A Leather Worker's Tools

A number of iron tools used for leather working in the Viking Age were found at Coppergate.

Leather shoes found at Coppergate

Four objects thought to be double-armed leather **creasers** were found. These would have had wooden handles and two arms that curved near the tip.

The most numerous leather working tools found at Coppergate were **awls**, which were used for making holes in the leather. Awls were also used in wood working, bone working or other crafts. Forty Viking-Age awls were found at Coppergate. Awls have two tapering arms, usually of equal length, with one end set into a wooden handle. One handle of this type was found at Coppergate.

An awl

Iron shears

Iron **shears** or parts of shears dating to the Viking Age were found at Coppergate. Although it is often assumed that these were used in textile manufacture, they may also have been used in the leather working process. One blade that measured 138mm must have come from a pair of shears over 200mm long. These may have been used for shearing sheep. The smallest shear blades, measuring 35–125mm long, may have been used in fine leather working or in textile crafts such as needlework or hand spinning.

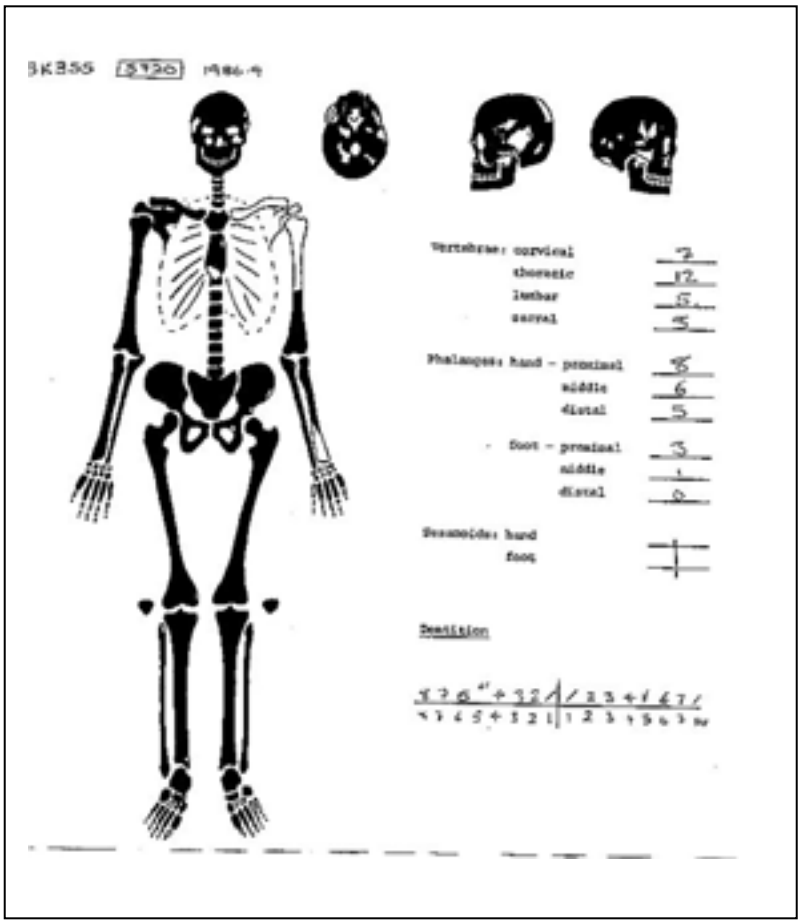
Wooden tools that may have been used by a leather worker in the Viking Age have also been found in York. They include three **shoe lasts** found during excavations at 6–8 Pavement. Shoe lasts were used to form a 'mould' for a leather shoe; they show how different shoes were styled with rounded or pointed toes. Lasts were often used in pairs and were asymmetrical to make a distinct left and right foot. Although they were not necessarily the exact outline of the finished shoe, some were possibly made to fit a particular individual's feet.

A Skeleton is Discovered!

Detailed study of human bones in archaeology is fairly recent. It is now known that we can discover much about past societies, lifestyle, diet, disease and so on by looking at and measuring bones, and by scientific techniques.

