**Anglo-Saxon Iron: Smelting, Smithing and Iron Items**

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**Abstract:** Early Anglo-Saxon ironworking is an area which is lacking in information. However, from the evidence recovered from archaeological sites, it appears that the Anglo-Saxons were using a variety of ores which were either local or imported, and smelted these on the edge of settlement sites. This paper looks at the evidence available for Early Anglo-Saxon ironworking and the items created.

**Keywords:** Iron, Smelting, Smithing, Early Anglo-Saxons, Tools, Hoards, Lyminge, Nazeing, Flixborough, Mästermyr

Graves, Weapons

# **Introduction**

There are few metalworking sites known from any period in the UK, and certainly ironworking in the Anglo-Saxon period is an area which requires further research (Arnold 1997:67; Birch 2011:16; McDonnell *et al* 2012:1). It may be that metalworking sites, especially in the Early Anglo-Saxon period, were located on the periphery of settlement sites, and the smiths themselves may have been itinerant and so had no permanent workshop (Birch 2011:6). Few tools of the Early Anglo-Saxon period have been recovered, and it is believed that these may have been inherited by apprentices, buried in later graves or hoards, or recycled into new items (Naylor 2015:125; Riley 2011b:24).

# **Iron Ore Sources**

The Anglo-Saxons primarily extracted ore from three iron sources, and the choice of ore used was restricted to the geology of the local area (Riley 2011a:3).

The most commonly exploited source was from carbonate ores, which could be found in sedimentary deposits or in nodules, such as in the Wealden series and the Cleveland Hills (Ottaway 1995a:2).

Bog ore was also used, especially in areas where there were few ironstone deposits. This ore was located in bogs and moorland regions, especially in the north and west of England (Birch 2011:6; Ottaway 1995a:2).

The third source of ore used was limonite. This can be mainly be found in the Forest of Dean and in Northamptonshire, and was certainly a major iron source for the Late Anglo-Saxon and Norman periods in Stamford (Ottaway 1995a:2).

However, the Anglo-Saxons may have also used refined iron bars and ore that was not locally available (Arnold 1997:135; McDonnell *et al* 2012:4). These may have travelled across the country via trade routes, or by boat where the ore may have been used as ballast for the ship, and could then be used by smiths to create tools and weaponry (Ottaway 1995a:4).

Certainly, the earliest record of Anglo-Saxon iron ore mining dates to AD 689, with a charter granting the monks of Canterbury to extract ore at Lympne, Kent (Arnold 1997:136). It is likely that the Early Anglo-Saxons used a mixture of iron ores, refined bars and recycled items to manufacture tools, weapons and other items.

# **Iron Smelting sites**

Anglo-Saxon smelting sites are rare indeed, and only one, in Lyminge, Kent, has been found which securely dates to the Early Anglo-Saxon period (Birch 2011:5; Thomas and Knox 2015:9, 15). It is generally believed that the lack of finds is due to the fact that iron smelting took place outside of settlement sites, for this decreased the risk of fire and may have also been for ritual purposes (Birch 2011:5, 14; Hinton 1998:14). It is entirely possible that the relative lack of smelting sites known compared to the number of Early Anglo-Saxon settlements is biased due to the main focus of excavations, as these tend to focus primarily on the centre of settlement sites rather than the wider landscape (Birch 2011:8).

It is possible that smiths were also itinerant in the Early Anglo-Saxon period, which may account for a lack of permanent sites (Riley 2011a:27). It may be that the smiths would travel and smelt iron as needed before moving on to the next settlement (Hinton 1998:9; Ottaway 1995b:7). Therefore, there would be little remains of a smelting site within the archaeological record.

A popular theory is that iron smiths were forced to smelt iron and conduct metalwork on the edge of settlement sites due to the view of smiths as being connected with another world (Birch 2011:10). Certainly, the ability to turn rock into metal could be viewed as sorcery (Birch 2011:8; Hinton 1998:14-15). There is a theory that some tools may have been buried for ritual purposes, especially if manufactured from iron (Ottaway *et al* 2009:261; Riley 2011b:28). It is thought that the Anglo-Saxons treated iron with suspicion and considered it to be magical, and thus so were the smiths who worked it (Hinton 1998:16; Naylor 2015:134). This may well have led to iron needing to be disposed of in certain ways, either through burial, hoards or recycling (Naylor 2015:134).

