An Analysis of the Metal Finds from the Ninth-Century Metalworking Site at Bamburgh Castle in the Context of Ferrous and Non-Ferrous Metalworking in Middle- and Late-Saxon England

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AN ANALYSIS OF THE METAL FINDS FROM THE NINTH-CENTURY METALWORKING SITE AT BAMBURGH CASTLE IN THE CONTEXT OF FERROUS AND NON-FERROUS METALWORKING IN MIDDLE- AND LATE-SAXON ENGLAND

by

Julie Polcrack

A thesis submitted to the Graduate College in partial fulfillment of the requirements for the degree of Master of Arts

The Medieval Institute
Western Michigan University
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AN ANALYSIS OF THE METAL FINDS FROM THE NINTH-CENTURY METALWORKING SITE AT BAMBURGH CASTLE IN THE CONTEXT OF FERROUS AND NON-FERROUS METALWORKING IN MIDDLE- AND LATE-SAXON ENGLAND

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Western Michigan University, 2017

This thesis opens with an investigation of the evidence for blacksmithing and non-ferrous metalworking in Anglo-Saxon England during the Middle- and Late-Saxon periods, c. 700-1066. The second chapter of this thesis focuses on knives and non-ferrous strap-ends during this period in order to discern any regional distinction in metalworking from the Anglo-Saxon kingdom of Northumbria. I initially conjectured that Northumbrian knives and strap-ends would show stylistic differences from knives and strap-ends made in other Anglo-Saxon kingdoms, but in this chapter, I conclude that Northumbrian metal objects were homogenous with the assemblages from the remaining kingdoms. In the final chapter of this thesis, I assess the collection of metal objects uncovered at the Anglo-Saxon smithy site at Bamburgh Castle. In my analysis, I use an archaeologically oriented approach; after I pull the metal objects from the small finds register, I divide them into the groups of ferrous, copper-alloy, and lead objects. I then assess the types of objects most commonly made out of these metals on this site. After this process, I plot the objects on a map of Trench 3 in order to discern any patterns of distribution. As I suspected, the objects cluster around the southern end of the trench near to where the smithy building was discovered. These conclusions and the extent of metal object production indicate that Bamburgh Castle was the location of a significant production site within the Northumbrian economy.
ACKNOWLEDGMENTS

This thesis would not have been possible without the dedication and support of many individuals along the way. First, I would like to sincerely thank the Bamburgh Research Project for its generosity in allowing me full access to their records. I am also grateful for the assistance of individual members of the Project; I would like to personally thank Des Taylor and Jeff Aldrich for helping me gain access to photographs that were instrumental to my research. I would also like to take this time to thank Graeme Young in particular for taking the time to continually offer guidance and answer my inquiries about the site during the course of this research endeavor.

I would also like to thank the other two members of my thesis committee – Dr. Jana Schulman and Dr. Robert Berkhofer. Dr. Schulman has guided me through every step in this process and I would not have been able to complete this project without her. Dr. Berkhofer too has been supportive and generous throughout my research for this thesis. I would like to offer my sincere gratitude to you both.

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Julie Polcrack
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INTRODUCTION

The transition from wooden and stone implements to metal tools marks a significant shift in many human cultures throughout time. The strength and durability of these tools and weapons increased our capacity to build, create, and thrive in this world. This principle holds true in the Anglo-Saxon kingdoms, in which metal tools proved integral to the workings of society. In my thesis, I seek to underscore the importance of ferrous and non-ferrous objects in the economic exchanges and everyday life of the residents of the Anglo-Saxon kingdom of Northumbria, as exemplified by the metalworking site at Bamburgh Castle, a site prominent in both the landscape and industry of the region. This thesis was inspired by my past research on Northumbria, the geographic focus of this study, and my field work at the archaeological site of Bamburgh Castle, which is run by the Bamburgh Research Project, a team of archaeologists and scholars who have been studying Northumberland’s archaeology since 1996. I was able to travel to Bamburgh to hone my archaeological excavation techniques and gather unpublished data through the Tashjian Study Fellowship, awarded by the Medieval Institute of Western Michigan University, and a Graduate Student Research Grant, issued by the Graduate College of Western Michigan University.

Background

In terms of my geographic focus, when I refer to ‘Northumbria’, I am describing the Anglo-Saxon kingdom of Northumbria in the modern regions of northern England and southern Scotland. The Firth of Forth marks the northern boundary and the Humber marks the southern boundary of this kingdom. At certain intervals in Anglo-Saxon history, the kingdom was divided into two separate subkingdoms – Bernicia in the north and Deira in the south. Bede recorded
King Æthelfrith (d. 616) as first uniting the two areas into one kingdom in the seventh century and credited his son Oswald with establishing a more lasting and harmonious union of the two subkingdoms.¹ This Northumbrian kingdom, however, was not continuously united throughout Anglo-Saxon history. Scandinavian settlers in the ninth and tenth centuries brought certain parts of the kingdom under their dominion while other portions remained under nominal Anglo-Saxon control. I have attempted to keep this fractious and turbulent history of Northumbria in mind throughout my thesis.

In terms of my temporal focus, I primarily concentrate on the Middle and Late Saxon periods in this work. These periods correspond with the time of Scandinavian invasion and settlement in Northumbria, c. 790-1066 CE. I am focusing on this period because it offers the largest collection of metalworking evidence throughout Anglo-Saxon England and I believe it is fruitful for investigating Northumbrian cultural identity. The influx of Scandinavian people would presumably have an effect on the material culture of Northumbria as immigrants often bring with them different styles of dress, craft production, and artistic expression. These styles can be incorporated into native craft and artistic production. At times, this type of stylistic evolution is visible in the material record; I explore this concept more thoroughly in chapter two.

**Theory and Methodology**

By the very nature of my evidence from Bamburgh, my approach in this thesis is rooted in archaeological theory and methodology. In using unpublished data collected from an archaeological excavation, I hope to enhance current understanding of the metalworking industry in Anglo-Saxon England and extrapolate an aspect of Northumbrian cultural identity from this

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practice. Both the ironworking sites themselves and the iron objects found at these sites constitute my evidence in this endeavor. In my analysis of archaeological evidence, I have attempted to apply Thing Theory and Actor-Network-Theory in hopes of keeping my approach rooted in the material evidence. Thing Theory underscores the importance of material objects and asks us to think about “how inanimate objects constitute human subjects, how they move them, how they threaten them, how they facilitate or threaten their relation to other subjects.”2 Similarly, Bruno Latour, in his book Reassembling the Social: An Introduction to Actor-Network-Theory, urged readers to see how human action is not simply a person making a decision, but that humans are part of an actor-network in which outside forces, like objects, affect our choices and, in a way, have a form of ‘agency’.3 I have used these theories in tandem to look at artifacts not just as things made by people, but as objects that shaped the lives of those who used them. A process like the production of metal objects would have a certain effect on the lives of those who participated in this industry or lived near it; this effect can be observed clearly within the industrial area uncovered at Bamburgh Castle. I have endeavored to understand how material things can shape everyday existence and keep this concept in mind while studying metal objects from Bamburgh Castle and other Anglo-Saxon sites.

I have used the archaeological data from Bamburgh and the interpretive skills I learned on the excavation this past summer to write this thesis on the metalworking industry in Northumbria, with a concentration on Bamburgh and nearby sites. The metal objects and evidence of metalworking from Bamburgh and other sites across Northumbria have helped me to

discern the importance of this industry in Northumbrian society; I then extended this work to compare Northumbrian metalworking practices to those of other Anglo-Saxon kingdoms.

**Past Scholarship**

One of the seminal scholars in the field of Anglo-Saxon blacksmithing, R.F. Tylecote, has written a number of works on ironworking and iron artifacts from Anglo-Saxon England. His most notable works are *The Metallography of Early Ferrous Edge Tools and Edged Weapons* (1986), *The Prehistory of Metallurgy in the British Isles* (1986), which is based on his previous monograph *Metallurgy in Archaeology: A Prehistory of Metallurgy in the British Isles* (1962), and *The Early History of Metallurgy in Europe* (1987). His works have become standards for any scholar working in this field.

More recently, Kevin Leahy has written a succinct, yet comprehensive resource on Anglo-Saxon smithing practices in his chapter on iron metalworking in his monograph *Anglo-Saxon Crafts*. This chapter explains the entire production of iron objects from iron ore extraction to the logistics of smithing in this period. Given its relatively recent publication date, 2003, this work incorporates a multiplicity of evidence from archaeological excavation and laboratory work conducted in the previous decades.

Patrick Ottaway has become one of the leading contributors to the study of Anglo-Saxon iron objects and smithing practices in recent years. He has authored two works on artifacts from excavations in York, including a work devoted entirely to iron objects from Anglo-Scandinavian York. In his analysis of iron artifacts from York, Ottaway created a foundational typology of Anglo-Saxon knife blades that has yet to be modified or replaced. This classification system is based on the shape of the back of the blade, as the cutting edge of a blade could change from use
or sharpening. I have adopted Ottaway’s knife blade typology in the second chapter of my thesis when I analyze ferrous blades in southern and northern Anglo-Saxon metalworking sites.

Ottaway also wrote a three-part, unpublished work on Anglo-Saxon ironwork, which is available online and comprehensively catalogs all classes of iron artifacts from Anglo-Saxon England. In the first part of this work, Ottaway summarizes smithing practices in this period and the various tools smiths required. This first part also includes a section on craftsmen’s tools and farming implements. The following two parts of Ottaway’s work separate the compendium of iron objects from Anglo-Saxon contexts into categories such as knives, spearheads, axes, and other tools. This study is a requisite source for anyone studying Anglo-Saxon iron artifacts.

Besides the works of these few scholars, very little scholarship has been focused on mining, smelting, and smithing during the Anglo-Saxon period. In 1976 David M. Wilson published a chapter entitled “Craft and industry” in the volume *The Archaeology of Anglo-Saxon England*. This chapter covers a broad range of craft industries, metalworking included, but the number of pages devoted solely to smithing and metalworking amounts to a very small section in a chapter containing barely more than twenty pages. In a few instances, works devoted to medieval metalworking in England contain passing references to practices during the Anglo-Saxon period, but not in any great level of detail.4

In conjunction with scholarship on metalworking, I have delved into research on Northumbrian regional identity as expressed through metal objects and metalworking. In general, the subject of Northumbrian cultural identity has inspired very little scholarship. David Rollason, in his substantial monograph *Northumbria, 500-1100: Creation and Destruction of a Kingdom*, defines Northumbrian identity by linguistic difference from other Anglo-Saxon

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kingdoms. Bede’s writings, which tie Northumbrian identity to descent from the Angles and linguistic distinction from other Anglo-Saxon kingdoms, are the basis for this argument. A far pithier work, Thomas Klein’s “The Non-Coherence of the Franks Casket: Reading Text, Image, and Design on an Early Anglo-Saxon Artifact,” explores Northumbrian identity in a specific piece of art, a whalebone ivory box, but it does not push the boundary beyond this specific artifact. The few works that deal with Northumbrian identity rarely broach the subject of craft production. When scholarship does delve into the realm of material objects, it is typically focused on the Franks Casket or the broader subject of stone sculpture. One scholar, Gabor Thomas, has attempted to identify a distinct Northumbrian style among a small group of strap-ends, but his conclusions were misleading and based on a small, carefully-curated sample size, as I outline in chapter two. I explore his work and the concept of regionality as expressed through metalworking more thoroughly in that chapter.

**Thesis Overview**

In the first chapter, I explore the processes of metalworking for both ferrous and non-ferrous metals in Anglo-Saxon England from the preliminary step of mining to the creation of a finished product through smithing. I chose to elucidate both ferrous and non-ferrous forms of metalworking because, although the processes for the mining and smelting of these metals are quite similar, the smithing of specific objects and the uses of these final products differ vastly between these two categories of metal. There are indications that metalworking was a specialized field in Anglo-Saxon society; smiths who worked with iron were not the same

craftsmen who made gold jewelry, for instance.\textsuperscript{6} Incorporating both textual and archaeological sources, I have been able to approach each step in the metalworking process for both metal types during this period. The arduous processes of mining, smelting, and smithing required an immense effort and a significant portion of time. To buy an object as labor-intensive as a sword, hefty resources would be necessary to fund such an effort. Understanding each step in the metalworking process helps to illustrate the strenuous nature of these efforts, which simultaneously underscores the vital place of metal objects in society.

I first analyze evidence for iron ore extraction, then that of iron smelting, and after that, smithing of iron objects in Anglo-Saxon society. After this analysis of ferrous metalworking, I describe the types of iron objects smiths made and how these items were used. In general, iron was typically used to craft utilitarian goods for everyday use, but nevertheless, major categories of artifacts emerge out of the corpus of Anglo-Saxon ferrous finds. Structural fittings and fixtures constitute one of the largest groups within the collections. Iron was the primary material used to make tools for workers of every type, ranging from humble farmers to skilled craftsmen like carpenters or smiths.

After my study of the Anglo-Saxon ironworking industry and iron objects, I analyze the non-ferrous metalworking industry and the non-ferrous metal artifact assemblage. Non-ferrous metalworking in the Anglo-Saxon period produced ornamentation on clothing and other decorative works. Anglo-Saxon metalworkers used silver, gold, bronze, lead, and copper alloys to create pins, brooches, strap-ends and similar objects. The production of these decorative objects offers a juxtaposition with ironworking, which often produced utilitarian objects like

tools and nails. Analysis of objects with more artistic flair and personalization should indicate a Northumbrian artistic style more so than a study of iron objects.

