation (Simpson *et al* 1935, 220-29).

One of two pits dating to this abandonment phase contained "a bundle of leather bindings and scrap material from tents" (Simpson and Richmond 1935, 10), which are interpreted as evidence of "boot-repairs" and "stitching the tents" having taken place at the milecastle (Simpson *et al* 1935, 227). These are held at Tullie House in a bag marked 'Kirkbride, 1977'. However, the bundle does not match any of the leather from Kirkbride desribed by Birley (1982) but does correspond with Simpson and Richmond's description (Simpson and Richmond 1935, 10); therefore, it seems mostly likely that the bundle of leather at Tullie House is in fact from Milecastle 50 TW.

High Rochester

[2] e.g. Brampton Old Church fort, where the Stanegate crosses the River Irthing

The outlier fort of High Rochester lies around 30km north of Hadrian's Wall, on the western side of Dere Street in Northumberland, and was for two centuries the most northerly fort in the Roman empire. The fort overlies a prehistoric enclosure, and has an annexe to the west. Much of the fort interior was excavated in the 1850s (Bruce 1857). This work "cleared over half of the interior down to Roman levels", clarifying a great deal of the 1.7ha fort's layout, but the original plans are sadly lost (Crow 2004, 213-18). The site was excavated again in 1935, when the north-west area of the interior and the defences were re-examined by limited trenching (Richmond 1936). Most recently the fort was studied under the auspices of the Northumberland National Park Authority and English Heritage. This recent work comprised a range of non-invasive survey complemented by targeted excavations, and provided further detail of the fort's internal layout but no evidence for any extramural settlement (Crow 2004). Like the other outpost forts, the site was abandoned by the early fourth century (Symonds and Mason 2009, 3).

Leather is not mentioned within Bruce's account of excavations in 1855, and the list of finds in is not comprehensive (e.g. "a pair of tweezers… is amongst the bronze articles which have been turned up" (Bruce 1857, 84)) but Bruce's catalogue of artefacts at Alnwick Castle lists shoes and sandals from the north-east corner of the *praetorium* (1880a, 152-153), which are held there still (E. Reverchon, pers. comm.).

Housesteads

The auxiliary fort of Housesteads is "the most complete example of a Roman fort in Britain and amongst the best known throughout the Roman empire". It sits on the line of Hadrian's Wall, high on the Whinsill crags in Northumberland. The upstanding remains include the full range of standard military buildings as well as part of the *vicus*, which extends to the south, east and west of the fort. The fort was constructed in the Hadrianic period and was in use until the fourth century at least (Crow 2009, 79-80).

Publication of excavations at Housesteads has been far from comprehensive. The site was first excavated formally by Hodgson in 1822 and 1830-33,who investigated the *Mithraeum*, gates and one of the buildings within the fort (Hodgson 1840, 185-195). The site was then bought by Clayton, who conducted a great deal of work in the late 19th century (including targeting the gates, the defences, and part of the *praetorium*) but did not publish the results comprehensively. A season of work by Bosanquet saw the *principia* fully excavated and the rest of the internal buildings located by cutting trenches along the walls – a common method of excavation at the time. This work was published along with the results of

some of Clayton's excavations, including a detailed plan (Bosanquet 1904). In the early twentieth century, Simpson explored the north-east, south-east and north-west corners and a lime kiln (Simpson, F. G., 1976). Excavations in the 1920s and 1930s were never fully published and many of the finds lost; work from 1954-95 was recently published as a monograph, although this only included the finds from 1974-81 (Rushworth 2009). Work in the *vicus* in 1961 saw the excavation of workshop which yielded "52 boots and shoes in a fragmentary state, besides scraps of unworked leather" (Birley 1962, 120-21).

Leather is referenced briefly by Bosanquet (1904, 205; 248) as it was noted in during trial excavation to the south of the fort. There is no further mention or description, though, and it is not clear if it was retained. Excavations in the *vicus* in 1961 yielded "52 boots and shoes in a fragmentary state, besides scraps of unworked leather" but these are not described further (Birley 1962, 120-21). Frances McIntosh, curator of Historic England's Roman collections, based at Corbridge, provided a useful catalogue which notes a child's shoe among the material from Birley's excavations, as well as other published material (below). The leather from excavations in 1974-81 comprises shoes, tentage, a shield cover and shoemaking waste. Shoe fragments and shoemaking waste were recovered from the *vicus*; two small fragments of shoe upper were recovered from the overburden above Barrack Block XIII; a fragment of shoe was recovered from an early second-century construction phase deposit; two further shoe fragments are unprovenanced; and twenty items of leather came from the north-east corner of the fort from two contexts, one an early second-century construction phase deposit and the other less well understood. These twenty items include tentage, secondary leatherworking waste, part of a shoe and part of a possible shield cover (Mould 2009a, 483-87). A leather purse is recorded from the same context as a coin hoard, and the two may have been associated (Brickstock and Casey 2009, 376), although its identification as a purse is questionable (F. McIntosh, pers. comm.). Excavations in 1984 yielded 211 items including shoes, shoe-making waste, a fragment of shield cover and tentage (Mould 1988, 112-22).