## **Early Anglo-Saxon Furnaces**

Of the Early Anglo-Saxon furnaces so far found, none were capable of creating sufficient heat to remove all impurities from the iron ore (Ottaway 1995a:2). This meant that the items manufactured from this iron were not pure, and their quality varied due to the type of iron ore used. Of the three major sources, bog ore was the worst quality, and required larger quantities of ore to be used.

Though few furnaces have been discovered, iron slag is an important indicator of iron smelting having taken place nearby (Ottaway 1995a: 2). Of the smelting sites discovered, it is believed that the Anglo-Saxons used clay-lined bowl furnaces, with charcoal as the main source of fuel (Riley 2011a: 27). Bowl furnaces consist of a covered pit, which may have been lined with clay, but could not produce enough heat to remove all impurities from the iron ore (Ottaway 1995a:2). A clay-lined bowl furnace dating from the Middle-Late Anglo-Saxon period was found in Wakerley, Northamptonshire, which was used for smelting but would have to be rebuilt with every use as there was no way of tapping the slag (waste material from the ore)(Arnold 1997: 77)

Iron slag found at Mucking, Essex, suggests that a shaft furnace was in use to produce iron (Hinton 1998:4). Certainly shaft furnaces produced a higher temperature and thus a purer iron, thanks to the natural draught and prolonged contact with carbon monoxide, but of those found so far, all date to the Middle or Late Anglo-Saxon period (Ottaway 1995a:2).

## **Lyminge, Kent**

Excavations in 2014 at Tayne Field, Lyminge, uncovered a midden (a waste heap) rich with metalwork and iron slag, and a hearth was found beneath this (Knox 2014b; Thomas and Knox 2015:9). It is believed that this was a smelting site, and is the only one known to date to the Early Anglo-Saxon period (Knox 2014b). This is a major find, though it should be noted that Lyminge was not a typical Early Anglo-Saxon settlement. It is known to have been a Royal centre during this period, and the presence of elite items in the midden supports the status of this settlement in the 6th century AD (Knox 2014a; 2014b; Thomas and Knox 2015:9, 15). To further support that this was an elite site, moulds and crucible fragments were also discovered, indicating that fine metalworking was also occurring (Knox 2014b; Thomas and Knox 2015:10). Indeed, finds of copper alloy sheeting and bronze indicate that ironworking was not the only metal to be worked on this site, although it was the most smelted due to the amount of iron slag found (Knox 2014b; Thomas and Knox 2015:10). Unfortunately the excavations finished before the hearth and the midden could be fully excavated, and the full report has not yet been published. It is certainly the only site known where iron smelting on a large scale was taking place in the Early Anglo-Saxon period.

# **Carpentry and Metalworking Tools**

There does not appear to be much evidence of iron tools from the Early Anglo-Saxon period, although woodworking and metalworking tools have been recovered from the Middle Saxon period and later (Arnold 1997:xx). From the evidence of houses, ships and furnishings that the Anglo-Saxons had, it is known that there was a range of carpentry tools available, although sadly these are rarely recovered from archaeological sites (Arnold 1997:39).

Of the tools found, it is known that Anglo-Saxon woodworking tools include shaves, adzes and T-shaped axes (Ottaway *et al* 2009:257). The T-shaped axe is especially notable for being shown on the Bayeaux Tapestry where these tools were used during boat building (Ottaway *et al* 2009:257).

It is also believed that rasps (a file with widely set teeth) may have been used to finish timber objects, but only one Anglo-Saxon plane has so far been found (Ottaway 1995a:12). The plane was discovered in a 6th century grave in Sarre, Kent (Ottaway 1995a:12).

The majority of Anglo-Saxon tools have been found outside of settlement sites, having been placed in graves or deposited as hoards.

## **The Flixborough Tool Hoard, North Lincolnshire**

The Flixborough tool hoard was discovered in 1994 during mineral extraction at Flixborough quarry, and is believed to date to the Middle Anglo-Saxon period, although sadly this was found in an unstratified context (this was not found in a dateable layer) (Naylor 2015:134; Ottaway 1995a:8; Ottaway *et al* 2009:253, 256). The hoard included a bell, twelve woodworking tools and two cultivation tools which had been placed within two lead containers before deposition (Ottaway *et al* 2009:253). The woodworking tools included two shaves, an axe, four T-shaped axes, an adze, a T-shaped adze, and three spoon-bits (Ottaway *et al* 2009:253). It is thought that the narrower axes were primarily used for woodworking, including felling trees and cutting and splitting timber (Ottaway 1995a:4). This is an unusual hoard, and the reason for burial is unknown. This may have been a ritual deposition, as it is located away from the contemporary settlement, and was not placed with any human remains.