The assemblage of non-ferrous objects is comprised of more decorative items used for adornment than the collection of ferrous objects. These objects could be jewelry items like rings or bracelets or clothes fittings like brooches or strap-ends, which prevented the ends of belts from fraying. These artifacts could be made of semi-precious metals like copper or more expensive metals like gold or silver, depending on the wealth and wishes of the person purchasing these items.

In the second chapter of the thesis, I analyze ferrous knife blades and non-ferrous strap-ends from a number of smithing sites in Anglo-Saxon England in an attempt to discern any deviation in Northumbrian metalworking practices from those same practices in the other Anglo-Saxon kingdoms to the south. In my analysis of metal objects in the region of Northumbria, I did not set out to define personal identity, but rather I sought to find shared metalworking practices within, and distinct from, Northumbria. Initially I conjectured that these practices, unique to this kingdom, would shine a light on its regional identity, but this was not the case as I argue in chapter two.

The third and final chapter of my thesis is focused on metalworking operations at Bamburgh Castle during the ninth century. In Trench 3 at Bamburgh Castle, the Bamburgh Research Project uncovered a metalworking building in the midst of an Anglo-Saxon industrial area within the confines of the fortress. After combing through the small finds register of the site and pulling all metal objects from the archaeological contexts related to the ninth-century smithy building excavated during the dig seasons from 2009 to 2012, I was able to interpret this artifact assemblage and investigate the metalworking operations at Bamburgh Castle during this period.
Through careful study of the metal finds assemblage at Bamburgh, the nature of metalworking practices at the fortress became more salient. In my analysis, I first separated the ferrous and non-ferrous metal finds. Next, I broke down the non-ferrous category of objects further into copper and lead, the two types of non-ferrous metal objects uncovered in layers related to the smithy building. These analytical categories highlighted the differences between the types of metalworking conducted at this site.

After assessing the artifact assemblage, I decided to map out the metal artifacts on a map of the site. For the metal finds that had recorded Easting and Northing grid locations,7 I was able to place them on a map of Trench 3 with the help of QGIS software. Sadly, this dataset is quite flawed; the Bamburgh Research Project operates as a field school to train archaeologists and many of the grid locations were not recorded accurately. A great many more of the artifacts do not have grid locations recorded at all in the finds register because these points were recorded on paper and have not been digitized or entered into the register yet. Despite these challenges, the mapping of iron, copper, and lead artifacts did prove useful in demonstrating trends in the metalworking area on the site.

This entire work furthers the study of metalworking through its emphasis on metalworking practices within the kingdom of Northumbria, at the specific site of Bamburgh. In my focus on a specific region, I have discovered the general homogeneity of metalworking styles for knives and non-ferrous strap-ends during the Middle and Late Saxon periods. It is my hope that this thesis thoroughly examines the metalworking process in Anglo-Saxon England and correctly characterizes the extent and type of metalworking conducted at the Northumbrian royal fortress of Bamburgh.

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7. Sites of archaeological organization are typically mapped on a grid oriented to the north and east. This means that locations of artifacts are recorded according to how far they are to the east and north of the (0,0) point of the grid. Easting locations are the x-coordinate and Northing locations are the y-coordinate.
CHAPTER I: THE PRACTICALITIES AND SOCIETAL IMPLICATIONS OF FERROUS AND NON-FERROUS METALWORKING IN THE MIDDLE AND LATE ANGLO-SAXON PERIOD

In this first chapter, I will explore metalworking practices, the products metalworkers made, and the role metalworkers played in Anglo-Saxon society. The research in this chapter focuses on the whole of Anglo-Saxon England during the Middle and Late Saxon periods, which span c. 700-1066.8 The Early Saxon period has been omitted because of the paucity of metalworking evidence in the Anglo-Saxon kingdoms at this time.

Chapter one serves as an introduction to the metalworking industry in Anglo-Saxon England. I first illustrate the ironworking industry from ore extraction to final, iron object. I then examine the smelting and smithing processes practiced in the non-ferrous metalworking industry and the subsequent non-ferrous products. Both sets of material will inform my observations and findings in chapters two and three of this thesis. In order to discern metalworking practices from material remains in the archaeological record, I will have to explore the techniques Anglo-Saxon metalworkers used and the types of products that they made. Ironworking is a natural place to start this study, for iron objects were indispensable to everyday survival.

Metalworking Sites

In this thesis chapter, I discuss evidence from a number of archaeological sites. To better contextualize this material evidence, I should illustrate the nature of each site in my study. Many of these sites I describe here will appear in this chapter, but not all. The remaining are featured

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in my second chapter, which investigates regional variation of Northumbrian ferrous and non-ferrous metalworking. The only site not included in this section is Bamburgh Castle, which is the focus of Chapter 3, and the archaeological and historical context of that site will be covered more extensively there.

A site that has produced a staggering number of iron artifacts is Coppergate 16-22, which was a prominent Anglo-Scandinavian trading and production site in the Anglo-Saxon kingdom of Northumbria during the ninth through tenth centuries. Today, the site lies within the city of York, North Yorkshire. Scandinavians began to occupy the site after their invasion of the city in 866/7. The richest contexts for ironworking and other craft production on a mercantile level fell in the timeframe c. 935-c. 975,\(^9\) from which period archaeologists have uncovered approximately 4700 iron artifacts.\(^10\) My research focuses on the occupation of the site in the period 850-1066, spanning the Middle and Late Saxon periods.

Cottam, located in East Yorkshire about ten miles from the coast, was discovered by metal detecting and has yielded a substantial number of metal finds.\(^11\) It has thus been considered a ‘productive site’, occupied in the eighth and ninth centuries.\(^12\) Archaeological investigation has shown that the principal function of the site was farming, followed by minor

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Excavations yielded evidence for two timber buildings and post-holes arranged into a possible enclosure in the eighth century during the early Anglian phase. These structures were demolished and another timber building was erected later in the Anglian period. That site was abandoned in the late-ninth century or early-tenth century and the occupation area was moved to a different, nearby area in the early-tenth century. This Anglo-Scandinavian occupation was characterized by a number of drainage and boundary ditches and post-holes. Throughout these Anglian and Anglo-Scandinavian layers, metal finds and pottery shards were intermittently distributed. The metal finds from metal detecting and archaeological excavation indicate that some metalworking took place, but on a small scale. No evidence was found for smelting on site.

South Newbald is another ‘productive site’ in East Yorkshire that was occupied from the eighth century into the tenth century. It was located squarely in the kingdom of Northumbria, ten kilometers north of the Humber, the traditional southern border of the kingdom during the Anglo-Saxon period. This site was investigated in an unusual manner; no formal archaeological excavation process took place. The metal objects were recovered from topsoil that was disturbed by modern farming efforts, which removed them from their archaeological context. Because these objects were no longer stratified and were so close to the surface, metal detecting was the

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only method used to locate artifacts. Metal objects such as pins, strap-ends, and eighth-ninth century coins constitute the majority of finds from South Newbald. The dearth of domestic items, like pottery or keys, and the quantity of metal items indicates that this was not a domestic settlement, but perhaps a market site.

Flixborough, North Lincolnshire was an elite settlement and production site occupied continuously from the seventh century into the eleventh century. Archaeologists have dubbed the site ‘elite’ because of the quality and quantity of the artifacts uncovered here. Excavations have discovered evidence for a substantial rural settlement; they have uncovered the remains of about forty different buildings. The site was only 8 kilometers south of the Humber; this proximity to Northumbria will be explored further in Chapter 2. Flixborough was later annexed into the Scandinavian-controlled Danelaw, which is worth noting for possible Scandinavian influence on the craft industries practiced on the site.

Lundenwic, the Anglo-Saxon trading site located on the Thames’ north bank in the modern city of London, produced a number of objects related to craft production. Lundenwic belongs to a class of trade sites labeled ‘emporia’ or wics (in Anglo-Saxon England). These sites were centers of trade and manufacturing in northern Europe in operation primarily during the

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22. Leahy, “Middle Anglo-Saxon Metalwork from South Newbald,” 77-80.
seventh through ninth centuries. In Lundenwic by the late-seventh century, the kings of Kent had royal officials stationed in Kent collecting tolls, indicating its prominence as a trading post in the North Sea economy. In the mid-sixth century to mid-seventh century, Lundenwic is estimated to have taken up around sixty hectares in the area between Trafalgar Square and Aldwych, a substantial area. The trading site also had a significant population; between 5,000 and 10,000 residents occupied the settlement in the middle of the eighth century. The majority of ferrous and non-ferrous objects I analyze in this thesis came from contexts in the period c. 770-850, slightly later than these population and geographic area estimates.

Ironworking

The ironworking industry touched nearly every stratum of Anglo-Saxon society. Blacksmiths created the quotidian tools of the farmer or craftsmen, while also possessing the capability to craft magnificent pattern-welded swords for the higher classes. The entire process of creating an iron object was quite involved. From finding and mining ore to crafting a finished product, this craft production required many man-hours and abundant resources. From the evidence at an iron smelting site in West Runton, Norfolk in operation from 850 to 1150, scholars have estimated that workers needed to move 270 cubic feet of sand in order to gather 600 pounds of rocks containing iron ore. After the iron ore was removed from the rocks, the result would produce only 150 pounds of smelted iron. Just to acquire the iron needed for

smithing, immense labor had to be spent to produce a rather meager result. Each laborious step in the ironworking process, like the smelting at West Runton, left behind physical traces on the archaeological record. Archaeologists have recorded and interpreted this scant evidence to illustrate the entire ironworking procedure from beginning to end.

Before a blacksmith set out to construct an iron tool or weapon, he had to acquire raw materials. Iron had to be extracted from ore, which came from one of two sources: iron oxide deposits in wet environments, referred to as bog iron, or deposits on dry land that contained iron. These dry deposits include carbonate, hematite, and limonite ores, which contain iron and were available throughout Britain in this period. Iron was typically collected from near the surface or from swampy areas in a process known as surface mining. Archaeologists have found little evidence for surface mining in the Anglo-Saxon period, although a few small, shallow pits, like the ones at West Runton, Norfolk, that were likely dug for iron ore extraction near the ground surface have been recovered; finds such as these are rare. Even less evidence has been uncovered for deep mining during the Anglo-Saxon period.

After collecting the ore, it had to be cleaned and roasted in order to prepare it for the iron smelting process, which would create usable iron for the smith. In the smelting process, the smelter would heat the ore in a furnace to further separate the iron from the remainder of the ore.

and purify the metal. The roasted ore needed to be heated to at least 800 °C with charcoal in order to separate and purify and ore.\textsuperscript{34}

The Anglo-Saxon ironworkers relied mainly on two types of smelting furnaces, the bowl furnace and the shaft furnace.\textsuperscript{35} The bowl furnace is the simpler of the two, consisting of a pit in the ground with an equal height and width, a short shaft, and a tuyere (opening at the base of the shaft where bellows would blow in air).\textsuperscript{36} In a bowl furnace, the smelted iron had to be removed from the top of the shaft.\textsuperscript{37} At Ramsbury, Wiltshire, archaeologists discovered two bowl furnaces dating to the late eighth to ninth centuries.\textsuperscript{38} The excavators conjectured that the bowl furnaces were either covered with a layer of clay or damp charcoal that was broken every time smelted iron was taken out or the furnaces had a permanent clay cover with a top opening large enough to take the iron out.\textsuperscript{39} The archaeologists at Ramsbury also uncovered a modified bowl furnace, where a slag-tapping hole was added to the furnace so the smelter could remove excess slag from the iron before removing it from the furnace.\textsuperscript{40} This furnace from Ramsbury clearly demonstrates the experimental nature of smelting. Through trial and error, the smelter would attempt to make the process more efficient, with a higher quality product as a result. The second type of smelting furnace, the shaft furnace, differed from the bowl furnace in that it had a height that was greater than twice the width and, presumably, a clay shaft built over top of it that was

\textsuperscript{35} Tylecote, \textit{The Prehistory of Metallurgy in the British Isles}, 179-82.
\textsuperscript{36} Tylecote, \textit{The Prehistory of Metallurgy in the British Isles}, 133-5.
\textsuperscript{37} Tylecote, \textit{The Prehistory of Metallurgy in the British Isles}, 135.
\textsuperscript{39} Haslam, “A Middle Saxon Iron Smelting Site at Ramsbury, Wiltshire,” 21.
\textsuperscript{40} Haslam, “A Middle Saxon Iron Smelting Site at Ramsbury, Wiltshire,” 25-6.
also taller than any structure built over a bowl furnace.\textsuperscript{41} With the shaft furnace, the iron would be taken out of the structure through a hole in the side, not through the top.\textsuperscript{42}

Concrete evidence for the smelting process has been difficult to find; archaeologists have confidently identified no more than a dozen smelting sites since 2011.\textsuperscript{43} The practice of smelting may be so difficult to identify in the archaeological record because smelting took place outside settlements and away from smithing areas, a practice that has been demonstrated in Scandinavia through archaeological investigation.\textsuperscript{44} One of the issues with archaeological evidence for these practices is the paucity of metalworking sites that have clear evidence of furnaces and tools. Many sites only contain partial evidence for ironworking, sometimes only slag and a few areas of burning. A few place-names appear to have been derived from smelting practices. Kirkby Overblow, Yorkshire may have gotten its name from \textit{orablawere}, the Old English term for ‘ore-blower’ or ‘smelter’.\textsuperscript{45} Several other settlements have names derived from \textit{ora} (‘ore’) – Orgreave, Yorkshire; Orgrave, Lancashire; and Orsett, Essex.\textsuperscript{46} These modern settlement names indicate that smelting and working with ore may have had such an impact on the economic life of these areas during the early Middle Ages that these practices became synonymous with the place.