Inveresk

Inveresk Fort lies at the end of a ridge close to the southern shore of the Firth of Forth in East Lothian. Much of the fort and its *vicus* now lie beneath the town of Musselburgh and its cemetery. A bath-house had long been known in the nearby grounds of Inveresk House, after numerous inadvertent discoveries (Moir 1860). The 2.84ha fort was first excavated in 1946-7 after a piece of sandstone pilaster was accidentally discovered in 1945 of while a grave was being dug in the modern cemetery. Richmond's work confirmed the existence of a fort, determined the nature of the defences and internal layout, and

assigned the fort to the Antonine period, with two distinct periods of occupation. Commercial excavations in the 1990s remain unpublished. The land to the west of the cemetery was once thought to be deep made ground, devoid of archaeology (Richmond 1980). Trial trenching in 1981 confirmed at least partial survival of Roman levels at the western end of the fort interior. The presence of timber buildings (as opposed to only stone) was suggested by the discovery of postholes (Hanson 1984).

Associated with the fort is a large *vicus* to its east, excavated in 1976-7 (Thomas 1979) and again in 1996-2000 (Bishop 2004). Thomas' excavations proved four phases of occupation, of which two were Antonine in date. Modest timber buildings were replaced with more substantial timber structures including one stone building, all constructed on a planned grid system. The evidence was mostly domestic in nature although signs of some industrial activities were also noted (Thomas 1979, 139). The most recent excavations, undertaken in 1996 and 1998-2000 in advance of the construction of new housing, were strictly limited to the areas directly affected by the footprint of the development. Evidence of defences concentric to the fort were revealed underlying the *vicus* levels. Within the *vicus*, industry in the form of metalwork and perhaps bone/antler crafts took place (Bishop 2004, 179), and leather off-cuts and scraps are indicative of leatherworking, shoemaking in particular (van Driel-Murray 2004, 161).

An assemblage of leather (19 small finds numbers, some assigned to groups of associated fragments) was recovered from the wood-lined well[3] in the *vicus*, comprising the remains of shoes and offcuts/scraps. The shoes were deposited in a fragmentary state, probably as secondarily displaced material. All are of adult male size where identifiable, and are mostly of a typical, sturdy construction but two stand out: the upper of an intricate goatskin slipper which adds "an element of luxury" to the assemblage, and the upper of a slip-on, open-toed 'mule'-type shoe. The shoe styles are of late second century date, and all are well worn (van Driel-Murray 2004, 161-2).

Kinneil

Kinneil Fortlet lies on the Antonine Wall between Carriden and Inveravon forts. It was discovered through fieldwalking and trial excavation in the 1970s (Keppie and Walker 1981), and further work in

[3] Four items were from various spits of context [1880], which is omitted from the concordance; however, one of the excavators recalls that all the leather came from the well (M. Cook, pers. comm.).

1980-81 provided further detail but was not comprehensive (Bailey and Cannel 1996). The fortlet was much denuded by medieval cultivation but traces of a single ditch and rampart remained, with the Antonine Wall ditch to its north. These defences were altered: the north gate was sealed and the rampart trenched to prevent access from this side. The site's function perhaps changed from fortlet to watch tower. No scientific dates were obtained but the fortlet and Wall may have been built by different construction teams, and its abandonment was perhaps related to the construction of secondary forts on the Antonine Wall (Bailey and Cannel 1996, 303; 337; 344).

The lower, waterlogged fills of a 3m-deep pit in the north-west corner of the fortlet yielded some fragments of nailed leather shoes, among other general waste (Bailey and Cannel 1996, 313-314). The 11 large fragments and numerous smaller pieces represented a number of different shoes, some delicately decorated (Croom 1996, 321-322).

Kirkbride

The 2.3ha fort at Kirkbride sits alongside the Stanegate, on the banks of the River Wampool. It had timber internal buildings, and, based on pottery evidence, was occupied in the Flavian/Trajanic period and abandoned in the Hadrianic period (Stobbs and Hodgson 2009, 32).

The fort has seen only limited excavations: in 1961-62 some very limited excavations were undertaken which confirmed the Roman nature of the site (Birley and Bellhouse 1963). Trial trenching and area excavation in the 1970s revealed evidence of industrial activity, perhaps lead processing (Bellhouse and Richardson 1975). A series of geophysical surveys were undertaken in 1975-77, and trial trenching followed by larger excavations in 1976 and 1977. These excavations comprised two long trenches cut over the defences at the north-eastern corner, and a third trench on the eastern side. Combined survey and excavation confirmed that the fort was defended by a double ditch and rampart. Much of the western half of the site has been destroyed by much later buildings (Bellhouse and Richardson 1982).

From the outer fort ditch, four identifiable pieces plus scraps of leather (calf) were recovered. These comprised a piece of sheet leather with stitch holes around the edges, that had been cut for reuse, two fragments of welt strips, an item with a ridged edge and evidence of patching, and ten miscellaneous

scraps. The scraps are interpreted as numerous pieces of the same item, possibly "a garment" (Birley 1982, 45-47).