Sometimes skeletons are unexpectedly uncovered by workmen: sometimes they are discovered during archaeological excavation. **What happens next**?

- **Permission:** Legal permission to excavate is sought
- **Uncovered:** The soil is carefully removed to reveal the remains.
- **Recorded:** A drawn, written and photographic record is made of the burial. Information about the position of the burial and what artefacts it was found with, if any, can tell us much about the burial rites and value systems of the society of the time.



A Skeleton Record Sheet

- **Excavated:** The skeleton is carefully lifted from the ground. Specialist tools such as dental instruments, soft brushes and protective clothing are used so that the bones are not damaged and nothing is missed.

- **Environmental samples:** These are taken as they may give information about the diet of a person, their health (if they had intestinal parasites) or if they were buried immediately (indicated through the presence of plant and insect remains).

- **Prepared:** The bones are washed, conserved and placed in special packaging

- **Analysed:** Analysis by specialists. A specialist in human bones is called a **human osteologist.**

When you look at a skeleton you are coming face to face with the past – these are the people who built the buildings and made the artefacts we carefully preserve and admire. We should treat them with the utmost respect when we seek to understand the story they can tell.

Antler Working: Craft or Industry?

The distribution and quantities of antler **roughouts, offcuts** and **waste** at Coppergate suggest that antler working may have taken place in one or two of the buildings that date from the Viking Age. There is not enough manufacturing debris, however, to suggest that there was a long-term workshop based here. One possibility is that travelling craftsmen may have worked from the houses at various times. As most of the debris is waste from **comb manufacture**, this may have been their main business. However, these craftsmen may also have produced other items such as strap ends, fine pins and decorated knife handles.

Antler offcuts

Many of the simple objects such as **skates**, **scoops** or **buzz bones** may have been produced by householders, or even by children, for their own use. Other sites in York from the period also indicate that some antler and bone items were produced by specialist crafts people, and some were home-made.

A buzz bone

Excavations at Driffield Terrace

The site at Driffield Terrace in York is of particular interest to archaeologists because it lies close to the main **Roman road** which approached York from the south-west. The Roman road itself runs along a line a little to the north-west of The Mount.

It is known from previous excavations in this area and from discoveries made in the 19th and early 20th centuries that Driffield Terrace lies within one of York's principal **Roman cemeteries**. Typically Roman cemeteries lined the main approach roads to settlements as burial was not permitted inside the settled areas themselves. The great Roman town (colonia) of **Eboracum** lies about 600m to the north-east of this site.

Burial customs in the Roman period were very varied. Bodies of the deceased could be either **cremated** or **buried unburnt** in what archaeologists call **'inhumations'**. In the latter case bodies were usually laid in shallow bath-shaped pits, but those of wealthy families were sometimes placed in stone coffins, sometimes known as sarcophagi. For example, the inscribed sarcophagus of a Roman lady named Aelia Severa was found a few metres away in Dalton Terrace. Wealthy people might also be given **tombstones** and the fine example of another lady, Julia Velva (now in the Yorkshire Museum) was found at junction of The Mount and Albemarle Road

Less fortunate members of Roman society might meet their end through **execution** and four skeletons found a few metres to the south-west of this site in 1987 belonged to adult males who are thought to have been beheaded!

Excavations at Melton

The site at Melton, extending over c.3.5ha, lies at the very southern tip of the chalk **Wolds** as they reach down towards the Humber. After stripping off the topsoil above the chalk a number of archaeological features were identified in two discrete areas, one on the east and the other on the west side of the site. All are thought to be **prehistoric**, although they cannot all be closely dated at present