Smelting iron resulted in what archaeologists call an ‘iron bloom’: a heterogeneous, uneven mixture of iron and slag, a byproduct of smelting iron that is composed of silica from the iron ore.\textsuperscript{47} The smelting of other metals and glassmaking can also produce slag. Because of the

\textsuperscript{41} Tylecote, \textit{The Prehistory of Metallurgy in the British Isles}, 133-5.
\textsuperscript{42} Tylecote, \textit{The Prehistory of Metallurgy in the British Isles}, 133-5.
\textsuperscript{44} Birch, “Living on the edge,” 5-6.
\textsuperscript{46} Page, \textit{Life in Anglo-Saxon England}, 83.
\textsuperscript{47} Kevin Leahy, \textit{Anglo-Saxon Crafts} (Stroud: Tempus, 2003), 114.
heterogeneous, irregular composition of an iron bloom, parts of a bloom can have differing levels of carbon in them.\textsuperscript{48} Parts of a bloom with a higher carbon content would be more suitable for making steel. Steel was so highly sought after because it is a much stronger substance than pure iron, and as such, it was perfectly suited for use in cutting blades.\textsuperscript{49} Ferritic or phosphoric iron came from the parts of a bloom with a lower carbon content. Ferritic iron is essentially pure iron with less than 0.1 \% non-ferrous elements and less than 0.05 \% carbon while phosphoric iron, as its name indicates, has between 0.05-0.5 \% phosphorous in it, which works to harden the iron alloy.\textsuperscript{50} Ferritic iron is easier to work with as it is more malleable than phosphoric iron, but phosphoric iron is advantageous because it can be worked into a much harder iron finished product than ferritic iron.\textsuperscript{51} A smith could take a bloom composed of any of these iron types and melt it down to make tools or weapons.

A smith could also modify the iron in an iron bloom. He could add more carbon into the iron to make steel if there was no steel already present in the bloom.\textsuperscript{52} One method of doing so was to allow the carbon from the charcoal to seep into the metal by heating the metal to around 900 °C in a furnace, a process called carburization.\textsuperscript{53} Steel could be made and strengthened in other ways as well. According to G. McDonnell, steel became such a strong metal alloy “not just

\textsuperscript{50} McDonnell, “Iron and its alloys in the fifth to eleventh centuries AD in England,” 375; Leahy, \textit{Anglo-Saxon Crafts}, 115.
\textsuperscript{51} Leahy, \textit{Anglo-Saxon Crafts}, 115.
\textsuperscript{52} Ottaway, “The Products of the Blacksmith in Mid-Late Anglo-Saxon England, 1,” page 3.
\textsuperscript{53} Ottaway, “The Products of the Blacksmith in Mid-Late Anglo-Saxon England, 1,” page 3; Leahy, \textit{Anglo-Saxon Crafts}, 116.
by additional carbon content, but by deliberate treatment,” such as quenching. Smiths quenched steel by quickly heating the metal and immersing it in water, thereby strengthening the metal. Kevin Leahy, in his comprehensive work Anglo-Saxon Crafts also thoroughly describes how steel could be hardened through quenching and tempering the metal. Tempering is a process in which the smith reheats the steel after it has been quenched, putting added stress on the steel and hardening it.

A bloom could also be cut into smaller pieces for the transport of iron to various smithing sites. In Scandinavia, these rough iron pieces were called billets, which could later be formed into neater bars. These bars always had a hole at one end and were presumably made for sending to other smithing areas. The holes in the bars may have been for ease of transport, but their exact function is uncertain. In Anglo-Saxon England, there is evidence that blooms were cut up and transported to smiths. Notably, Coppergate produced one of the largest collection of iron strips and unworked bar iron in Britain during this period, numbering approximately 440 items.

Once the iron was smelted and the blooms were cut into bars, the metal had to be fashioned into tools or weapons through smithing. Intense heat was integral to the smithing process. In order to shape iron into objects, it must be heated, as iron is only malleable from

55. Leahy, Anglo-Saxon Crafts, 115.
56. Leahy, Anglo-Saxon Crafts, 115.
59. Dr. Jana K. Schulman, pers. comm.
60. Patrick Ottaway, Anglo-Scandinavian ironwork from 16-22 Coppergate, 492-3, 506.
700-1250 °C. The smith then used a hammer to beat out the iron bar or strip on an anvil and shape it into whatever implement he desired. To make certain items, the smith had to join separate pieces of iron or steel together through the process of welding. Welding also required high heat; in order to weld, the smith would have to heat the metal to c. 1200 °C. Smiths often used sand to simultaneously hinder oxidation and to produce slag that would weld the pieces together.

Smithing furnace areas, where the heating of iron took place, are the most apparent pieces of evidence for this process left on archaeological sites. Much of this evidence at furnace sites includes residue from burning, hammerscale (miniscule metal flakes that fly off metal after it is hammered), and the tools smiths used. Archaeologists uncovered two possible smithing hearths at Ramsbury. Compared to the smelting furnaces on the site, these smithing hearths were shallower and had evidence of post-holes surrounding them. These post-holes would have held wooden stakes that were part of a timber structure assembled around the hearth, constituting a simple smithy building.

The most iconic tools of the blacksmith are the hammer and anvil. According to Leahy, anvils in this period were quite small (See Fig. 1). Taking into account their size and shape, he theorized they “were placed in a socket, cut into a tree-stump or a log, which secured them and took the shock of the hammer blows.” Other tools include chisels for cutting iron from blooms or bars, tongs for holding metal, files for shaving sharp edges, clippers for cutting metal sheets,

and punches for cutting holes through sheets of metal.\textsuperscript{67} The smelting and smithing site at Ramsbury provided a fine collection of these smithing tools, but no evidence of an anvil.\textsuperscript{68} Archaeologists at Lundenwic uncovered a punch and two hammers that were likely used for metalworking.\textsuperscript{69}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure1.png}
\caption{End view of an anvil, 82 mm in length, found at Coppergate. Plate XXXVIa from Patrick Ottaway, \textit{Anglo-Scandinavian ironwork from 16-22 Coppergate}, The Archaeology of York, vol. 17, fasc. 6 (London: Published for the York Trust by the Council for British Archaeology, 1992). Used with permission of Patrick Ottaway.}
\end{figure}

\textsuperscript{68} Haslam, “A Middle Saxon Iron Smelting Site at Ramsbury, Wiltshire,” 36-7.
**Written Evidence for Ironworking**

Anglo-Saxon textual sources are strangely quiet on the subject of ironworking. The Old English word for blacksmith was *smið*, but this same word could be used to refer to any kind of smith, like a gold- or silversmith, or, more broadly, it could mean ‘handicraftsman’.70 This ambiguity presents a challenge, albeit a minor one. Typically *smið*, when used to refer to a smith of non-ferrous metal, would be modified by the type of metal the smith used, as in the instance of *seolforsmið*, or silversmith. When Anglo-Saxon authors wanted to be more explicit in their writing about a blacksmith, they could modify the word ‘smith’ with the words for iron, *isen* or *ieren*, and write *isenmið* or *ierenmið*. Authors also used the word *isenwyrhta* to refer to blacksmiths or ironworkers.71

The broad term *smið* occurs in forty-nine instances in twenty-four different Old English texts, according to the *Dictionary of Old English Corpus*.72 The majority of these occurrences are in texts written by the abbot and theologian Ælfric of Eynsham. Of the forty-nine total occurrences of *smið*, it appears twenty-six times in Ælfric’s various texts and fifteen times alone in one of his grammatical texts.73 In Ælfric’s writing, this word is used most often for the purposes of grammar pedagogy. This particular use of the word does not indicate any particular viewpoints on the role of the smith in Anglo-Saxon society.

The word *smið* appears six times in various versions of the gospels and twice in Anglo-Saxon law codes – once in the law code of King Æthelberht of Kent (d. 616) and once in the laws of King Ine of Wessex (d. c. 726). In Æthelberht 7, if a person murders a smith or messenger in the king’s service, the offender has to pay the normal wergeld for the smith or messenger.\(^{74}\) This law demonstrates that while a smith could work in the service of the king, it did not grant him any greater legal protection. Ine 26 allows a nobleman to take his reeve, smith, and the nurse of his children with him if he changes his place of residence.\(^{75}\) This capitulary grants a nobleman the right to essentially treat his smith as property, taking him with him wherever he moves. These laws begin to elucidate how smiths were treated in their lived experience, but do not reveal very much about their day-to-day actions.

The more specific term *irensmið*, however, only occurs in two texts. Both of these occurrences are tied to specific people, the biblical figure Tubalcaïn and Stephen the smith in Gregory the Great’s *Dialogues*. Again, these instances of *irensmið* do not provide much of an indication of how the Anglo-Saxons viewed smiths and smithing.

Ælfric of Eynsham included a blacksmith in his *Colloquy*, an instructional text for Anglo-Saxon students learning Latin. In this Latin work, there is a hypothetical discussion between workers about the value of their own trades and occupations. When the carpenter boasts that his skill is the most crucial to society, the blacksmith retorts that the carpenter would be unable to do his job without the tools the blacksmith provides him.\(^{76}\) The blacksmith responds: “Oh, carpenter, why do you say this, when without my skill, you are not even able to make one

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hole?" This pointed jab at the carpenter indicates that the blacksmith was a highly regarded
craftsman who was integral to the function of Anglo-Saxon society.

Ælfric’s Colloquy was written in Latin, but it contained a full interlinear Old English
gloss in Version C, Cotton MS Tiberius A. iii, fols. 60b-64b. Line 231 of the text begins the
section where the smith taunts the carpenter. The Latin calls the smith ferrarius, meaning
blacksmith, however, the Old English gloss dubs the speaker goldsmiþ, goldsmith. This clear
disparity between the Latin and the Old English points to a possible scribal error or an ambiguity
of the Old English, but this instance of difference does not appear to add any nuance to our
understanding of how the Anglo-Saxons perceived blacksmithing. According to the Dictionary
of Old English, Ælfric’s Colloquy is the only instance in which goldsmiþ is used when irensmið
would be expected; the Dictionary explains it as an incorrect glossing of ferrarius. This
apparent error could indicate that blacksmiths sometimes worked with gold, but as this one
instance is the only evidence for this possibility, it is highly unlikely. Blacksmithing and non-
ferrous metalworking were both highly specialized professions that required intense training in
different skillsets. Artisans would likely be trained to work with either ferrous or non-ferrous
materials, not both.

The most famous smith of the period, the mythical figure Weland, makes a few
appearances in Anglo-Saxon poetry. The most complete and potentially older stories concerning
Weland, however, come from Scandinavian mythology. The account of Weland in the Poetic
Edda, Volundarkvitha, is one of the two mostly intact versions of his story and may have been

77. My translation from the Latin
79. “goldsmiþ,” Dictionary of Old English: A to H Online, ed. Angus Cameron, Ashley Crandell Amos,
Antonette diPaolo Healey et al. (Toronto: Dictionary of Old English Project, 2016).
80. Dr. Jana K. Schulman, pers. comm.
composed as early as the ninth century.\textsuperscript{81} The myth opens with Weland and his two brothers marrying Valkyries, but after seven years, they abandon their husbands without explanation.\textsuperscript{82} Weland’s two brothers go on a journey to search for their wives, but the smith stays behind to craft rings and other metal objects.\textsuperscript{83}

When King Nithhad learns of Weland’s skill and solitude, the king decides to send men to kidnap the smith.\textsuperscript{84} After questioning, Nithhad’s queen has Weland hamstrung and imprisoned on the island of Saevarstoth.\textsuperscript{85} Upon Weland’s imprisonment, the king takes his sword and one of the rings the smith made for his wife and gives the ring to his own daughter, Bothvild.\textsuperscript{86}

Weland works tirelessly, trapped in his island prison, until the king’s boys come to the island to see him. He cleverly formulates a plot to kill the king’s sons as revenge against him. He asks the boys to return to his island in two days time and implores them to keep the meeting a secret. The boys come back to the island and Weland takes the opportunity to cut off their heads. He turns their heads into cups coated with silver and sends them to the king. He fashions the boys’ eyes into jewels and sends them to the queen and then he crafts their teeth into ornaments and sends them to the king’s daughter.\textsuperscript{87} Bothvild visits Weland in his island prison because she wants him to repair her ring, and the smith takes this as an opportunity to take further vengeance against King Nithhad. He gives her enough beer to make her fall asleep and, although the narrator does not say directly what he did at this point in the text, it is assumed that Weland had

\textsuperscript{83} Crawford, trans., \textit{Volundarkvitha}, stanzas 4-5.
\textsuperscript{84} Crawford, trans., \textit{Volundarkvitha}, stanzas 6-11.
\textsuperscript{85} Crawford, trans., \textit{Volundarkvitha}, stanzas 12-7.
\textsuperscript{86} Crawford, trans., \textit{Volundarkvitha}, stanzas 16-8.
\textsuperscript{87} Crawford, trans., \textit{Volundarkvitha}, stanzas 19-24.
intercourse with Bothvild in her drunken state, because the text later reads "Bothvild wept as she left the island – she wept for her lover’s departure." Soon after, Weland flies to escape his island prison, though the text does not explain how he performs this feat, and he goes directly to the king’s home. The smith tells the king that he killed his sons and raped his daughter, but only after he gained the king’s assurance of his lover’s safety. Weland does not tell Nithhad that his lover is the king’s very own daughter when he asks for the king’s protection, as he wishes to keep her identity secret until he receives the king’s assurance of safety. After Weland recounts his revenge, he claims that Bothvild may even be carrying his child. Weland then laughs and flies away without any explanation from the text as to how he flew. Bothvild confirms Weland’s story and tells her father that though she resisted, she could not stop Weland from raping her.