Kirkbuddo

The 24.7ha temporary camp at Kirkbuddo, south of Forfar, was discovered by Captain Robert Melville in 1754. The remains of an annexe are visible on the south-eastern side. The camp has been subject only to very small-scale excavation for soil science research (Romans 1962). The rampart is visible in places up to 1m high, and the ditches 0.5m deep (Jones 2011, 248-249).

Some shoes were apparently discovered during 18th century landscaping work to remove four large mounds of earth covering the camp (Crawford 1949, 98). Crawford references the Roman shoes from Bar Hill for comparison, but given that the shoes from Kirkbuddo were found in mounds of soil on the ground surface , and that they are described as square-toed, these shoes were perhaps medieval or post-medieval[4].

Kirkintilloch

The town of Kirkintilloch in East Dunbartonshire lies on the line of the Antonine Wall. The remains of a probable fort and/or fort annexe in the north-west of the modern town have been excavated on a number of occasions, within Peel Park but also at a number of urban sites ahead of development, and as part of a Youth Opportunities Programme in 1979. It is difficult to build a clear picture of the Roman remains as they have been excavated only partially and in discrete areas. The first excavations at the site were undertaken by Macdonald in 1914, whose work confirmed the Roman nature of the site but little more (Macdonald 1925, 290-295). A range of small-scale excavations in 1952-61 revealed the traces of probable barrack blocks as well as finding the course of the Antonine Wall in some areas (Robertson 1966, 180-188). The course of the wall and various stretches of ditch have been noted on numerous

[4] The soles of some Roman sandals are broadly square at the toe e.g. van Driel-Murray's numbers 12 and 18 (2001b, 193) but it seems likely that these would have been described as sandals rather than shoes. Square-toed styles known as "cowmouth" or Tudor shoes were fashionable in AD 1510-50 (Goubitz *et al* 2001, 275-79).

occasions since then (DES 1975; Stevenson 1980; DES 1990, 39; Keppie *et al* 1995; James and Swan 2002).

Trial trenching in 1978-79 in a car park just south of Peel Park revealed traces of two Antonine ditches containing the only known Roman leather from Kirkintilloch – "Roman leather sandals" (Stevenson 1980, unpaged) about which nothing more is known.

Mollins

The Agricolan fort at Mollins, Strathclyde, was identified during aerial survey in 1977. The fort lies on a ridge 4.5km south of the Antonine Wall, with the Luggie Water to its north. The small (0.4ha) fort is defended by a double ditch to east, south, and possibly north, and has an annexe to its west (Hanson and Maxwell 1980).

Excavations in 1977-78 placed trenches across the single northern and double southern ditches, confirming a Roman date. Waterlogged conditions in the northern ditch preserved organic material including three fragments of shoe upper (*caligae*) and a sole fragment (Hanson and Maxwell 1980, 45-46).

Mumrills

At 2.8ha in size, Mumrills is the largest fort on the Antonine Wall. It sits in an arable field east of Lauriston, Falkirk, with an annexe to the west of the fort. The layout and phasing of the fort and its annexe has long been up for debate. Excavations in 1923-28 confirmed a Roman date, and established at least two phases of occupation, the excavators believing the earlier fort to be Agricolan in date (Macdonald and Curle 1929). In 1958-60 work was carried out in advance of development, which explored the northern and western defences and confirmed that there were at least two periods of occupation (Steer 1963). The western defences of the annexe were excavated in 2003 by Geoff Bailey, who suggests that the original fort was destroyed and shortly repositioned further east, with only a small interval between the phases, both within the Antonine period. The move was intended to enable better control over communications both along and across the Wall (Bailey 2010).

Three scraps of leather were noted during excavations in the 1920s but their provenance is not given and they are not described (Macdonald and Curle 1929, 553). These are presumably the three pieces held at NMS: a fragment of sole from a nailed shoe, a strip of upper that has been salvaged from its shoe, and a small fragment of very thin leather with torn edges. Finds from excavations in 2003 included "remains of shoe leather" (EAFS newsletter 145) but this in fact refers to clumps of hobnails held together by corrosion (G. Bailey, pers. comm.), which fall outside the parameters of this study.

Newcastle upon Tyne

Located on the north bank of the Tyne in what is now Newcastle city centre, this small (0.5ha) fort was built on a promontory in the late second /early third century to protect a bridge crossing the river. Little is known of the fort's layout as it underlies a medieval castle and has been excavated only partially, but it is clear that it was not attached to Hadrian's Wall, which ran to its north. Parts of the principia, granaries and barracks have been excavated. Coin losses suggest that a market was established on the *via praetoria* in the fourth century (Bidwell 2009).

Excavations in 1928-29 discovered the fort's southern ditch and buildings to the south of the *principia* (Spain *et al* 1930, 501-06; Simpson, G., 1976, 169-192), however, the exact location of the fort was not confirmed until the late 1970s. Excavations around medieval Castle Garth in 1976-92 explored parts of the Roman *principia*, *praetorium*, granaries, northern fort wall and various streets and extramural features; and in 1995-96 excavations were carried out in the cellars of a hotel prior to development that revealed the southern intervallum street of the fort (Snape and Bidwell 2002).

The only leather known from the fort at Newcastle is a single fragment, recovered from the lower fill of the southern ditch (Simpson, G., 1976, 188).