The earliest pottery came from a small pit (above) on the eastern edge of the site. The pottery is early **Neolithic** (c. 4000–3000 BC) and takes the form of several large fragments of a **Grimston Ware bowl**. Dating to the late Neolithic (c.3000–2000 BC) were five further pits containing numerous fragments of pottery known as **Grooved Ware**. They come from large, highly decorated vessels thought by some scholars to have been primarily used in religious and ritual contexts, perhaps to contain offerings to the gods. One of these pits in the extreme south-west corner of the site was unusually deep for a 'Grooved Ware pit' at 0.7m, and in addition to the pottery produced an **antler pick**, the sort of tool which was used for digging in the Neolithic. The pit also produced numerous pieces of worked flint including one very fine large blade

Probably dating to the **Bronze Age** (c.2000–750 BC) were two **human graves**. On the east side of the site there was a pit 0.3m deep containing two **crouched** female skeletons, aligned east - west. The skeleton found at the base of the pit was accompanied by a small piece of bronze, probably a pin. It was sealed by 0.2m of soil before the second burial was made, accompanied in this case by a 2 - 4 month old infant. On the west side of the site a small patch of flints on the surface suggested there had originally been **cairn** over the second grave which also contained a crouched skeleton. This grave produced a fragment of a comb-decorated **Beaker**, a type of pottery dated to c.2000–1500 BC. Radiocarbon dating should give a closer date for these burials and may give support to the

theory that the origins of the well-known Iron Age crouched burial tradition in east Yorkshire (the Arras culture) lie in the region's Bronze Age rather than being, as was once thought, imported from the Continent

The other features on the site are difficult to date at present, but they include a row of what are probably post-holes on a north-west / south-east alignment, about 20m west of the double burial. The posts in these features may have had some ritual function and may have been connected with the burial. This theory will be tested when charcoal in the post-holes has been radiocarbon dated

A striking feature of the site has been the number of pits and post-holes which contained burnt material, including **charcoal**, in which it is already clear that there are **hazel nut shells**. It is also likely that there will be seeds, in which case the site should provide some very valuable evidence for the environment and agriculture on the Wolds in the Neolithic and/or Bronze Age (depending on radiocarbon dates) about which very little is otherwise known, as organic material, unless burnt, does not survive well on sites on chalk

Further research on the site is about to begin and will lead to a publication available on the YAT web site

Uncovering Fishergate through the ages!

York Archaeological Trust excavated the site at Fishergate in the 1980s.

- The first human activity found on the site was **Roman** agricultural.
- There was then an **Anglian** trading settlement dating to the first part of the 8th century.
- The **church** and **cemetery** date from mid 11th century and a **Gilbertine priory** was built in stone from 1195.
- **Demolition** of the church, cloisters etc occurred in the 16th century.
- The land was then occupied by **orchards** from 17th to 19th century.
- From 1900 to 1984 a modern **glass factory** existed.
- Today the area is covered by a **hotel.**
- **Burials** took place on this site for over 500 years from c. **mid 11th century to 16th century.** The skeletons on display are generally the earlier burials but there are some later medieval ones.
- Over **400** human skeletons were found.