One verse of the poem Deor alludes to Weland’s story. The poem is focused on offering solace in times of sadness and hardship, as exemplified through the refrain at the end of each verse, “That passed over – so can this.” Weland is used as an example in the poem because, according to Volundarkvitha, he overcame being hamstrung and imprisoned by King Nithhad.

Beowulf too includes a cursory mention of Weland. In lines 450-5, the eponymous hero claims that he is wearing chainmail that Weland made. This reference to a mythical, magical smith adds to the heroic and mystical aura of Beowulf. While Weland was a legendary figure, Anglo-Saxons may have viewed all smiths as possessing magical abilities, as David Hinton

91. Crawford, trans., Volundarkvitha, stanzas 31-5.
92. Crawford, trans., Volundarkvitha, stanza 35.
suggests in his article “Anglo-Saxon Smiths and Myths.”\textsuperscript{95} He points to a paucity of smithy evidence in early Anglo-Saxon settlements as an indication that smithing took place primarily outside of settlements. He posits that smiths might have been kept outside of villages and towns because they were viewed as magicians who turned iron ore into tools and weapons.\textsuperscript{96}

Thomas Birch also argues that smithing was often conducted outside of settlements in the early Anglo-Saxon period for superstitious reasons, but Birch factors in smelting as well, which also occurred beyond the boundaries of settlements. Birch contends that smiths and smelters were physically marginalized, their work taking place outside the settlement, because they were viewed as societal outsiders with magical abilities.\textsuperscript{97} He argues that this mindset is seen in both the archaeological and the literary evidence. Archaeologically, there is little evidence for smithies and smelting areas within settlements. In literary works like \textit{Beowulf}, weapons from elsewhere, from beyond Anglo-Saxon settlements, are shrouded in secrecy and more powerful than other, similar weapons.\textsuperscript{98}

These arguments about smiths having an otherworldly status are fascinating, but I find it more likely that smelting and smithing happened outside of settled areas for more practical reasons. Hammering a piece of iron on an anvil is a noisy task, which makes the smith a lousy neighbor. The high heat required for smelting and smithing required a considerable amount of charcoal to be burned, thus making these activities a dangerous fire hazard, which Birch concedes as a possible reason for smithy marginalization.\textsuperscript{99} It is, therefore, understandable why Anglo-Saxons would want to push smithing and smelting away from their homes and families.

\textsuperscript{96} Hinton, “Anglo-Saxon Smiths and Myths,” 14-5.
\textsuperscript{97} Birch, “Living on the edge,” 10, 13-4.
\textsuperscript{98} Birch, “Living on the edge,” 13-4.
\textsuperscript{99} Birch, “Living on the edge,” 14.
Mythical Weland also appears in Anglo-Saxon artwork on the Franks Casket, a carved, whalebone box that, while found on the Continent, was likely created in Northumbria during the eighth century. The casket is famous for the comingling of Roman, Christian, and Germanic pagan images, surrounded by Latin and Old English written in both the Latin alphabet and Runic writing. This object includes a scene with Weland, depicted working in his smithy, juxtaposed with an image of the Magi bringing gifts to newborn Jesus. The same scene progresses to show a man strangling a goose, which could refer to Weland’s legendary escape using wings his brother made for him.\(^\text{100}\) Pairing this scene with the adoration of the Magi appears strange, but there are a few possible thematic links between the two depictions. A contrast between good and bad kingship could be the commonality. The image of Christ the king is common in Christian theology and Nithhad, the king who trapped Weland, would be an obvious example of a bad king to a Germanic audience.\(^\text{101}\) More recently, Richard Abels has conjectured that the Weland and Magi scenes demonstrate the Anglo-Saxons’ views on reciprocity. According to Abels’ interpretation, these scenes show that “gift giving and revenge were two sides of the same coin” in Anglo-Saxon society.\(^\text{102}\) While these are valid interpretations of the paired images, these conjectures do not further our knowledge of Anglo-Saxon attitudes on smithing. Rosemary Cramp, however, offers such a possible reading of the Weland image. She contends that the scene “may hint at the subjection of smiths to kings.”\(^\text{103}\) This relationship between smiths and kings could have been a common trope to an Anglo-Saxon audience. This type of relationship


\(^{101}\) Webster, “The Iconographic Programme of the Franks Casket,” 232-3.


between kings and smiths may have existed not only in literature, but at royal sites like Bamburgh Castle, which had its own smithy building.

No Anglo-Saxon author composed a treatise on iron or non-ferrous metal production. One of the earliest works on metalworking techniques and practices from the medieval West was in the third book of *De Diversis Artibus* by Theophilus. The identity of this author and the origin of the text are opaque, but C.R. Dodwell conjectured that the text was composed by a twelfth-century German author, given the high praise of German metalworkers in the work. *De Diversis Artibus* provides a rare glimpse into how medieval authors viewed this craft, but this anachronistic source from continental Europe cannot be entirely representative of the Anglo-Saxon experience with ironworking or non-ferrous metalworking. Instead, we must look to the objects a smith crafted in the Anglo-Saxon period as an indicator of the smith’s place in this society.

**Iron Objects**

The types of iron objects found on a site varies immensely depending on the nature of the site. A small, agricultural settlement will produce different iron objects than a vast royal complex as these sites serve different purposes and have different needs. The nobility living at a royal site may require fine weaponry, while farmers in their bucolic homesteads need equipment to till the soil and care for their animals. In my study, I will look only at sites that offer evidence of iron artifact production, not simply sites where iron tools and implements have been uncovered.

Nails are a common, everyday item found at nearly every Anglo-Saxon settlement site. Nails held together wooden structures and are often the only evidence left behind of buildings
beside soil discoloration where walls or post-holes stood. Similarly, nails and other structural fittings such as rivets are often all that survive of wooden ships buried in the ground, like the rivets archaeologists uncovered during the excavation of the iconic Sutton Hoo ship burial. Additionally, nails were necessary to fasten a horseshoe to a horse’s hoof. At Flixborough, North Lincolnshire, archaeologists discovered 1463 nails of seven different varieties, labeled types A-G. Type A has a flat and rounded head, type B has an L-shaped nail head, type C has no head and looks like a pin, type D has a wide head and looks more like a golf tee, type E has a rounded and hollow dome head, type F looks like type E but has a solid head, and type G has a round dot for a head (See Fig. 2). Type A nails outnumbered all the other nail types on this site. Lisa M. Wastling posits that nail types A, B, C, and D had applications in carpentry while nail types E, F, and G were likely used in upholstery based on analogous Roman examples. Nails, commonplace, seemingly insignificant items, show us the necessity of having an accessible blacksmith for every settlement in this time.

Knives are also one of the most ubiquitous iron finds in Anglo-Saxon settlements.107 These objects have been found at such a high frequency across Anglo-Saxon sites, presumably, because knives had such a practical application in ordinary life. They could be used for mundane activities like cutting food or they could aid a craftsman in his work. At the Anglo-Scandinavian site Coppergate, 211 knives have been found that date from the mid-ninth to the eleventh centuries, thus making it one of the biggest collections for the period in northern Europe.108

Tools for craft production are another important category of Anglo-Saxon iron objects. Those tools used for ironworking have been briefly described above. Carpenters needed a sundry list of tools from the blacksmith, including hammers, T-shaped axes, wedges, adzes for shaving wood, augers for drilling holes, and files for delicate shaving.109 Excavators at Flixborough found an axe, an axe fragment, an adze, a chisel, three files, eighteen wedges, and


three drawknives (knives with handles on each side so the operator can pull the knife toward himself). At Coppergate, a number of woodworking tools were also uncovered, including an axe, three partial axe fragments, a wedge, a chisel, a drawknife, three augers, and five fragmentary augers.

Farmers too needed iron tools in order to work the land and produce crops. Ploughshares, scythes, and sickles have been discovered on Anglo-Saxon occupation sites. Flixborough offered archaeologists a few fine examples of farming implements, namely a ploughshare, bill hook (used for cutting branches), and a spade. A spade, sickle and prong of a pitchfork were also uncovered at Coppergate.

In a culture where land transportation was limited to movement by foot or by horse, horse riding equipment constituted another category of work for the blacksmith. Anglo-Saxon smiths created the stirrups, bits, and horseshoes necessary for effectively maneuvering on horseback. Stirrups first appear in the Anglo-Saxon archaeological record in the late-eighth to early-ninth century, while horseshoes were a later invention, not coming into vogue until the later-ninth century. In ninth-century contexts, archaeologists have found bar bits and modified bar bits, which have snaffle links where rings could be attached that would hold the leather. Two such

111. Ottaway, Anglo-Scandinavian ironwork from 16-22 Coppergate, 527-35.
snaffle links have been found at Flixborough. Excavations at Coppergate 16-22 have also uncovered an assemblage of riding equipment that included “buckles, buckle-plates, pins and spurs,” totaling approximately 165 objects.

The most elite items produced at this time were weapons for warriors in the nobility. Pattern-welded swords are among the rarest of these weapons uncovered on Anglo-Saxon sites. Knives and seaxes (short swords with only one cutting edge) could also be made through pattern-welding, as seen in two examples of knives from 16-22 Coppergate, but swords much more commonly exhibited pattern-welding techniques. Brian Hope-Taylor found two extraordinary examples of pattern-welded swords in two separate layers at Bamburgh castle in the 1960s. The term ‘pattern-welded’ refers to an arduous smithing process used to create a distinctive pattern visible on the outside of the blade. These swords were exorbitantly expensive to produce and, therefore, could only be purchased by a minority of the population: the richest of the rich. Wealthy lords could also offer swords to men working in their service, which would then be returned to the lord after death, but substantial monetary resources were still necessary to purchase a sword initially. A smith made a pattern-welded blade through an intensive, and by extension, costly, process. First, he had to make the central core out of steel.

118. Ottaway, Anglo-Scandinavian ironwork from 16-22 Coppergate, 681.
121. Ottaway, Anglo-Scandinavian ironwork from 16-22 Coppergate, 481.
123. Ottaway, Anglo-Scandinavian ironwork from 16-22 Coppergate, 481.
Then to make the distinctive pattern, the smith would twist thin steel strips, heat them, and then beat them together. The smith would put together several groupings of twisted strips and hammer them out until they were flat. After he has between four and six of such groupings, he would weld half of them to each of the flat sides of the steel core. To complete the sword, the smith would affix cutting edges to the thin sides of the core (See Fig. 3). A pattern-welded sword dated between the fifth and seventh centuries was found nearby Ely, Cambridgeshire. This sword had “four bundles each of five strips only 0.25 mm thick” welded to the central core. Metallurgical examination of this sword has indicated that the sword consists of forty-three different layers of metal. The forethought and time that went into crafting this weapon must have been substantial.

125. For the complete pattern-welding process, see Tylecote, The Prehistory of Metallurgy in the British Isles, 171.
Figure 3 – Diagram of pattern-welded sword. Based on third century sword found in Nydam, Denmark. From R.F. Tylecote, The Prehistory of Metallurgy in the British Isles (London: The Institute of Metals, 1986), 171. Author deceased.

Non-Ferrous Metalworking

Non-ferrous metalworking in the Anglo-Saxon period produced ornamentation for clothing and other decorative works. Anglo-Saxon metalworkers used silver, gold, bronze, lead, and copper alloys to create pins, brooches, and strap-ends. The production of these decorative
objects offers a juxtaposition with ironworking, which primarily produced utilitarian objects like tools and nails.

Much like iron mining, archaeologists have uncovered little evidence for precious or semi-precious metal mining. The most expensive precious metals, gold and silver, were likely imported from abroad. This imported metal likely came to England via coinage. Scholars have identified a trend in medieval coinage at this time; gold coins began to be superseded by silver and bronze coins throughout Europe at the end of the seventh century and beginning of the eighth century. Precious and semi-precious metal objects follow a similar pattern. In England, gold objects became scarce around the year 700. Mining of precious and semi-precious metal likely occurred within Britain as well. Certain parts of the British Isles are known for their metals, like Cornwall and its tin supply, Derbyshire and lead, and Shropshire and its deposits of copper; however, there is not enough evidence to definitively show that these regions supplied metal to smiths during the Anglo-Saxon period.