Newstead

Although the site of the fort at Newstead, in the Scottish Borders, is flat and featureless on the ground, the complex site comprises a large fort and associated settlement, and at least eight temporary camps are known in the vicinity (Jones 2012a, 51). The fort lies on a flat terrace above the River Tweed,

strategically located at the point where Dere Street crosses the water - an ideal position from which to monitor movement on one of the principal routes of the empire's transport network (Hanson 2012, 63).

Although the fort was identified in the mid-19th century, formal excavations did not take place for a further sixty years. Six years of excavation by James Curle from 1905 established two main periods of occupation, Flavian and Antonine. Ian Richmond built upon Curle's findings with further excavations in 1947, and these in turn were followed by excavations in 1987-1993 by Rick Jones of the University of Bradford (Hanson 2012, 63-64).

In the Flavian period, a large (4.3ha) timber fort with double ditches, unusually laid out rather like a four-leafed clover, preceded an even larger (5.8ha) stone fort with a single, massive ditch. The layout of the internal structures during the fort's early life are not well understood. Artefactual evidence is suggestive of a legionary presence, including cavalry. The fort was systematically demolished after the primary phase of occupation in around AD 86, and much material – including leather – was thrown into the ditch and thus preserved (Hanson 2012, 65-70).

Overlying the Flavian remains are those of two Antonine-period stone forts: the first was slightly larger again than its precursor at 5.95ha, with double ditches and a rampart topped by a substantial stone wall. Convincing evidence of a demarcated area for industry including metal-working is associated with this phase. The second Antonine fort saw the double ditches backfilled and replaced by three new ones; the earlier internal buildings remained largely unchanged. In the Antonine phase, the fort housed both legionary troops and auxiliary cavalry. Demolition following this second phase of occupation (again resulting in the deposition of material including leather in waterlogged deposits such as pits) took place sometime in the early second century[5], perhaps in response to unrest in the area (Hanson 2012, 68-70). Beyond the fort's defences are enclosed areas covering 16ha. Opinion is divided regarding their purpose: they may have been areas of extramural civilian settlement, housing a significant non-militant population, self-governing but economically reliant on the fort through various industries including metalworking (Sommer 2012, 87); alternatively, they may have been military in nature (e.g. Clarke (2000, 466) sees the western annexe as "a complex and rapidly evolving part of the military base of Trimontium").

[5] Coin evidence suggests abandonment of the fort sometime after AD 180, and that extramural settlement continued until the late second century, with a Roman presence of some kind extending into the third century AD (Holmes 2012, 132).

The rich and varied leather assemblage from Newstead was recovered mostly from the pits and wells of the extra-mural areas. Leather was noted during the railway cutting excavations through which the fort was initially identified (Smith 1855, 30) and a large assemblage was recovered during Curle's excavations, including numerous shoes, tentage and parts of two chamfrons, one almost complete. At least one piece of tentage is stamped with 'SDV', as is a fragment from Carlisle (above) (Shotter 2009, 831; RIB 2445.12). The chamfrons were not immediately recognised by Curle ("it does not seem to have formed any part of clothing, and its whole appearance conveys the impression that it was used as a horse trapping" (Curle 1911, 155)). Writing just a few years later, however, Curle had successfully identified the chamfrons (1913, 400-405) and noted the differential survival of sheet leather compared to straps (*ibid*., 392-3); Bishop has pointed out that Curle's analysis and interpretation of Newstead and its assemblages, and his presentation of the information in publication, were unparalleled in his time. Rather than presenting a catalogue of finds, Curle integrated discussion of the material culture within the body of the text (Bishop 2012, 176-177). While this makes for a good read, it does make quantifying the material and interpreting it stratigraphically a little trickier.

Richmond notes the recovery of leather from the fort's ditches (1952, 26), but it is not clear if he is referring to items recovered during his own excavations, or to the material previously recovered by Curle. Jones' excavations examined part of the western interior of the fort and the southern annexe. The only leather recovered was a single shoe and some small fragments, from the annexe ditch in 1990 (R. Jones, pers. comm.). The exact number of items recovered from Newstead over the years is unknown to the author; they are held at NMS and were catalogued some time ago with a view to publication (F. Hunter, pers. comm.).

The deposition of a wide range of items in Newstead's pits and wells, both inside and outside the fort itself, has been interpreted by some as ritual activity (e.g. Ross 1968; Ross and Feachem 1976; Clarke 1997) but, as at Coventina's Well and numerous other sites, is best understood as a mixture of ritual and practical (e.g. waste disposal) activity.

Old Kilpatrick

The Antonine fort at Old Kilpatrick marks the western terminus of the Antonine Wall. Constructed in advance of the Wall, and abandoned in the AD 160s or 170s (Breeze 2008, 85), the 1.91ha fort featured a

stone-built *principia* and granary, with timber barracks and store buildings. An annexe to the south was affected by the creation of the Forth and Clyde canal (Spiller and Leslie 1995, 5).