Excavating the Fishergate site

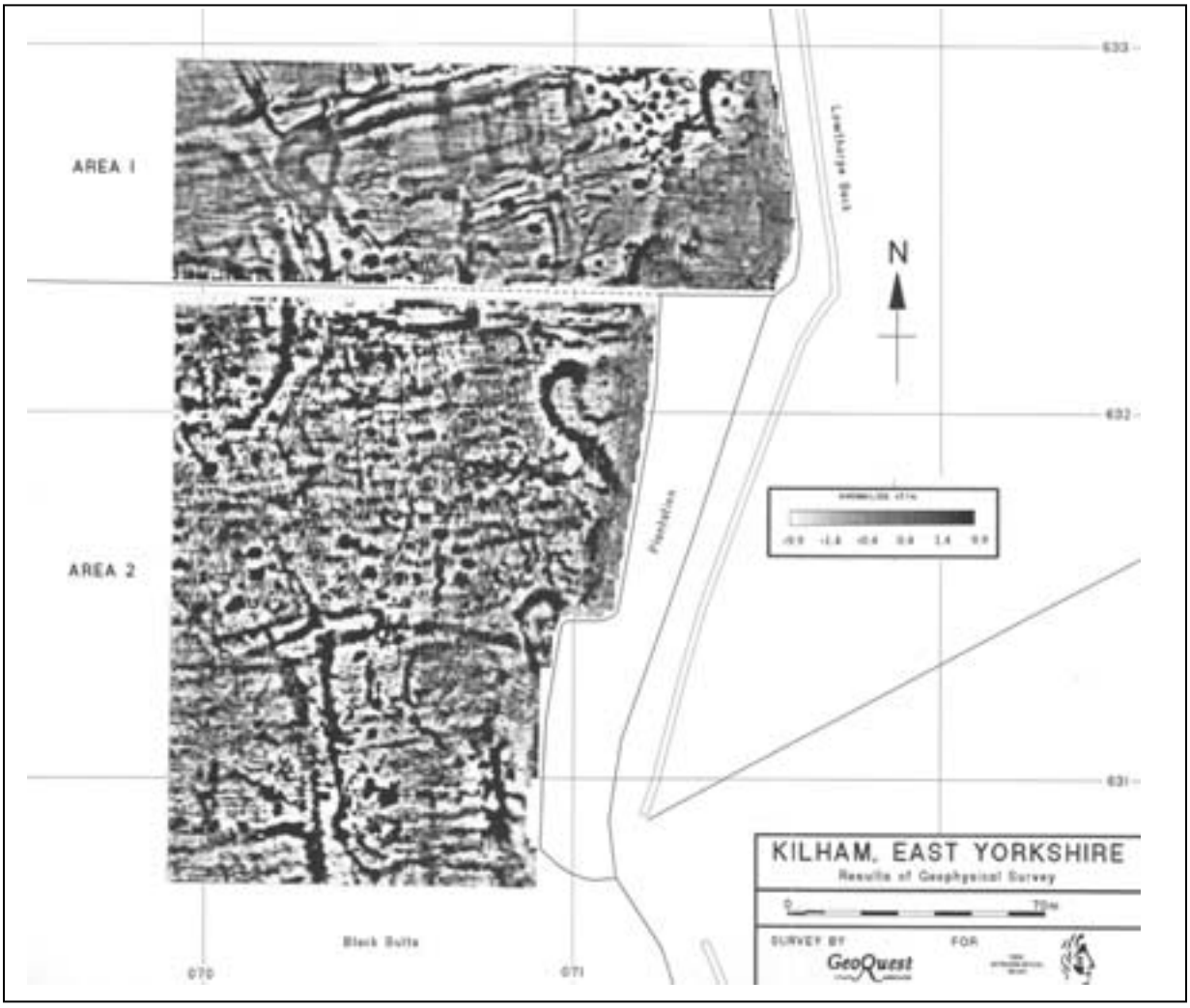
- Certain areas of the cemetery were used by the lay population and other by the priory's community.

- All but one burial was facing east, the traditional alignment for Christian burial.

Fishergate from the Air

Geophysical Surveying

Resistivity measures different levels of resistance to electrical current.
A Resistivity meter passes an **electrical current** through the soil. The damper the soil, the easier the electricity flows through it. Filled in ditches and pits contain damper soil than the soil around them, therefore the pit or ditch shows less **electrical resistance**. Walls contain a lot less water so create greater resistance to the electrical current. The different patterns of resistance, which are then mapped out, can be examined to interpret possible **features** underground.



Geophysical Surveying Results at Kilham, East Yorkshire

Magnetometry works on the same principle of recording different patterns.
Buried objects such as walls, iron objects, kilns, hearths etc, produce small **"blips"** in the earth's magnetic field. Different objects create greater or lesser "blips" which are the magnetic field readings. These are recorded as different **shades** on a site plan

Mosaics

Mosaics came into common use from the 2nd century AD, and would **decorate** the dining room and other principal rooms of the homes of wealthy people. Designs were probably taken from **pattern books** and included geometric patterns, fish, animals, and mythological subjects. It seems that there was a firm of mosaic makers working in York or Aldborough in the late 3rd century AD