## **The Nazeing Hoard, Essex**

The Nazeing Hoard, Essex, is an unusual tool hoard, for though this was deposited in the 11th Century, it contains tools dating between the Late Roman and the Late Anglo-Saxon periods. Most notably, within the hoard was a Late Roman axe which showed signs of retouching and repair, indicating that this had been used continuously since its manufacture until its removal from use (Naylor 2015:133; Riley 2011b:23-4). There were also a number of knives of 7th or 8th century AD date, suggesting that some tools were so valuable that they simply were not buried until they were no longer of use (Arnold 1997:39; Riley 2011b:24).

## **Mästermyr, Sweden**

On the continent, tool hoards were deposited at the same time as those in England. Most notably is the Mästermyr hoard in Sweden. This hoard is the largest and most diverse of the Scandinavian tool hoards, with 150 items recovered, and appeared to have been the property of an itinerant craftsman who was skilled in carpentry and metalwork (Birch 2011:13; Ottaway *et al* 2009:259, 261).

The hoard included a varied range of metalworking and woodworking tools, as well as three bells, some keys and lock parts, and a griddle (Ottaway *et al* 2009:259). Woodworking tools included an adze, a rasp, and axes (Birch 2011:13). It was found in a wooden box in a lake, and it is unknown whether this was a ritual deposition or an accidental loss during travel.

## **Tattershall Thorpe, Lincolnshire**

This is so far the only Anglo-Saxon grave found to contain smithing tools, and dates to the 7th or early 8th century AD (Hinton 1998:5; Ottaway *et al* 2009:261). The burial belonged to a male, and the grave goods included six smiths’ tools, some scrap items, and a bell (Birch 2011:13; Ottaway *et al* 2009: 261). The tools consisted of a hammer, a punch, an anvil and a draw plate or nail bar, which indicates that he was able to create iron weapons and implements as well as items of precious metals and copper alloys (Hinton 1998: 5). It would appear that this burial belonged to a metalsmith, with the tools either deposited in boxes or wrapped in textiles (Riley 2011b:24).

# **Weaponry**

By far the most common items manufactured from iron during the Early Anglo-Saxon period were items of weaponry, and these are mainly found in cemeteries of this date (Arnold 1997:67, 77). The Anglo-Saxons buried their dead with a variety of grave-goods, with men and boys often buried with items of weaponry whereas females were buried with dress accessories and weaving related items (Arnold 1997: xix, 92).

The most popular iron artefact was the iron knife, and these have been found in both male and female graves (Arnold 1997:77). However, swords, shields, seaxes (a one-edged blade), and spears have been recovered from male graves dating to the Early Anglo-Saxon period (Arnold 1997:215).

# **Conclusion**

There is much more research to be done about iron working in the Early Anglo-Saxon period, and it is hoped that further excavations may reveal more sites of smelting and metalworking. Overall it can be seen that smelting was occurring on the edge of settlements for both pragmatic and ritualistic reasons, and iron was the most common metal used for tools and weaponry. It may be that tools were passed down from master smith to apprentice before being deposited in the archaeological record many years later, and the Nazeing Hoard especially indicates that tools were carefully retouched and looked after. It may also be that iron tools were recycled or repaired for many years before deposition.

The Early Anglo-Saxons also used lead, gold, silver, tin and copper-alloys, with various tools being required for the manufacture of tools, weapons, vessels and dress accessories using these metals (Arnold 1997:33, 83). However, it is unclear if these were smelted from ores, or imported from other parts of Britain and the Continent (Arnold 1997:136). The smithing process in the Early Anglo-Saxon period is an area which requires further study, and hopefully more smelting sites will be discovered over time.

# History

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| Status | Date | Author | Details of change |
| Draft 0.1 | 20/4/20 | Victoria Fleming | First draft |
| Draft 0.2 | 9/5/20 | Victoria Fleming | Placed focus on the UK. More detail on the smelting process, and other metals. Added section on weaponry. |
| Issue 1.0 | 25/5/20 | Victoria Fleming | Issued with no change after peer review. |

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