The fort was discovered in 1790 during construction of the nearby Forth and Clyde Canal (Miller 1928, 1) and noted again during Macdonald's work to trace the line of the Wall in 1913 (Macdonald 1915, 103-105). Excavations in 1923-24 prior to development explored the southern defences and the *praetentura* including the *praetorium*, barracks and a granary (Miller 1928). Macdonald returned in 1930-31 to clarify certain matters, and confirmed that, contrary to Miller's belief, the fort did meet the Wall (Macdonald 1932). A number of small-scale investigations have taken place since. In 1969, a stone altar dedicated to Jupiter was discovered nearby (Barber 1971). Work in 1987 located the outer ditch at three points (Keppie *et al* 1995, 659), and in 1994 excavations took place in the inexplicable break in the defences at the western corner of the fort (Spiller and Leslie 1995). A series of test pits revealed discrete features in 1998 but no diagnostic Roman finds were recovered, and in 1999 narrow trenches were dug across the western defences and a section of ditch predating the fort (Dunwell *et al* 2002, 293-296).

The only known leather from Old Kilpatrick is "a small fragment showing stitch-holes (leather stitching) along the sides", recovered from a c. 7.6m deep well in the *praetorium*, along with fragments of quern-stones, structural debris, wood, sherds of pottery/*amphorae* and a length of rope (Miller 1928, 23; 51).

Peel Gap Turret

Between Turrets 39a and 39b, in a low-lying position with poor visibility of the surrounding area, is an 'extra' turret, excavated in 1987. Similar in structure and use to its nearest neighbours, this turret was found to have been secondary to the Wall, perhaps because the distance between 39a and 39b (over 200m more than the usual 494m) was considered too long. A lone leather boot was discovered in the peat to the north of the Wall (Crow 1989, 53; 1991, 53).

Petty Knowes Cemetery

The cremation cemetery at Petty Knowes, Northumberland, was discovered in 1975. The cemetery comprises around 75 barrows, of which sixteen were excavated in 1978-79. Pottery evidence suggests

that the site was in use during the mid-second to fourth centuries, contemporaneously with the nearby fort at High Rochester. While a number of the burials included hobnails indicative of the presence of footwear, one also contained the remains of a leather sole (Charlton and Mitcheson 1984).

The Pict's Knowe

The Pict's Knowe, Dumfries and Galloway, is a Neolithic henge that was appropriated in the Iron Age. The function of the Iron Age enclosure is not clearly understood, although woodworking waste and evidence of metalworking suggest that it was not domestic in nature. Timber objects and broken quern stones found in the re-cut fill of the Iron Age ditches are thought to have been deliberately deposited there (Thomas 2007, 264). Among this material was a single shoe sole, typologically Roman, of adult male size (van Driel-Murray 2007, 128-29).

Rough Castle

The defensive rampart and double ditches of the small (0.63ha) fort at Rough Castle, a few miles west of Falkirk on the Antonine Wall, are clearly visible on the ground. Causeways allow access from all sides. An annexe to the east of the fort contains a bathhouse. North of the fort, beyond the Antonine Wall, are rows of defensive *lilia* (MacIvor *et al* 1981).

The rampart was explored by the Glasgow Archaeological Society in 1890/93 (ntoed in MacIvor *et al* 1981, 230). The fort and annexe were first excavated in 1902-03, when work explored both the defences and the interior buildings (Buchanan *et al* 1905). Limited excavations in 1932 clarified some unanswered questions from this work (Macdonald 1933). In 1957-61, following work to clear vegetation and trees from the fort, the north and west ramparts and part of the *praetentura* were excavated. This work revealed the presence of early temporary buildings followed by timber buildings (probably barracks) in the *praetentura*, and pottery evidence suggests that the fort was occupied into the AD 160s (MacIvor *et al* 1981, 282).

During the 1902-03 excavations, "portions of the sides and soles of shoes and sandals were found" (Buchanan *et al* 1905, 497); their context is not given. 63 items of leather were recovered in 1957-61,

including shoe fragments, offcuts and scraps. All are listed as unstratified except two of the most complete shoes, which were discovered in the Antonine Wall ditch, and the offcuts/scraps are not described in the finds catalogue. The front portion of a nailed shoe sole has a stamp on the outer sole, described as ME (MacIvor *et al* 1981, 275-78) but correctly illustrated with ligatured *tria nomina* MAE. Although the full length of the shoe does not survive, the width of just 66m at the tread suggests that it may have been a child's shoe. Not noted in the report is an inscription on a crescentic secondary offcut, 143mm long and 25mm wide. It is marked twice with the letters 'C F' (see Chapter Five for more on stamped leatherwork).

Sewingshields (Milecastle 35)

Sewingshields lies between Housesteads and Carrawburgh forts on Hadrian's Wall. The milecastle is perched on the edge of the Whinsill crags, with a sheer drop of c. 30m to its north-west, the ground sloping steeply away to the south-east. Excavations were conducted in 1978, 1980 and 1982 on the milecastle itself as well as the stretches of Hadrian's Wall to east and west, and a range of medieval buildings nearby. The site showed multiple phases of use from the early third to fourth centuries (Haigh and Savage 1982).