The two main techniques used for working non-ferrous metals in this period were casting the metal or working sheet metal with a hammer. In casting, craftsmen used clay crucibles to melt down precious or semi-precious metals. Metals had to be heated at various temperatures corresponding to their melting points. Copper and gold have higher melting points, 1,083 °C and 1,063 °C respectively, while silver had a slightly lower melting point of 960.5 °C. The metalworker actually had to heat these metals well beyond their melting point because once a

128. Wilson, “Craft and industry,” 267
130. Wilson, Anglo-Saxon Ornamental Metalwork 700-1100 in the British Museum, 10.
131. Wilson, “Craft and industry,” 267
132. Leahy, Anglo-Saxon Crafts, 137.
crucible is removed from the furnace area, the metal will begin to cool and harden. In order for the crucible to withstand these high temperatures and create a stronger vessel, the clay for crucibles was often mixed with quartz. David Wilson characterizes crucibles as “[u]nremarkable objects, they are made of thick clay, have a round base and are rarely more than 8 cm high.” Setting aside this disparaging description, these crucibles are one of the most reliable sources of evidence for non-ferrous metalworking. While no intact specimens survive, numerous fragments have been uncovered and a few crucible lids have been discovered as well. Examples of these clay containers have been found near the royal settlement at Yeavering in the territory of Northumbria and at the trade site Lundenwic. The finds at both sites were potentially used for work with copper-alloy.

In the casting process, after the metals were melted down, they could be poured from the crucible into a mold made of clay, wood, bone, or lead. Molds could be used for making ingots to transport precious metals more easily or for making specific metal objects. Two types of molds were used in the Anglo-Saxon period. The simplest type was “open on top, like a modern jelly-mould” and created a pattern on only one side of the object when the metal hardened.

The second mold type was made of two separable parts. A metalworker would hold these two

138. Brian Hope-Taylor excavated the royal site of Yeavering over multiple dig seasons in the 1950s and -60s. He interpreted the extensive series of timber structures as a royal complex. For more information on this royal site, see Brian Hope-Taylor, *Yeavering: An Anglo-British Centre of Early Northumbria*, British Archaeological Reports, no. 7 (London: Her Majesty’s Stationery Office, 1977).
pieces together and pour the molten metal through an opening.\textsuperscript{141} The air displaced by the hot, liquid metal would escape through “the joint between the two halves of the mould.”\textsuperscript{142} These molds, unlike clay crucibles, are rarely recovered on archaeological sites. Their absence from the archaeological record may be explained by how metalworkers removed objects from molds. According to Kevin Leahy, “The breaking of moulds to remove the castings gives them a very poor rate of survival.”\textsuperscript{143} Archaeologists have, however, found some evidence of molds for simple objects, like pins, or more intricately designed artifacts, such as strap-ends.\textsuperscript{144} At Flixborough, archaeologists found four clay mold fragments and four clay crucible fragments, which indicate that small-scale, non-ferrous metalworking took place on the site.\textsuperscript{145}

In the second method of semi-precious metalworking, working sheet metal with a hammer, the craftsman had to first create the sheet. He would invariably still have to cast the metal to first make the sheet. The metalworker would then heat the metal to anneal it and hammer it on an anvil into the desired shape.\textsuperscript{146}

**Non-Ferrous Objects**

Non-ferrous metals were typically used for decorative items in Anglo-Saxon society. Many of these decorative items, like strap-ends and clothes fittings, still had utilitarian purposes, but they exhibited artistic motifs and designs much more frequently than iron counterparts.

\begin{itemize}
\item \textsuperscript{141} Claude Blair and John Blair, “Copper Alloys,” 86.
\item \textsuperscript{142} Leahy, *Anglo-Saxon Crafts*, 144-6.
\item \textsuperscript{143} Leahy, *Anglo-Saxon Crafts*, 139.
\item \textsuperscript{146} Claude Blair and John Blair, “Copper Alloys,” 85.
\end{itemize}
Smiths often added non-ferrous metals onto iron clothes fittings for further ornamentation, especially from the eighth century onward.147

Clothes fittings from the Anglo-Saxon period include small, delicate items like pins or hooks and bulkier items like buckles. Dress hooks could be made of ferrous or non-ferrous metal, with the non-ferrous only slightly outnumbering the ferrous examples.148 Many pins, like the 407 non-ferrous pins recovered from Flixborough, had heads with delicate, yet intricate, designs. One common example from the site has a flattened triangular head with three dots each surrounded by a circle (See Fig. 4).149

Figure 4 – Example of triangular-headed pins with dot and surrounding circle pattern. Image taken from Fig. 1.26 in Nicola Rogers, with contributions by Sonia O’Connor, Patrick Ottaway, and Ian Panter, “1.8 The pins,” in *Life and Economy at Early Medieval Flixborough, c. AD 600-1000: The Artefact Evidence*, edited by D.H. Evans and Christopher Loveluck, Excavations at Flixborough, vol. 2 (Oxford: Oxbow Books, 2009), 62. Used with permission of Patrick Ottaway.

Strap-ends constitute one of the most commonly found items within the category of dress fittings. Ferrous and non-ferrous examples have been uncovered, but the non-ferrous strap-ends
have been found more frequently. Strap-ends were used to prevent the ends of belts, girdles, or straps on clothing items or horse equipment from fraying. While they served a practical purpose, artisans used these objects as an opportunity to display their artistic prowess. Distinct styles of strap-ends developed throughout the Anglo-Saxon period. In the seventh and eighth centuries, geometric patterns dominated the strap-ends repertoire. Starting in the ninth century, however, zoomorphic designs began to dominate and geometric patterns fell out of favor. These zoomorphic designs varied. Animals incorporated into interlace patterns was a popular motif. A substantial number of zoomorphic strap-ends were actually shaped into animal heads at the bottom. These animal-head terminals are often quite worn, making it difficult to determine the identity of the animal, but they often resemble dragon heads. More attention will be given to strap-ends and their design styles in the next chapter of this thesis.

Jewelry comprised another significant category of non-ferrous objects produced by Anglo-Saxon craftsmen. Gold and silver smiths crafted rings and brooches that have caught the attention of antiquarians and modern scholars alike. These precious metal smiths must have had considerable skill and attention to detail. Rings such as the Æthelwulf and Æthelswith rings (See Fig. 5 and 6) are stunning examples of a goldsmith’s workmanship in Anglo-Saxon England. Their inscriptions also provide us with the names of living, breathing individuals who owned and wore these pieces. This personal touch with the past is often lost when we look at groups of objects in a particular period for sweeping trends. The brooches of the Anglo-Saxon period are another marvel of craftsmanship. Think of the man-hours it would take to inscribe and cut the metal to make the intricate representation of the five senses on the Fuller Brooch (See Fig. 7)

the zoomorphic designs of the Strickland Brooch (See Fig. 8). Iron brooches have been recovered, but they are typically much simpler in design, like the twenty-two so-called ‘safety-pin’ iron brooches found at Flixborough.\(^{152}\) Regardless of their beauty and intricacy, I do not include jewelry and brooches in my study because this sort of finery is rarely recovered from a smithing site or the part of a site where smithing took place.

\(\begin{align*}
\text{© Trustees of the British Museum}
\end{align*}\)

*Figure 5 – Picture of Æthelwulf Ring. Image taken from “Æthelwulf Ring,” British Museum Collection Online, http://www.britishmuseum.org/research/collection_online/collection_object_details/collection_image_gallery.aspx?assetId=84494001&objectId=88977&partId=1.*

Figure 6 – Picture of Æthelswith Ring. Image taken from “Æthelswith Ring,” British Museum Collection Online, http://www.britishmuseum.org/research/collection_online/collection_object_details/collection_image_gallery.aspx?assetId=273000001&objectId=91379&partId=1.
Figure 7 – Picture of Fuller Brooch. Image taken from “Fuller Brooch,” British Museum Collection Online, http://www.britishmuseum.org/research/collection_online/collection_object_details/collection_image_gallery.aspx?assetId=35987001&objectId=87155&partId=1.
Concluding Thoughts

In my research of the smith in Anglo-Saxon society, I have discovered the prominence of the smith within this culture. Written and material evidence indicate that the smith’s craft was necessary in everyday life, while the smith himself was a complicated figure. He held a
necessary role in society, but he simultaneously may have been regarded as a magical, otherworldly figure tied to conceptions of the mythical smith Weland. The legal evidence and image of Weland the smith on the Franks Casket also indicate that smiths were beholden to their lord, which may have affected how their fellow citizens viewed them. The smith may not have had a great deal of autonomy, but the scant textual evidence we have is inconclusive. This uncertainty about the agency of the smithy should be kept in mind in chapter three when I explore metalworking at Bamburgh Castle,

The focus of my study, however, is not solely the smith, but the objects he made and the techniques he used to mold the metal. The metal artifacts, both ferrous and non-ferrous, that I have assessed show the breadth of metalworking during the Anglo-Saxon period. From mining ore to smithing metal items, metalworking was an involved, arduous process. It took many hours and the work of several craftsmen to make even the simplest of utilitarian objects.
CHAPTER II: NONDESCRIPT IN THE NORTH: NORTHBURIAN METALWORKING IN THE MIDDLE AND LATE ANGLO-SAXON PERIODS

Northumbria, the northernmost Anglo-Saxon kingdom and focus of this study, is demarcated by the Firth of Forth as the northern boundary and the Humber as the southern boundary. At certain intervals in Anglo-Saxon history, the kingdom was divided into two separate subkingdoms – Bernicia in the north and Deira in the south. Bede credited King Æthelfrith (d. 616) with first uniting the two areas into one kingdom in the seventh century, with a more lasting union established during the reign of his son, Oswald (d. 642).153 This kingdom, however, saw political turmoil and upheaval as Scandinavian settlers in the ninth and tenth centuries brought certain parts of the kingdom under their dominion while other portions remained under nominal Anglo-Saxon control. The influx of Scandinavian immigrants and shifting settlement patterns must have brought about cultural changes, but many of these are irrecoverable. Craft production, though, which allows for innovation and artistic expression, could serve as a reliable indicator of regional practice in Northumbria. This kingdom should have had metalworking practices distinct from southern kingdoms, which remained relatively free of Scandinavian settlement, but after careful examination of both ferrous and non-ferrous metalworking across Anglo-Saxon England, I conclude that there was no significant difference in practice between the northern and southern kingdoms.

Archaeologists and historians have shied away from the study of regional variation in their research of metal craft production in Anglo-Saxon England. Craftspeople from one area would not necessarily make objects in the exact same way as craft workers in another area. Living in different kingdoms, speaking different dialects, and holding different customs should

have had a tangible effect on craft production and artistic industries. The kingdom of Northumbria in the Middle and Late Anglo-Saxon periods represents a distinct area with an abundance of metalworking evidence. Furthermore, the Middle and Late Anglo-Saxon periods are the richest phases of metalwork production in every Anglo-Saxon kingdom, which allows for cross-regional comparison. Northumbria was also the scene of a cultural confluence at this time with Scandinavian invasion and settlement. Through analysis of both ferrous and non-ferrous craft industries, I set out to analyze smithing practices in Northumbria and the southern kingdoms, but was unable to see any widespread Northumbrian smithing distinction or variation. With evidence from metalworking sites across Anglo-Saxon England, I argue that no Northumbrian cultural distinctions are visible in this craft production; rather, I see uniformity between the practices of this kingdom and the remaining Anglo-Saxon kingdoms. Analysis of the most common ferrous and non-ferrous objects, iron knives and non-ferrous strap-ends, bolsters this image of homogeneity. The only apparent changes appear in quantity of metalwork produced, which may in part be explained by Scandinavian settlement throughout Britain.

In my analysis of metal objects in the region of Northumbria, I did not set out to define personal identity, but rather I sought to find shared metalworking practices within, and distinct to, Northumbria. 154 These practices, unique to this kingdom, would then shine a light on its

154. Brigitte Miriam Bedos-Rezak defines identity in the Middle Ages as follows: “In the medieval lexicon, the concept of identity did not address individual personality. Rather, identity in the eleventh and twelfth centuries centered on a logic of sameness and operated by assuming a model of similarity, referring to human beings as members of an identical species, or to the person as a psychosomatic whole, a social agent identical to itself with respect to number, essence, or properties.” I used this definition of identity in the Middle Ages for my study. In my current work, I assess regional differences in metal objects, but do not try to extrapolate personal or ethnic identity from them. For more on medieval identity, see Brigitte Miriam Bedos-Rezak, “Medieval Identity: A Sign and a Concept,” The American Historical Review, 105, no. 5 (Dec. 2000): 1492.
Past scholarship on Northumbrian culture and regional identity has often glossed over the possibility of regional expression in metalworking. David Rollason, in his comprehensive work *Northumbria, 500-1100: Creation and Destruction of a Kingdom*, tentatively traces the development of Northumbrian identity and ethnicity. Rollason highlights the linguistic divide between Anglo-Saxon kingdoms as a defining feature of Northumbrian identity, seeing Bede in his writings highlighting linguistic differentiation between Northumbria and other Anglo-Saxon kingdoms. Bede claims that the people of Northumbria are descended from the Angles, one of the three Germanic tribes who invaded Britain in the fifth-century. This passage assigns the origins of all Anglo-Saxon kingdoms to settlers who are either Jutish, Saxon, or English (of the Angles). Rollason argues that Bede, in this section, was differentiating between the peoples of Britain based on their language. The rest of Rollason’s monograph explores the political and ecclesiastical history of this kingdom, but he makes no further attempts to define Northumbrian regional identity or culture. He is only concerned with Bede’s view of Northumbrian identity at the kingdom’s onset, not how this region’s identity evolved over the course of its history.