A mosaic found in **Clementhorpe** in York, was originally discovered in 1851 on the site of the Benedictine nunnery. The mosaic dates from the 4th century AD and has a design of geometric patterns incorporating crescent shapes, knots and an interlaced border. Nothing remains of the central square that this border would have surrounded. The mosaic was made up of different types of material in red (tile), beige (limestone), pink (baked limestone), light brown (sandstone), dark grey (slate), black (jet or shale), and white (the background chalk)

A detail of the mosaic pavement found at Clementhorpe

After excavation, the Clementhorpe mosaic was lifted for transportation and taken to the Yorkshire Museum. A facing fabric of gauze was stuck to the surface with adhesive, and it was undercut with long slaters' knives to remove the soft Roman mortar. It was divided into sections and slid onto boards for removal. At the conservation lab the sections were turned over and any remaining mortar was removed. The sections were then backed with modern support materials, turned the right was around, and then the adhesive dissolved so that the gauze could be removed. The surface of the mosaic was then thoroughly cleaned ready for display.

The Pole-Lathe: A Short History

The wooden cups and bowls found in Viking-Age levels at Coppergate show distinct markings of spiralling grooves which indicate that they were made using a **pole-lathe**.

Wooden objects from Coppergate

The earliest examples of lathe-turned wooden vessels in Britain come from late **Iron Age sites** such as Glastonbury lake village in Somerset. Some very rare Roman examples have also been found in Britain, although the Romans commonly used pottery vessels and not wooden ones. In Anglo-Saxon and **Viking-Age** Britain, however, lathe turning was an important and commonly used technique for producing **domestic tableware**.

Three illustrations dating from before AD 1500 show the use of wood turning lathes. These are a painted miniature dated to c.1250, a 13th-century painted glass window in Chartres Cathedral, and a page from a manuscript dated to c.1425. The lathe in the window has no clear pole, but the two manuscripts certainly show craftsmen using a pole-lathe.

Using a pole lathe

Turners continue to use pole-lathes today. This continuous use of a device over the last two millennia in Britain illustrates that a tool that is able to do the job it originally set out to do will continue in use over long periods of time.

Roman Wall Plaster

The Romans developed a new technique of applying a protective plaster wall covering to their walls, which were made from a **mortared rubble core** faced with **limestone**. At its simplest the plaster consisted of a minimum of 3 coats. The first coat was relatively thick, typically 30-50mm, consisting of lime and course sand with a roughened surface to take the second layer. A mortar using fine sand was smoothed off to take the final layer of lime wash on which decorative schemes were painted.

Painted plaster from Blake Street depicting a candelabra design

To ensure that the paint did not fade the basic scheme was applied when the plaster was wet, a technique known as **fresco**. On occasion, however, paint was applied to dry plaster, a technique known as **tempra**. The paint was given adhesive qualities by mixing it with a glue made of egg white.

Evidence if York shows that decoration, for the most part, was very simple, the commonest pattern being one or two coloured stripes on a white background. However, other evidence shows more elaborate designs, which were divided into three distinct zones:
Zone One – one metre or so above the floor occupied by the so-called **dado**, often painted to resemble marble.
Zone Two – the central zone – usually painted with a range of **trompe l'oeil effects** suggesting recessed and moulded panels and architectural features. There were also more naturalistic motifs, such as **flowers**, **animals** and **mythological scenes**.
Zone Three – **The frieze** - painted with a range of distinctive motifs.

The wall plaster design now on show in the **Minster undercroft**, and restored from fragments found in the north west of the fortress basilica added in the forth century, uses a **tri-partite design**:

Above an elaborate marbled dado is a series of panels interrupted by niches defined by classical columns. The frieze is also panelled and at one point is a mask of tragedy, which was probably matched by a mask of comedy.

Mask of Tragedy

Roman Building Techniques

Whilst drystone walling is known from pre-Roman times in Britain, the **mortared stone walling** was an innovation of the Romans, and allowed them to construct buildings of far greater architectural ambition, than anything seen previously in Britain.