One fragment of leather was recovered from Building V in the eastern area of the milecastle, a fourth century structure associated with industrial activity, perhaps metalworking. The fragment was unidentifiable in nature, with one curved edge and no stitch holes (Haigh and Savage 1982, 45-46; 80).

South Shields

The Hadrianic fort at South Shields sits on high ground on the east coast, on the southern bank of the mouth of the Tyne. The site is open to the public as a visitor attraction and museum under its Roman name, *Arbeia*. The fort was first explored in 1875-6 and the upstanding remains formed the focus of the Roman Remains Park. The small finds (except pottery, coins, inscribed stones, animal bones and shell) from these early works were published alongside the results of more recent excavations (Allason-Jones and Miket 1984). The first modern excavations took place in 1949-50, when Richmond undertook works to combat the deterioration of the open areas, identifying four phases of construction in the process. Excavations were undertaken in the 1960s and 1970s and published alongside the earlier century

excavations (Dore and Gillam 1979). The defences were explored in 1977-81 (Miket 1983) and work continues every year; between 2012 and 2015 excavations are taking place as part of the WallQuest project[6]. Although the internal layout is known in detail, the majority of the fort's interior is yet to be fully excavated to modern standards. The date of the earliest fort's construction is unclear, but a Hadrianic timber and turf fort certainly preceded the 1.67ha Antonine stone fort which was built in around AD 160. This fort was expanded to 2.1ha in the early third century and was occupied throughout the remainder of the Roman period. The fort seems to have escaped deliberate destruction. It is not clear exactly when the Romans abandoned the fort; occupation continued into the fifth century, when a "sudden dislocation in the life of the Fort" is noted, demonstrated by human remains showing evidence of violence, buried within the fort's walls. However, a community was present into the mid/late fifth century. Little is known of the layout of the associated *vicus*, which now lies beneath 1970s housing (Hodgson 2009b, 68-69).

At least nine items of leather are known from South Shields, of which eight are identifiable, including composite pieces of tentage, binding strips, a fragment of shoe and some torn scraps, all of calf/cattleskin where identifiable (Hooley 1994, 193-196). These were recovered from the lowest fill of a Hadrianic period pit probably dug for clay, underlying a late Hadrianic/early Antonine building of uncertain character in the *principia*. The pit was filled with waste including wood, bone, pottery and possible stable sweepings before finally being sealed with redeposited natural (Bidwell and Speak 1994, 48). The assemblage is interpreted as discard resulting from routine maintenance (Hooley 1994, 197-198).

Stanwix

Stanwix Fort lies within the modern city of Carlisle, less than 1km north of Carlisle Fort. It sits on a high plateau to the north of the River Eden. Almost all of the 3.96ha fort lies under modern development, and as excavations have been numerous but small-scale, the internal layout is not well understood. The northern side of the fort joins Hadrian's Wall, and a *vicus* extends both east and west. The fort was built in the AD 120s and enlarged in around AD 160 to house the cavalry *ala Petriana*, the largest Roman auxiliary regiment in Britain. It is not clear when the fort was abandoned but it may have been in use until the end of the Roman period (Caruana 2009).

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[6] www.hadrianswallquest.co.uk

Various excavations in 1930s established the forts location but publication was fragmentary. More recently, a range of rescue excavations and watching briefs have taken place in the vicinity in response to development, many of which are unpublished/grey literature[7]; an assessment of the site has recently been produced by Oxford Archaeology North (2007). Excavations in 1984 explored the western end of the fort's northern defences (Dacre 1985). Caruana's report (2000) is the result of an informal watching brief that arose during building work in the area of the *vicus* to the west of the fort in 1986. Many of the finds recovered were found on the spoil heaps, and as such, most are unstratified.

"A boot sole of the ordinary military pattern" was discovered accidentally during excavations to lay a new sewage pipe in 1930; however, the leather, pottery and tiles were neither listed nor described in the catalogue (Collingwood 1931, 69). No leather is known from Simpson and Richmond's excavations in the 1930s. Caruana (2000) noted that the lower levels of the site were waterlogged, and 15 leather finds are noted, comprising shoes, shoemaking offcuts, and sheet leather (including tentage) that has been stitched/hemmed. Some of those pieces of unidentifiable sheet leather (SF14) were well stratified in a deposit dating to the very early second century at latest (Winterbottom 2000, 69-74), although it is not clear to which area of the fort these relate.

Vindolanda

The auxiliary fort at Vindolanda has yielded the largest assemblage of Roman leather from anywhere across the empire. The fort sits about a mile south of Hadrian's Wall, roughly halfway between Newcastle and Carlisle, in south-west Northumberland. It is a complex site with at least ten different phases of occupation: the earliest timber fort was built in the early 80s AD, and over the next three centuries, a second timber fort and a number of successive stone forts were constructed and occupied as well as associated annexes, bath houses, settlements and so on. The latest known remains date to the fourth century AD (Birley 2009a).