Artistic evidence has been another fruitful source for research on Northumbrian cultural identity. Rosemary Cramp, among others, has pointed to Northumbrian sculpture as a distinct cultural marker. She sees Northumbrian sculptors creating public works, like the Ruthwell and Bewcastle monuments, with a style distinctive to Northumbria, exemplified by scrolling

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The stylistic choices of Northumbrian smiths theoretically would have the potential to yield similar results.

The Franks Casket, a whalebone box most likely produced in eighth-century Northumbria, has also intrigued scholars of Northumbrian culture. The box depicts scenes from Roman, Christian, and Germanic mythology intermingled. The object’s purpose, according to scholarly consensus, was instructional. Classical scenes are paired with Germanic ones in order to teach a lesson. The mélange of Germanic and Christian imagery provides a commentary on the lasting memory of pagan tradition after Christian conversion; however, one must not forget that this high-status object must have been designed for a learned, ecclesiastical audience. The ambiguity of the text around the Germanic and classical scenes makes the casket excellent fodder for art historians, but gives no definitive markers of culture that extends beyond the clergy or elite classes.

The few scholars who have written on cultural expression in Northumbria have yet to integrate either ferrous or precious metalworking into their discussions. Adding this material culture evidence illuminates the culturally homogenous nature of metalworking in the Anglo-Saxon kingdoms during the Middle and Late Anglo-Saxon periods.

Knives

In my analysis of Anglo-Saxon ironworking, I chose knives as my focal point. Knives are one of the most ubiquitous iron finds in Anglo-Saxon settlements.\(^{160}\) Given their frequency, they reliably indicate the level of iron object production on a site. Anglo-Saxon knives are composed of a blade and a tang, the extension of the blade that is fitted into a handle. The blade itself has a cutting edge and the opposite side is known as the blade back. The ‘shoulder’ of a knife is the area where the blade back and tang meet.\(^{161}\) Patrick Ottaway created a typology for Anglo-Saxon knives based on the shape of blade backs that remains in use today. Ottaway chose this method of classification, the so-called ‘York Typology’,\(^{162}\) because the cutting edge of a blade could become worn or sharpened throughout a lifetime of use, thus changing the shape of it, unlike the blade back, which would remain relatively unchanged.\(^{163}\) The frequency of various back forms of blades in various parts of Anglo-Saxon England could hint at regional variation in ironworking.

In his famous classification system, Ottaway categorized Anglo-Saxon knives into back forms A, B, C, D, and E. Back form A is further divided into subgroups A1, A2, and A3. Knives that exhibit back form A are also known as an angle-back blades because their backs are angled at some point between the tip and the shoulder of the blade.\(^{164}\) Back form B “have blade 

\(^{161}\) Patrick Ottaway, Anglo-Scandinavian ironwork from 16-22 Coppergate, the Archaeology of York, vol. 17, fasc. 6 (London: Published for the York Trust by the Council for British Archaeology, 1992), 559.
\(^{163}\) Ottaway, Anglo-Scandinavian ironwork from 16-22 Coppergate, 559.
\(^{164}\) Ottaway, Anglo-Scandinavian ironwork from 16-22 Coppergate, 561.
backs with a straight rear part.”

Knives in the grouping back form C are similar to back form B knives in having a straight back, but before the tip of the knife, these knife backs begin to curve downward in a gentle slope. The C back form category, like back form A, is also subdivided into three groups: C1, C2, and C3. The knives from the back form D group “have backs which are slightly convex and curve downwards from the shoulder to the tip.” The final category, back form E, contains blades that are shaped much like modern steak knives. These blades are virtually straight from the tip of the knife to the shoulder where the back and tang meet.

Patrick Ottaway’s blade back form classification system has been so influential that nearly all published works on Anglo-Saxon production sites have sections devoted to knives and their blade back form classification. Patrick Ottaway utilized his own typology in his assessments of the ironwork from 16-22 Coppergate (1992) and Flixborough (2009). Lyn Blackmore also used his system in her classification of knife blades uncovered in Lundenwic, as did Julian Richards in his study of the finds at Cottam. Using Ottaway’s classification system, I assessed the assemblage of knives from metalworking sites in the north and south to search for signs of regional variation.

165. Ottaway, Anglo-Scandinavian ironwork from 16-22 Coppergate, 565.
166. Ottaway, Anglo-Scandinavian ironwork from 16-22 Coppergate, 565.
Coppergate 16-22, a massive Anglo-Scandinavian trade site located in the modern city of York, has produced an impressive array of iron finds, including knives. Of the approximate 4700 iron artifacts found at the Northumbrian site of Coppergate, 211 of them were knives and seven were only the tangs of knives.\textsuperscript{172} Within this collection, the majority of the knives fell into the category back form C, ninety-eight of the total assemblage.\textsuperscript{173} This amounts to 46\%, nearly half of all knives found on site.

Cottam, in East Riding, Yorkshire, was another, smaller Northumbrian production site. While its main purpose appears to have been agricultural, evidence of small-scale metalworking at the settlement has been uncovered.\textsuperscript{174} Metal-detecting and archaeological excavations were conducted and both produced an assortment of knives. Thirty-six knives were found during metal-detecting efforts and an additional seven knives and knife fragments came from formal excavation.\textsuperscript{175} Blade back form A was the largest subset of knives on site with twenty-one examples, followed closely by back form C with thirteen.\textsuperscript{176} One pivoting knife and a possible back from D blade were the noticeable outliers, while the remaining knives or knife fragments were incomplete.\textsuperscript{177}

The elite site Flixborough, while not in Northumbria, is located only eight kilometers south of the Humber. Because of the site’s proximity to the kingdom of Northumbria, the editors of the volume \textit{Northumbria’s Golden Age} included an article about Flixborough in this essay collection.\textsuperscript{178} A hefty collection of knives, 250, were excavated at Flixborough.\textsuperscript{179} The vast

\textsuperscript{172} Ottaway, \textit{Anglo-Scandinavian ironwork from 16-22 Coppergate}, 464, 558.
\textsuperscript{173} Ottaway, \textit{Anglo-Scandinavian ironwork from 16-22 Coppergate}, 581.
\textsuperscript{174} Richards et. al., “Cottam,” 91.
\textsuperscript{175} Richards et. al., “Cottam,” 72-4, 78.
\textsuperscript{176} Richards et. al., “Cottam,” 72-4, 78.
\textsuperscript{177} Richards et. al., “Cottam,” 72-4, 78.
majority, 152, were part of the back form C group, much like the majority of knives uncovered at Coppergate in Northumbria.\textsuperscript{180} The next most common blade back form was A, with thirty-seven examples from the site.\textsuperscript{181} Of the remaining, nine belonged to the back form D group and 52 were of an indeterminate back form type.\textsuperscript{182} Even if one were to remove the eighty-five unstratified knives (those found out of context), the pattern remains the same. Back form C still holds the predominant position in the assemblage, followed by back form A, then the indeterminate types, and lastly the fewest number of knives belong to the back form D category.\textsuperscript{183}

Traveling even further south, Lundenwic is a well-documented trade and production settlement, analogous to Coppergate in Northumbria. In excavations of Lundenwic from 1987-2000, archaeologists found thirty-five knives of various back forms.\textsuperscript{184} As the excavators only found around 264 iron objects in total, the assemblage of knives composes a reasonable percentage of the iron finds.\textsuperscript{185} Analysis of the blade back forms shows a similarity with Coppergate and Flixborough. While the majority of knives are of an indeterminate back form, fourteen in total, the knives with back forms that could be identified here were labeled as back form C more often than any other back form, eleven in all.\textsuperscript{186} The remaining knife blades were distributed almost equally among the other back form types; four examples of back form A, one

\begin{thebibliography}{9}
\bibitem{180} Patrick Ottaway et. al., “Knives,” 204.
\bibitem{181} Patrick Ottaway et. al., “Knives,” 204.
\bibitem{182} Patrick Ottaway et. al., “Knives,” 204.
\bibitem{183} Patrick Ottaway et. al., “Knives,” 204.
\bibitem{184} Blackmore, “11.7 The Iron Objects,” 267.
\bibitem{185} Blackmore, “11.7 The Iron Objects,” 263.
\bibitem{186} Blackmore, “11.7 The Iron Objects,” 269.
\end{thebibliography}
knife with back form B, two blades had back form D, only one example of back form E, and two
draw knives were uncovered from Middle Saxon layers at Lundenwic.\textsuperscript{187}

Without a doubt, blade back form C was the most widely produced type of knife on
production sites in Anglo-Saxon England, no matter the geographic location, especially if blades
of an indeterminate back form are discounted. According to Patrick Ottaway, this blade type is
most commonly found on sites across Anglo-Saxon England, which this study confirms.\textsuperscript{188}
Cottam was the only site that did not fit this pattern, with more back form A than back form C
knives, but the margin of difference between the two groups was only eight knives. The
comparatively small collection of knives found at Cottam may have contributed to this result.

In addition to stylistic analysis, scientific testing of the metal alloys in knife blades and
other iron objects have brought archaeologists closer to understanding the smithing process in
Anglo-Saxon England. This metallographic analysis of knives requires scientists to cut thin
sections from the metal objects for microscopic inspection and chemical testing.\textsuperscript{189} These tests
can elucidate the types of iron alloys used in an object and how these various alloys could be
combined. Knives, as one example, could have various combinations of steel, ferritic iron, or
phosphoric iron in the same blade. R.F. Tylecote and B.J.J. Gilmour made a typology of knife
blade composition based on how smiths chose to combine steel and iron alloys. To illustrate
Tylecote and Gilmour’s typology, look at knife type 1a (See Fig. 9). This type of knife was
made with steel in the center of the blade with either phosphoric or ferritic iron attached on either
side of the steel center.\textsuperscript{190} In the past few decades, scientists and archaeologists have worked

\textsuperscript{187} Blackmore, “11.7 The Iron Objects,” 269.
\textsuperscript{188} Ottaway et. al., “Knives,” 203.
\textsuperscript{189} Patrick Ottaway, \textit{Anglo-Scandinavian ironwork from 16-22 Coppergate}, 472.
\textsuperscript{190} Ottaway, “The Products of the Blacksmith in Mid-Late Anglo-Saxon England, 2,” page 2; Ottaway, \textit{Anglo-Scandinavian ironwork from 16-22 Coppergate}, 484.
together to conduct metallographic examination of objects to classify objects and determine the skill of smiths in Anglo-Saxon England using Tylecote and Gilmour’s system.

Figure 9 – Knife blade 1a from Tylecote and Gilmour’s blade composition typology. Cropped from Figure 1 in R.F. Tylecote and B.J.J. Gilmour. *The Metallography of Early Ferrous Edge Tools and Edged Weapons*, British Archaeological Reports British Series, 155 (Oxford: British Archaeological Reports, 1986), 6. Authors deceased.

Taking up Tylecote and Gilmour’s mantle of metallographic investigation, Andrew Welton has examined metallographic data for knives and spears from grave good assemblages to discern the skill-level of smiths in Anglo-Saxon England. He argues that smiths had varying degrees of skill across Anglo-Saxon England, judging by their ability to combine iron alloy and steel to make a sturdy, or in some cases, not so sturdy, tool. Welton’s work aims to push the field of metallographic study in new directions. He concludes that smiths made deliberate
choices in their work with differing results. While this conclusion has important implications for the study of Anglo-Saxon metalwork, it does not elucidate regional variation in this craft. For the purposes of regional study, I would need more metallographic data from areas of smelting and smithing in the north and south of Anglo-Saxon England to make an argument about smithing practices. Some metallographic data is published and available, but not enough to make a conclusive argument. Patrick Ottaway, in his analysis of ferrous objects from the Coppergate site, had metallographic data from only forty-seven of the collection of over 200 knives. The knives tested represent a fraction of the knives found at Coppergate, thus impeding a thorough analysis of the smithing of knives at Coppergate. Knives from across Anglo-Saxon England that have undergone metallurgical analysis have shown an overall trend in smithing practice; smiths implemented more efficient quenching techniques to make stronger steel in the Middle and Late Anglo-Saxon periods. More metallographic testing in the future could lead to new, increasingly nuanced insights on the practices of smiths in particular regions of Anglo-Saxon England. The present conclusions about the steel in knives of the Middle and Late Anglo-Saxon periods, however, do not demonstrate any trends specific to Northumbria.

**Non-Ferrous Strap-Ends**

To further investigate the relationship between metalworking and the expression of regional identity, I set out to analyze non-ferrous metalworking through an assessment of metal artifacts from kingdoms throughout Anglo-Saxon England; essentially the same method I used in my study of blacksmithing practices. Objects made out of copper, bronze, silver, and gold often

had ornamental purposes and clear decorative elements that can be categorized into a typology. This offers a juxtaposition with ironworking, which often produced utilitarian objects like tools and nails. Analysis of objects with more artistic flair and personalization should indicate a Northumbrian artistic style more so than a study of iron objects. The study of artifacts made of precious metal also elaborates on the metalworking industry as a whole.

Strap-ends, on Anglo-Saxon sites, are among the most commonly found non-ferrous metal artifacts. This class of objects is useful in understanding the Anglo-Saxon metalworking industry because these objects served both a utilitarian function, to prevent belts from fraying at the ends, and a decorative role. These strap-ends were the canvas for artistic expression in metalworking. Separate styles developed over time. Geometric styles appear to have been favored in the seventh and eighth centuries, while in the ninth century, zoomorphic designs gained popularity as geometric designs fell out of fashion.