The stability of the Roman buildings depended on their **foundations**. In York foundation trenches were usually **0.5m – 1m deep**, which protected them from the destructive effects of freezing and thawing in winter. Either **clay mixed with cobbles** or **mortar mixed with stone rubble** was used as foundation material. In the fortress a very tough **concrete** was used in parts of the walls, but not like the concrete used today which is made with cement.

Roman mortar and concrete were made in the same way using **lime** as the main ingredient. Lime is produced by a process called **calcination**, which involves heating limestone to about 1,000 degrees c. in a special kiln. The lime that results is very powdery, and to this water is added to make a paste called **slaked lime**, which can be used for building.

Both **mortar** and **concrete** used mixtures of **lime**, **sand**, and **aggregate** (usually cobbles and pebbles), in different proportions. Mortar used more sand but less aggregate, and lime. Concrete used more aggregate and lime. **Lime** was, however, very **expensive** and therefore was used **economically**. As a result many Roman buildings, especially in civilian settlements, had poorly bonded walls. The concrete in the fortress footings was, however, very tough indeed.

Whilst a clay and cobble mix could be laid directly into the foundation trenches, fresh **concrete** and **mortared rubble** was in **semi liquid form**, so had to be poured into a timber frame work, which was known as **shuttering**. The shuttering was placed within a trench to enable the concrete or mortared rubble to set into a tidy block with a smooth and level surface. On occasion marks of shuttering planks have been found on the surfaces of the foundations.

Roman buildings in York often had **timber piles** driven into the base of the foundation trenches to make the walls above more **stable**. The Romans found that much of the soil in York was either **unstable sand** or **silty clay**, and matters were made worse by the fact that it was prone to flooding, even though the water table was lower in Roman York than it is today. The timber piles, which were usually made from **oak**, would have been up to 3m in length and 0.5m thick. However, more common sizes of the piles were 0.5m – 1m long and 100-200mm thick.

Some Roman walls in York had their lower courses made from **large gritstone blocks**, although the main method of wall construction involved a **mortared rubble core** with narrow facing **courses of limestone** in York's case. The usual method of

building walls was to proceed upwards in stages of a given height. The facing blocks were tapered to allow them to be pushed easily into place before the core set hard. If the walls were higher than a person's height **scaffolding** would be used. This scaffolding was usually a timber structure which was attached directly to the wall. By leaving out some of the facing stones, cross members could be inserted into the walls, or alternatively, poles were passed through the complete thickness of the walls to hold the scaffold in place on either side. These holes in the face of the wall were known as **"putlog holes"**, and were often left open to allow scaffolding to be re-erected if repairs to the wall were needed. Good examples of "putlog holes" can be seen in the Multangular Tower in York.

The Multangular Tower

Roman Floors

The best known type of Roman flooring is the **mosaic** pavement, and there only a few examples that have been discovered from Roman York, including an early 4th century example found at **Clementhorpe**.

A detail of the mosaic pavement found at Clementhorpe

A detail of the mosaic pavement found at Clementhorpe

In the majority of cases floors were made from more simple materials. The headquarters basilica may have had a floor of stone flags, but military buildings usually had floors of beaten earth or clay, with better quality buildings having a covering of **"opus signinum"**. This was a form of concrete which incorporated tile fragments to make it waterproof. In civilian settlements there are examples of timber floors.

Roman Roofs

The roofs on Roman buildings in York are the parts about which least is known since none survive, and we are only left with broken material found in demolition layers. There is no evidence for domes or vaults made in concrete which have been found in the Mediterranean.

In most cases the roofs were probably based on some kind of **timber framework**, such as a **triangular A frame**, which supported boards which were in turn given a waterproof cladding. This **cladding**, on the fortress buildings, usually took the form of **clay tiles**. Rows of rectangular tiles, known as **tegulae**, which had flanges along their sides, were arranged so that each row overlapped the one below. The junctions between the tegulae were covered by semi-circular tiles called **imbrices**. At the eaves of the better class of Roman building there were sometimes small vertical tiles called **antefixes**, which closed off the lowest imbrices. These antefixes often bore images of legionary emblems or gods.