The Roman nature of the site has long been recognised, and excavations have been taking place there since the 18th century. The earliest record of leather from Vindolanda dates to Warburton's 18th century

[7] Those available were consulted at Cumbria's HER in Kendal.

forays. In 1814, clergyman Anthony Hedley purchased land including parts of Vindolanda, and began to conduct a few weeks excavation each year, and more shoes were recovered, although his notes were lost on his death. In 1863, the estate was purchased by the Clayton family, the youngest son John owning and conducting excavations at a range of Roman sites along the wall up to his death in 1890. In 1929, Eric Birley bought part of the Clayton estate when it was broken up, and the land remains in the Birley family's control today. Eric Birley conducted fairly small-scale excavations at the site in the 1920s to 1940s before passing the reins to his son Robin in the late 1940s. In the late 1960s, Robin Birley undertook modest excavations that demonstrated the exceptional nature of the Roman remains – much of which were outside the Birley's land. In 1970, Daphne Archibald bought that land and donated the relevant field to the Vindolanda Trust. An ongoing summer field-school has seen volunteers participating in a programme of excavation and research at Vindolanda ever since (Birley 2009b, 19-32).

With the advent of an ambitious excavation programme in the 1970s, vast quantities of leather (and other organic material) began to be unearthed from the forts' ditches and from pre-Hadrianic deposits to the south of the *vicus*, including the die-stamped, thonged, ladies' sandal now known as the Lepidina slipper. The stamp reads L-AEB/THALES T F, and remains unparalleled (Birley 1973, 121). A preliminary report on the leather excavated in 1972-73 concluded that *calcei* and *carbatinae* were the prevalent forms of footwear, which dominated the assemblage. Other articles included tentage and "doubtful garment pieces" (Metcalfe and Longmore 1973, 38-40).

The leather from Vindolanda has been central to the successful reconstruction of the Roman tent. A collection of leather tent panels were recovered in 1987, having been used to line a large pit. The remains of one corner comprising twelve panels of varying sizes as well as a range of patches, binding etc. enabled the matching of seams and analysis of stretching to create a reconstruction. Details such as the location of the doorway, and how tent poles were used, remain enigmatic (van Driel-Murray 1991).

Almost 4000 leather items had been recovered by the time of the publication of van Driel-Murray's report in 1993, which dealt with around half of over 2600 leather finds that were recovered in 1985-89. This includes chamfrons and other horse gear (saddles, breast bands, fringes, straps) (van Driel-Murray 1989), tentage, footwear, and a range of other items found in smaller quantities such as knife sheaths, bags/purses, and miscellaneous straps, thongs, tabs and knots. Offcuts were also present, indicating the manufacture of tentage, horse gear and shoes onsite (van Driel-Murray 1993, 9-61). The survival of leather items featuring stamps and inscriptions is generally rare (occurring also at Newstead and Carlisle

(above) within the study area, and at York (van Driel-Murray 2002b) and London (Rhodes 1987)), although the practice is not considered to have been unusual. However, numerous examples are known at Vindolanda, both on offcuts and completed items, allowing for useful comparison and interpretation (van Driel-Murray 1993, 62-72).

The shoes from Vindolanda are of particular importance. Based on almost 1500 examples recovered between 1985 and 1988, van Driel-Murray has established a chronology of shoe fashions from the early first to mid-fourth century AD, tracking typological changes through time. The assemblage is broken down into six main categories comprising 13 distinct styles and the prevalence of these styles charted to show the lifespan of each fashion. The rapid turnover of footwear renders it "particularly responsive to changing consumer demand." A diverse range of footwear was available, but the majority (73%) can be broken down into four main styles (2001b, 185-87; 195).

A sample of Vindolanda's shoes was analysed by Elizabeth M. Greene (2011) for her PhD examining evidence for the presence of women and children in auxiliary forts in the north-western Roman empire. Her analysis of the footwear focussed on patterns of deposition of women's and children's shoes from AD 85-130. She aimed to explore the possibility that women and children were indeed present on Roman military sites before soldiers were legally permitted to marry, and considered the role of non-combatants in the social structure of military communities in the north-western Roman empire. In the past it was commonplace to try to explain away the presence of artefacts associated with women and children in Roman military settings (van Driel-Murray now describes her own such attempts as "ridiculous" (1997, 60)) and even in the 1990s Drummond and Nelson suggested that at Vindolanda "it would appear that the army workers… used their spare time and army equipment (and perhaps materials) to make shoes for local sale" (Drummond and Nelson 1994, 82).

The organic preservation at Vindolanda is quite exceptional. Combined factors of the topography and the restructuring of the site throughout the Roman period has permitted the survival of a much higher proportion of organic material than is standard, and in closely dated contexts (van Driel-Murray 2001b, 186) and the site has yielded some of the best-known examples of Roman leatherwork including the ornate chamfrons and the remarkable assemblage of footwear of all shapes and sizes, of which the elegant Lepidina slipper and the children's shoes are perhaps most popular in the public imagination. Research to date on the Vindolanda leather has contributed a great deal to the corpus of knowledge on military equipment, tentage and footwear in particular. However, as is often the case on long-running and large

scale excavations, publication has not been able to keep up with onsite progress. Van Driel-Murray has noted that while the leather assemblage continues to grows it is impossible to offer any overall view or secure analysis (1993, 1). The number of leather finds stood at around 6500 in February 2014 (E. Greene, pers. comm.).