Scandinavian influence on metalworking and stone sculpture designs may explain some of this stylistic evolution. Contact between cultures has often led to the adoption of new artistic or dress styles. The Borre style, appearing in the Scandinavian context c. 850 and disappearing in the late-tenth century, was characterized by a “ring-chain pattern, which is in effect a balanced ribbon interlace.” (See Fig. 10) This style could also feature geometric designs, animal motifs, interlace knots, and bows. Gabor Thomas once classified three separate subclasses of the Borre style in Anglo-Saxon metalwork – the first was characterized by “animal masks and ring-knots” (See Fig. 11 for animal mask), the second by “vertebral ring-chain” (See Fig. 11 for

this type of ring-chain), and the third by “other interlace designs.” Strap-end scholars argue that the spine-like interlace design, the so-called “vertebral ring-chain” motif, is almost exclusively an Anglo-Saxon interpretation of the Scandinavian Borre style. The namesake of this style is the ship burial at Borre in southeastern Norway, which produced some of the earliest identified examples of the style, including a horse collar (see Fig. 12).

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Figure 10 – Example of a Borre style strap-end from St Mary Bishopshill Senior, York. Fig. 18D from Gabor Thomas, “Anglo-Scandinavian Metalwork from the Danelaw: Exploring Social and Cultural Interaction,” in Cultures in Contact: Scandinavian Settlement in England in the Ninth and Tenth Centuries, edited by Dawn M. Hadley and Julian D. Richards, Studies in the Early Middle Ages 2 (Turnhout: Brepols, 2000), 243. Used with permission of Gabor Thomas

Figure 11 – Example of ‘vertebral ring-chain’ decorated strap-end in the Borre style from Weston, Hertfordshire. Notice the “cat-like animal mask” terminal and how the design on the shaft looks similar to a spine with surrounding ribs. Fig. 4.4D from Gabor Thomas, “Strap-ends and the Identification of Regional Patterns in the Production and Circulation of Ornamental Metalwork in Late Anglo-Saxon and Viking-age Britain,” in Pattern and Purpose in Insular Art: Proceedings of the Fourth International Conference on Insular Art held at the National Museum and Gallery, Cardiff 3-6 September 1998, edited by Mark Redknap, Nancy Edwards, Susan Youngs, Alan Lane, and Jeremy Knight (Oxford: Oxbow Books, 2001), 43. Used with permission of Gabor Thomas.
Scandinavian influence in Anglo-Saxon England also led to the importation of the Jelling style, a name derived from the design on a particular silver cup from the Jelling royal site in Denmark (See Fig. 13).\textsuperscript{199} This style, primarily appearing in silverwork from southern England, was developed in Scandinavia during the later-ninth century and was used by artisans into the late-tenth century.\textsuperscript{200} Jelling-style pieces typically exhibit animals with the following elements: a thin body contouring twice, an open mouth with curled lip, a twisted tail, and a “spiral hip” as characterized by David Wilson.\textsuperscript{201} In Anglo-Saxon England, Jelling-style animals appear mainly on brooches, not strap-ends; therefore, this particular style will not be explored further in this study of strap-ends.

\textsuperscript{199} Wilson, \textit{Anglo-Saxon Art}, 143.  
\textsuperscript{200} Wilson, \textit{Anglo-Saxon Art}, 143.  
\textsuperscript{201} Wilson, \textit{Anglo-Saxon Art}, 144.
One popular zoomorphic motif found on the strap-ends of Anglo-Saxon England was the animal-head terminal, which often looked like a type of dragon head or a cat head at the bottom of a strap-end. These strap-ends were ubiquitous in ninth-century Anglo-Saxon England. Craftsmen decorated the front panel with geometric or more intricate zoomorphic designs.202 These animal-head terminals could exist on strap-ends decorated with Scandinavian-influenced Borre style or on strap-ends with more traditional, native designs. A modified version of the

zoomorphic terminal, dubbed ‘multi-headed’ strap-ends, has two animal heads, often facing in opposite directions (See Fig. 14). These multi-headed strap-ends were quite popular in the Danelaw during the tenth century.\textsuperscript{203} Archaeologists have deduced from their evidence that many of these multi-headed strap-ends appear to have been manufactured in Scandinavian-occupied areas of Britain, including Scotland and the area around the Irish Sea.\textsuperscript{204} Another subset of zoomorphic strap-ends that became popular in the Middle to Late Saxon periods was the collection of strap-ends decorated in the Trewhiddle style.

\textsuperscript{203} Thomas, “Strap-ends and the Identification of Regional Patterns,” 45.
\textsuperscript{204} Thomas, “Strap-ends and the Identification of Regional Patterns,” 45.
Figure 14 – Example of multi-headed strap-end from Hurly Hawkin, Grampian, Scotland. Arrow points to two animal heads facing away from each other. In this example, a third animal head can be made out above the two heads facing in opposite directions. Fig. 4.6A from Gabor Thomas, “Strap-ends and the Identification of Regional Patterns in the Production and Circulation of Ornamental Metalwork in Late Anglo-Saxon and Viking-age Britain,” in Pattern and Purpose in Insular Art: Proceedings of the Fourth International Conference on Insular Art held at the National Museum and Gallery, Cardiff 3-6 September 1998, edited by Mark Redknap, Nancy Edwards, Susan Youngs, Alan Lane, and Jeremy Knight (Oxford: Oxbow Books, 2001), 43. Used with permission of Gabor Thomas.
The Trewhiddle style was such a popular metalworking style in the ninth century throughout Anglo-Saxon England\textsuperscript{205} that, according to Gabor Thomas’ assessment in 2005, almost seventy percent of all strap-ends uncovered conform to this group.\textsuperscript{206} This type of design was named after a hoard of coins and metal objects dating to c. 875 uncovered in Trewhiddle, St. Austell, Cornwall.\textsuperscript{207} The style is typified by twisted, backwards facing animals (See Fig. 15) that often have interlace patterns intertwined around them (See Fig. 16). These intricate designs are placed on a black niello (silver sulphide)\textsuperscript{208} background surrounded by beaded border patterns along the edges of the strap-ends. These strap-ends usually have a bifurcated top end with two rivet holes on each side of the split (See Fig. 15).\textsuperscript{209} On this end, many Trewhiddle strap-ends feature a fan-shaped plant motif (See Fig. 17) or looping design (See Fig. 18) directly above the main decorative panel.\textsuperscript{210}


\textsuperscript{208} Wilson, \textit{Anglo-Saxon Ornamental Metalwork 700-1100 in the British Museum}, 21.


\textsuperscript{210} Thomas, “Strap-ends and the Identification of Regional Patterns,” 40-2.
Figure 15 – Example of a Trewhiddle style strap-end found in Souldern, Oxfordshire in 1949. Arrow points to the bifurcated top end of the strap-end with two rivet holes. From David A. Hinton, A Catalogue of the Anglo-Saxon Ornamental Metalwork 700-1100 in the Department of Antiquities Ashmolean Museum (Oxford: Clarendon, 1974), 60. Used with permission of David A. Hinton.

Figure 16 – Trewhiddle strap-end from Lundenwic. Illustration cropped from Figure 135 in Lundenwic: Excavations in Middle Saxon London, 1987-2000, principal authors Robert Cowie and Lyn Blackmore, MOLA monograph 63 (London: Museum of London Archaeology, 2012), 195. Used with permission of Lyn Blackmore.
Figure 17 – Example of fan-shaped foliate motif on a Trewhiddle strap-end, as indicated by the arrow. Fig. 4.2A in Gabor Thomas, “Strap-ends and the Identification of Regional Patterns in the Production and Circulation of Ornamental Metalwork in Late Anglo-Saxon and Viking-age Britain,” in Pattern and Purpose in Insular Art: Proceedings of the Fourth International Conference on Insular Art held at the National Museum and Gallery, Cardiff 3-6 September 1998, edited by Mark Redknap, Nancy Edwards, Susan Youngs, Alan Lane, and Jeremy Knight (Oxford: Oxbow Books, 2001), 42. Used with permission of Gabor Thomas.
Figure 18 – Example of a looping design above the main decoration on a Trewhiddle strap-end. Cropped from Figure 2.1 in Gabor Thomas, “‘Brightness in a Time of Dark’: The Production of Ornamental Metalwork in Ninth-century Northumbria,” in *De Re Metallica: The Uses of Metal in the Middle Ages*, AVISTA Studies in the History of Medieval Technology, Science and Art, vol. 4, edited by Robert Odell Bork (Burlington: Ashgate, 2005), 45. Used with permission of Gabor Thomas.

Strap-ends have been a popular subject of study for art historians and metalwork scholars of Anglo-Saxon England. Many of the earliest studies by eighteenth-century antiquarians merely described the artistic designs of strap-ends in a small private or museum collection. In more recent decades, scholars have tried to connect certain motifs and patterns to ethnic and cultural labels – Anglo-Saxon, Scandinavian, Anglo-Scandinavian. Today, Gabor Thomas is the sole scholar to study strap-ends in conjunction with regionality in Anglo-Saxon England. He has analyzed strap-ends of the Trewhiddle style and concluded that this assemblage is not a uniform, monolithic group. While strap-ends that archaeologists have put into this category share a

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number of similarities, Thomas argues that regional variations are apparent. His argument centers on an assemblage of six strap-ends recovered from a ninth-century Northumbrian hoard of silver objects, including many intricately decorated strap-ends, uncovered at Upper Poppleton near York (See Fig. 19). Thomas contends, using these six “king-sized” strap-ends in the Trewhiddle style and two other similar examples from Bamburgh and North Yorkshire, that Northumbrian craftsmen embellished the Trewhiddle design to suit their own artistic style. Northumbrian metalworkers tweaked the intertwined, zoomorphic motifs to emphasize movement and fill the space with even more twisted, interlace creatures. Thomas then points to a few examples of smaller strap-ends from Cumbria and North Yorkshire that he claims are “degenerative” versions of this so-called ‘Northumbrian’ style seen in the king-sized strap-ends. He contends that these two objects are examples of this Northumbrian style applied to pieces made as part of a mass production effort.

213. Thomas, “‘Brightness in a Time of Dark,’” 34.
216. Thomas, “‘Brightness in a Time of Dark,’” 38.
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*Figure 19* – Strap-ends from Upper Poppleton that Gabor Thomas uses in his study of Northumbrian strap-ends. Cropped from Figure 2.1 in Thomas, ""Brightness in a Time of Dark,"" 45. Used with permission of Gabor Thomas.

Thomas’ model has influenced my analysis of strap-ends and I have adapted his approach of looking for regional variation to the study of strap-ends found at production centers. Thomas’ analysis was focused on an assemblage of objects deposited purposefully in the ground, whereas I have investigated contexts in which objects are unintentionally dropped. In adapting his approach, I encountered significant problem in Thomas’ methodology – his selection of evidence.
Thomas’ argument appears convincing initially, but when one looks to the larger assemblage of strap-ends in Northumbria and the remainder of Anglo-Saxon England, the regional difference he highlights disappears. He compares six king-sized strap-ends from Upper Poppleton to one from Bamburgh and one uncovered at Lilla Howe, North Yorkshire (See Fig. 20). Many strap-ends fit into the Trewhiddle style, but only the few chosen for his article fit into his smaller, distinctly Northumbrian group. Two more strap-ends from Cumbria and Yorkshire make up his second Northumbrian group, which he claims is a cruder adaptation of the finer, king-sized group, but the artistic style of these two strap-ends does not appear to fit with that of the previous group (See Fig. 21). Choosing only a handful of strap-ends to make an argument about the metalworking style of an entire region seems ill-conceived, even more so when one considers that approximately 1,500 Anglo-Saxon strap-ends have been identified in later Anglo-Saxon contexts. Even eliminating any non-zoomorphic strap-ends, this leaves a body of over 900 strap-ends. A mere eight (or ten, if the cruder adaptations are counted) strap-ends do not constitute a metalworking style for a region as large as Northumbria. Additionally, only eight of the ten total strap-ends are “king-sized”; the two strap-ends with the more simplistic design are far smaller. Instead of arguing for a Northumbrian style, I would contend that the eight king-sized strap-ends that comprise the Trewhiddle style subset that Thomas identifies could be the work of a specific workshop in the north that catered to prominent sites like Bamburgh where substantial industrial production and trade occurred.

Figure 20 – Strap-ends from Bamburgh, Northumberland and North Yorkshire Gabor Thomas uses in his study of Northumbrian strap-ends. Cropped from Figure 2.1 in Gabor Thomas, “"Brightness in a Time of Dark": The Production of Ornamental Metalwork in Ninth-century Northumbria,” in De Re Metallica: The Uses of Metal in the Middle Ages, AVISTA Studies in the History of Medieval Technology, Science and Art, vol. 4, edited by Robert Odell Bork (Burlington: Ashgate, 2005), 45. Used with permission of Gabor Thomas.
In my own research, I have found a multitude of strap-ends excavators uncovered in the Northumbrian sites of Coppergate, Newbald, and Cottam. Only five non-ferrous strap-ends were found at Coppergate. Two of these pieces exhibit Carolingian design motifs of vine scrollwork, leaf patterns, and rosettes (See Fig. 22). These strap-ends could have been brought from the Continent through trade or a Carolingian craftsman could have been working at Coppergate. The remaining three strap-ends are zoomorphic, which could be the result of Scandinavian

influence, but none of these examples fit the Trewhiddle, Borre, or Jelling styles. These fittings are all shaped like animals and a few even have interlaced patterns on the strap-end, but none of them have backwards facing, animal motifs intertwined in interlaced patterns, that is, the typical features of the Trewhiddle style or the curled lips or twice-contoured bodies indicative of the Jelling style (See Fig. 23).