In addition to clay tiles, excavations in York have also produced large numbers of thin sandstone slabs, usually of Elland Flag, which in many cases can be identified as roofing material as they are pierced on one side to allow it to be attached to the roof timbers using an iron pin.

Roof pitch would have been fairly low, probably about **20 degrees** from the horizontal

Roman Frescoes

Designs

Public buildings in the Roman period often had very elaborate decorations, including **wall mosaics.** Private individuals often decorated the walls and ceilings of their homes with **painted plaster.** The simplest designs were stripes on a white background. More elaborate designs included paintworks giving the effect of **panelling.** This gave homes a grand appearance.

Sometimes designs gave the impression of **architectural features**, such as alcoves and columns. Into these were incorporated mythological figures, birds, flowers and other designs. An example of this type of design was uncovered during excavations of the Roman fortress in York. See if you can find the tragic mask!

Fortress wall plaster displayed in the Undercroft, York Minster

Designs, though sometimes purely decorative were at times selected for their **symbolic** meaning. Flowers and wildlife illustrated paradise, peacocks symbolized immortality, doves were the sacred bird of Venus and candelabra brought eternal light.

The most elaborate designs had overall **pictorial schemes**. These were often placed in panels or separated by wide borders along a wall to give the effect of individual tapestries. For instance, they might depict scenes from mythology. The bathhouse of a villa in Southall, Nottinghamshire was decorated with a Cupid swimming on his back, surrounded by fish. Other images in the room showed water and marine life around an island. Often watery imagery could be found in bathhouses!

Draped figure forming part of the Fortress wall plaster

Application and colours

The **colours** of Roman wall-plaster have survived remarkably well. The method of application and composition of the paint both helped preserve these images. Coarse plaster was applied to walls and ceiling first then a fine plaster. While this was still damp the background paint was applied. This technique, known as **fresco** painting insured that colours were absorbed into the plaster and would not fade. Guidelines for the decoration were marked out onto the wet plaster with a **stylus**. Once dry the design was then painted onto the background colour

The range of colours used on the Fortress plaster

Colours included **red, pink, blue, yellow, green and black.** In a villa at Witcombe in Gloucestershire two small paint pots were found. One of them contained a pink pigment, made from haematite and chalk, another a yellow paint made from white chalk and green earth. It is possible that an oyster shell with traces of red paint might have been used as a palette!

Red pigments were made from red ochre, red lead, vermilion or cinnabar. Blue was powered blue frit (the mixed materials from which glass is made) and applied with the yolk of an egg. Green was composed of the copper-bearing mineral malachite and black a mixture of soot and powdered charcoal.

Redecoration

Some of the discoveries in York show that the Romans either painted directly over an old design or first applied a new layer of fine plaster. The wall-plaster from Catterick showed that the design had been repainted 3 times over a period of 60 years. Each design was different and to study the underlying designs archaeologists had to peel off the upper layers of decoration.

Smithing Techniques

The Viking-Age blacksmiths were supplied with **iron** in the form of a **bar** that was then worked into smaller strips. In addition, they recycled old and broken objects that were no longer of any use.

Iron working evidence from Coppergate

Smiths used **chisels** to cut pieces of iron to the required size. Numerous iron strips found at Coppergate, which had not been turned into finished objects, show marks from a chisel. A small chisel was found that could have been used in blacksmithing.

After cutting, the strips were forged into objects at a very high temperature when the iron was red hot. This involved hammering and also welding if more than one piece of iron was needed. A large smithing **hammer** was found at Coppergate, and marks showing the use of a hammer can be seen on many objects such as the large metal pan, hinge straps and horseshoes. Smiths used **anvils** for forging and a small example, probably used for making needles, came from Coppergate.

An iron pan found at Coppergate

Clippers would have been used for cutting thin sheet metal, such as tin. A special tool known as a **mandrel** was probably used to make the tubular sockets that attached the iron head of an arrow to its wooden shaft.