Insect evidence from Vindolanda was once thought to demonstrate that tanning had taken place onsite (Birley 1977, 123-24) but the area in question is now understood to have been a yard area for livestock (van Driel-Murray 2011, 69; Birley 2009b, 72-73).

Also of relevance to this study are Vindolanda's writing tablets, the first of which were discovered in 1973. Over 100 wax tablets were recovered, but the vast majority (80%) are leaf tablets (Birley 2005, 60), which were written on with ink and folded in concertina form, which contributed to their survival,[8] albeit fragmentary in many cases. The tablets date to Periods 2-5 (pre-Hadrianic period, c. AD 92 onwards) and almost all relate to the forts, although in 2013 the first fragment was recovered beyond the fort's defences.[9] The tablets are particularly relevant here as they give insights into the economy of Roman Vindolanda, of which leather was undoubtedly a key component (see Chapters 3 and 4 for information about leather supply and leatherworking gained from Vindolanda tablets).

Wallsend/Segedunum

The 0.66ha fort of Wallsend, in Tyne and Wear, is now in an urban location with modern development on al l sides. As its name suggests, the fort marks the eastern end of Hadrian's Wall. The fort was built in the AD 120s, directly on top of a working Iron Age field system. Stone defences were built to contain timber barracks and stone central buildings. The timber barracks were rebuilt in stone in the second half of the second century, and reorganised again to accommodate new buildings and a change in garrison in the third and fourth centuries. Coin evidence suggests that the site was not occupied beyond AD 380 (Hodgson 2003).

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[8] http://vindolanda.csad.ox.ac.uk/tablets/TVI-2-3.shtml

[9] http://vindolanda.blogspot.co.uk/2013/09/over-but-not-out-2013-excavation-season.html

The site has been extensively excavated, and the Roman remains (the fourth century levels in particular) suffered a great deal during agricultural and industrial activity in the 18th century (Hodgson 2009b, 69). Various developments through the 19th /early 20th century led to the observation of Roman remains at numerous locations across the site, followed by formal excavation in 1929 (Spain *et al* 1930, 488-89). The site was excavated by Daniels in 1975-84 in response to development, but this work is only partially published as yet (Daniels 1980; 1989)[10]. Nonetheless, this work produced the most complete plan of the interior of a Hadrian's Wall fort. Research in the 1990s sought to gain a better understanding of the stratigraphy of the site through area excavation and by removing later Roman walls, gaining more precise chronological information (Hodgson 2003, 1-3). A number of small-scale excavations have also been carried out in the area of the *vicus*, which extends south and west from the fort , and Roman buildings have been noted to the north of the fort (Hodgson 2009a, 71). The site is now open to the public, with modern buildings on all sides and a road running across it.

In 1895, demolition of buildings in the south-west area of the fort revealed a stone-lined well, which was emptied "but produced little except pottery, bones and a few leather fragments"[11] (Spain *et al* 1930, 488). Great North Museum, Hancock (Newcastle) holds a few items in its stores: two pieces of sheet leather and the brittle remains of a nailed shoe. It is not clear from which excavations these finds derive. They may be the 'fragments' noted by Spain (*ibid*.) but in the absence of detailed information, are considered to represent separate finds.

Wilderness Plantation Fortlet

This fortlet is located just at the edge of forestry, adjoining the southern side of the Antonine Wall just north of Bishopbriggs (East Dunbartonshire). It sits on a low ridge almost halfway between Balmuildy and Cadder forts. Water runs freely through the site, and various attempts at drainage over the years have caused significant damage. Additionally, ploughing has destroyed much of the southern half of the site. A double ditch and rampart encloses the interior, with an entrance and causeway on the southern side. The fortlet has a total area of around 0.2ha, including the defences. Rescue excavations were undertaken in 1965-66 following the detrimental effects of sand and gravel quarrying in the vicinity. The whole interior

[10] Publication in prep. (Hodgson 2009, 69).

[11] Spain goes on to lament how little work at the site was recorded, and how few finds preserved (Spain *et al* 1930, 490).

was excavated and the defences investigated on all three sides not adjoining the Wall (Wilkes 1974, 51-53).

Leather was discovered in the lower levels of the fill of the inner ditch, but "only a token amount could be removed for study". Seven fragments of leather are noted in the Hunterian's accession book, along with an unspecified number of scraps. They are interpreted as possible tentage and/or clothing (Wilkes 1974, 63-65); the former is more likely.

Bibliography for Site Reviews

Abbreviations

AA	*Archaeologia Aeliana*
BAR	*British Archaeological Reports*
DES	*Discovery and Excavation in Scotland*
GAJ	*Glasgow Archaeological Journal*
JAS	*Journal of Archaeological Science*
JRA	*Journal of Roman Archaeology*
JRMES	*Journal of Roman Military Equipment Studies*
JRS	*Journal of Roman Studies*
PSAS	*Proceedings of the Society of Antiquaries of Scotland*
PSAN	*Proceedings of the Society of Antiquaries of Newcastle upon Tyne*
TCWAAS	*Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society*
TDGNHAS	*Transactions of the Dumfriesshire and Galloway Natural History and Antiquarian Society*
TLMAS	*Transactions of the London and Middlesex Archaeological Society*

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