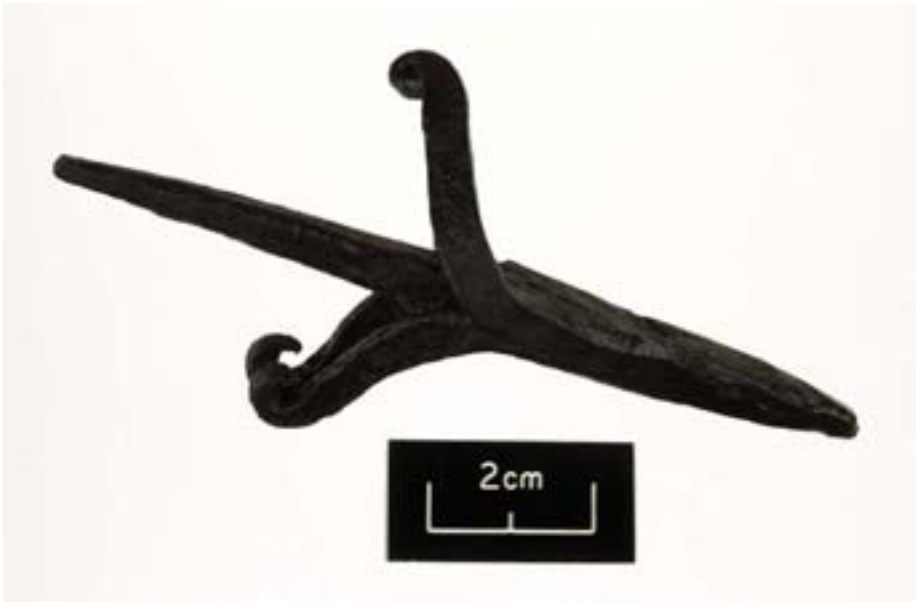
Clippers used for cutting thin sheet metal

Holes in an iron object like a hinge, which had to be nailed on to a door, were made with **punches**, and a number of these were found at Coppergate.

Some of the more delicate iron objects, such as buckles, strap-ends and spurs, were finished off when the metal had cooled down. Small punches were used to make decorative patterns of dots and grooves. A finish of **tin plating** can be seen on many of the iron dress fittings from Coppergate.

Tin plated objects from Coppergate

Another simple decorative effect was based on forging iron into a **spiral strip**. This involved twisting and welding two strips of iron together. Objects from Coppergate that incorporate spirally twisted strips include hinges and handles.



An iron candle holder or pricket

Victorian Housing

Some of the housing in the Hungate area was called **slum housing**. These houses were very dirty, dingy and stuffy. They had two or three rooms. Windows and furniture were often broken. Bugs like fleas, woodlice and cockroaches could be found living there. **Toilets** and running water would be **shared** with other families living in the area.

People became very concerned about families living in these conditions and wrote reports about what they saw and campaigned for better housing.

Some reports on the housing in the area by a **sanitary inspector** reported the following:

House No.5:
Two rooms. Six inmates. Brick floor in holes. Cupboard door broken off. Wall-paper falling off. Walls in holes in many places, plaster having fallen away and bricks much broken. Staircase very rickety, containing only one sound step. Children very dirty and ragged.

House No.7:
Rain comes through roof, requiring pail to be placed below.
Holes in walls. Staircase wall-paper falling off.
Two window panes broken.
Tenant reports that the house is infested with bugs.

Due to these living conditions, which included dirty, cramped and ill-ventilated homes and a poor diet, many people living in the area Hungate district were **unhealthy.** Disease spread quickly in the area.

A Sanitary Inspection of the period reveals that the more densely populated areas of the city had considerably higher death rates with far greater numbers of infant deaths. Diseases such as **typhoid, tuberculosis** and **scarletina** were much more prevalent in the slum districts. Between 1898 and 1907 there were 74 cases of Typhoid, and 65 cases of TB.