Figure 22 – Two strap-ends with Carolingian motifs from Coppergate. Illustration cropped from Figure 1265, in A.J. Mainman and N.S.H. Rogers, *Craft, Industry and Everyday Life: Finds from Anglo-Scandinavian York*, The Archaeology of York, vol. 17, fasc. 14 (London: Published for the York Trust by the Council for British Archaeology, 2000), 2569. Used with permission of Nicola Rogers.

Twenty-five strap-ends, primarily from the ninth century with a few outliers in the eighth and tenth centuries, have been identified from the Northumbrian site of Newbald. The overwhelming majority of strap-ends from Newbald exhibit zoomorphic features, eighteen in all. Two of these definitely exhibit Trewhiddle style animal-interlace motifs (See Fig. 24 and 25) and four examples share a few Trewhiddle characteristics, but are not definitely within the style, as demonstrated in one strap-end with a crude animal motif similar to the backward-looking animals of the Trewhiddle style (See Fig. 26). The remaining strap-ends in the zoomorphic assemblage have animal head terminals, fitting with the consensus on ninth-century

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222. Leahy, “Middle Anglo-Saxon Metalwork from south Newbald,” 56-64.
strap-ends. Overall, the assemblage is mainly composed of strap-ends with zoomorphic features, similar to the small collection of strap-ends uncovered at Coppergate. Newbald, a site that has produced a plethora of pins and coins in addition to strap-ends, may have operated as a local, regional market, which may explain this array of decorative finds despite the lack of evidence for a settlement.

Figure 24 – Trewhiddle-style strap-end from Newbald. Figure 6.3.5 in Kevin Leahy, “Middle Anglo-Saxon Metalwork from south Newbald and the ‘Productive Site’ Phenomenon in Yorkshire,” in Early Deira: Archaeological Studies of the East Riding in the Fourth to Ninth Centuries AD, edited by Helen Geake and Jonathan Kenny (Oxford: Oxbow Books, 2000), 57. Used with permission of Kevin Leahy.

224. Leahy, “Middle Anglo-Saxon Metalwork from south Newbald,” 56-64.
225. Leahy, “Middle Anglo-Saxon Metalwork from south Newbald,” 78.
Figure 25 – The second example of a Trewhiddle-style strap-end from Newbald. Figure 6.3.10 in Kevin Leahy, “Middle Anglo-Saxon Metalwork from south Newbald and the ‘Productive Site’ Phenomenon in Yorkshire,” in Early Deira: Archaeological Studies of the East Riding in the Fourth to Ninth Centuries AD, edited by Helen Geake and Jonathan Kenny (Oxford: Oxbow Books, 2000), 57. Used with permission of Kevin Leahy.
Northumbrian Cottam has revealed thirty-four strap-ends through metal-detecting efforts. The collection exhibits geometric and Trewhiddle styles, with the geometric falling out of favor by the end of the ninth century. As these examples came from metal-detecting it can be difficult
to assign a precise date, but stylistically, they appear to fit within a ninth-century context, much like the strap-end assemblage from Newbald.\textsuperscript{226}

Only a few kilometers to the south of Northumbria, excavations at Flixborough have yielded numerous high-end strap-ends exhibiting geometric and zoomorphic patterns from the ninth century. Six of the thirty-six strap-ends from Flixborough fit into the Trewhiddle style (See \textit{Fig. 27}), while eighteen of the remaining strap-ends are without decoration.\textsuperscript{227} About ten others are so fragmentary that no style can be identified and the remaining three strap-ends have zoomorphic terminals, but do not have the Trewhiddle-style animal motif in the center of the flat surface.\textsuperscript{228} Because over half of the examples from Flixborough are either plain or fragmentary, it is difficult to assess the entire collection stylistically. It appears as though the majority of these strap-ends were utilitarian and allowed for little artistic expression, but we must take into account how the decorated strap-ends of the assemblage appear to fit within the pattern of ninth-century strap-ends that tend to favor zoomorphic designs.

\begin{itemize}
\item \textsuperscript{226} Richards et. al., “Cottam,” 11-13, 70.
\item \textsuperscript{228} Gabor Thomas et. al., “1.2 Strap-ends,” 7-12.
\end{itemize}
The prominent, southern trading sites of Hamwic and Lundenwic are worth noting in this study as well. Hamwic, located in the modern city of Southampton and occupied primarily from c. 700 to c. 850, was a renowned site for trade and production, albeit smaller than Lundenwic. In the late-eighth century, Hamwic had a population of merely 3,000, about 2,000 fewer residents than the most conservative estimate of Lundenwic’s population. Despite the sparse population, Hamwic has produced a larger assemblage of strap-ends than Lundenwic during

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archaeological excavation of Middle Saxon contexts. Hamwic produced 37 bronze strap-ends while only about seven have come from the Middle Saxon settlement of Lundenwic.\textsuperscript{231} David Hinton has divided the Hamwic strap-end assemblage into five groups. Group A, with eleven examples, is exemplified by a very slender width, only one rivet hole, and sphere-shaped terminals (See \textit{Fig. 28}).\textsuperscript{232} The decoration on this type is quite plain; a few have incised crisscross patterns cut into the front, while others possess rounded bands near the rivet end (See \textit{Fig. 29}). Group B is typified with a single rivet, not as slender as Group A strap-ends on average, and not limited to solely rounded terminal ends.\textsuperscript{233} Ten strap-ends from Hamwic belong in this group. The eight strap-ends in Group C possess two rivet holes on top and animal head terminals.\textsuperscript{234} A few in this subclass look like they were decorated with a simplified or modified Trewhiddle style (See \textit{Fig. 30}). Group D is exemplified with double rivet holes near the top and a variety of terminal ends (See \textit{Fig. 31}).\textsuperscript{235} Four examples constitute this class of strap-ends. The final type, Group E, Hinton labeled as “Folded and other sheet-metal strap-ends” (See \textit{Fig. 23}).\textsuperscript{236} Only three, rather fragmentary, examples belong to this group.

\textsuperscript{234} “Strap-ends,” in \textit{The Gold, Silver and Other Non-Ferrous Alloy Objects from Hamwic}, 40-2.
\textsuperscript{235} “Strap-ends,” in \textit{The Gold, Silver and Other Non-Ferrous Alloy Objects from Hamwic}, 43.
\textsuperscript{236} “Strap-ends,” in \textit{The Gold, Silver and Other Non-Ferrous Alloy Objects from Hamwic}, 44.
Figure 28 – Example of Group A strap-end found at Hamwic. Illustration cropped from Figure 14, David Hinton with contributions by Justine Bayley, D.R. Hook, A.D. Morton, W.A. Oddy, Alison L. Parsons, M.S. Tite, and Paul Wilthew, The Gold, Silver and Other Non-Ferrous Alloy Objects from Hamwic, and the Non-Ferrous Metalworking Evidence, Southampton Finds vol. 2, Southampton Archaeology Monographs 6 (Stroud: Alan Sutton, 1996), 39. Used with permission of David Hinton.
Figure 29 – Example of Group A strap-end with bands near riveted end. Illustration cropped from Figure 14, David Hinton with contributions by Justine Bayley, D.R. Hook, A.D. Morton, W.A. Oddy, Alison L. Parsons, M.S. Tite, and Paul Wilthew, The Gold, Silver and Other Non-Ferrous Alloy Objects from Hamwic, and the Non-Ferrous Metalworking Evidence, Southampton Finds vol. 2, Southampton Archaeology Monographs 6 (Stroud: Alan Sutton, 1996), 39. Used with permission of David Hinton.
Figure 30 – Examples of modified Trewhiddle style strap-ends in Group C at Hamwic. Illustration cropped from Figure 14, David Hinton with contributions by Justine Bayley, D.R. Hook, A.D. Morton, W.A. Oddy, Alison L. Parsons, M.S. Tite, and Paul Wilthew, *The Gold, Silver and Other Non-Ferrous Alloy Objects from Hamwic, and the Non-Ferrous Metalworking Evidence*, Southampton Finds vol. 2, Southampton Archaeology Monographs 6 (Stroud: Alan Sutton, 1996), 42. Used with permission of David Hinton.
Figure 31 – Example of Type D strap-end from Hamwic. Illustration cropped from Figure 14, David Hinton with contributions by Justine Bayley, D.R. Hook, A.D. Morton, W.A. Oddy, Alison L. Parsons, M.S. Tite, and Paul Wilthew, *The Gold, Silver and Other Non-Ferrous Alloy Objects from Hamwic, and the Non-Ferrous Metalworking Evidence*, Southampton Finds vol. 2, Southampton Archaeology Monographs 6 (Stroud: Alan Sutton, 1996), 43. Used with permission of David Hinton.
In the Hamwic strap-end collection, one can see a few contrasting features with the Northumbrian strap-end assemblages. Hamwic produced more thin, sparsely decorated examples, as seen in Groups A and B, the largest stylistic groups found at Hamwic. A smaller percentage of zoomorphic designs were represented in the strap-end assemblage here than at other production sites in Anglo-Saxon England. The difference in strap-end types between Hamwic and those of sites mentioned earlier in this study may best be explained by chronology. Hamwic’s occupation ended c. 850, whereas sites like Newbald, Cottam, and Flixborough were occupied well into the ninth century. The zoomorphic styles, including the Trewhiddle style, only began to dominate the Anglo-Saxon strap-end assemblage in the ninth century.

The small sample-size notwithstanding, the seven strap-ends from Lundenwic are more comparable to Hamwic than other sites, but with a few zoomorphic exceptions. In Lundenwic and the closely surrounding region, strap-ends with zoomorphic terminals and Trewhiddle-style
designs have been uncovered. Arguably, the finest Trewhiddle-style strap-end uncovered in Lundenwic came from the Globe House, Temple Place excavation (See Fig. 16). Another, simpler Trewhiddle type strap-end was found at the Bull Wharf excavation at Queenhithe. Even in this paltry collection of seven artifacts from the wic and closely surrounding region, the animal-motif is represented.

The remaining five strap-ends recovered from various Lundenwic excavations exhibit geometric designs that, while not as popular as zoomorphic motifs in the Middle and Late Anglo-Saxon periods, were still in use during this time. Two strap-ends uncovered in Middle Saxon Lundenwic from excavations at the Royal Opera House closely resemble the Group A strap-ends from Hamwic. Another strap-end uncovered at Bedfordbury, one of three uncovered at the site, also fits within the Group A typology and is decorated with the incised crisscross pattern seen on a number of the Hamwic examples (See Fig. 33). Lyn Blackmore points out another example of a Group A strap-end from Fishergate, the Anglo-Saxon settlement at York that preceded Coppergate, and finds it to be comparable to the Group A strap-end from Bedfordbury. The second strap-end from Bedfordbury, while also rather thin with line pattern decoation, fits into a group of strap-ends more common in the ninth and tenth centuries with a “squared attachment plate” (See Fig. 34). The third and final strap-end from Bedfordbury

238. Blackmore, “From beach to burh,” 129.
was not reproduced in illustration and is, thus, difficult to classify.\textsuperscript{243} While this strap-end evidence from Lundenwic does not contain as high of a percentage of zoomorphic strap-ends as some of the northern sites in the ninth-century, the repertoire does contain geometric strap-ends that were still in use in the Middle and Late Anglo-Saxon periods. The reduced number of zoomorphic strap-ends and low number of strap-ends uncovered in general at Lundenwic may be evidence of Scandinavian disruption in the ninth-century, which is observed at many trade sites. Considering this disturbance, the Lundenwic strap-end assemblage again indicates some similarity to the strap-end collections of the northern Anglo-Saxon kingdom. It appears as though these thin, geometric patterned strap-ends fell out of favor, but did not disappear entirely, in the eighth century while zoomorphic designs became much more prevalent. Further excavation efforts in London may add more Trewhiddle-style or zoomorphic strap-ends to the current repertoire.

\textsuperscript{243} Lyn Blackmore, “The copper alloy,” 121.
Figure 33 – Group A strap-end with incised lattice-pattern uncovered at Bedfordbury excavation in Lundenwic. Cropped from Figure 41 in Lyn Blackmore, “The copper alloy,” in Transaction of the London and Middlesex Archaeological Society 40 (1989): 119. Used with permission of Lyn Blackmore.
Excavations at another southern trade site, Ipswich, revealed seventeen distinct strap-ends, three of which date to the late medieval period and are, therefore, of little value to this study. Twelve of the fourteen Anglo-Saxon strap-ends feature a zoomorphic terminal, thus, fitting within the pattern of strap-ends recovered from ninth-century metalworking sites. Thomas attributes two strap-ends in this collection to the Trewhiddle-style group. Of the two strap-ends that did not possess zoomorphic end pieces, one was unable to be identified because of corrosion and the other possessed a geometric ring-and-dot design based on a type of Carolingian tongue-shaped strap-ends from the tenth century. Thomas characterizes the entire

collection of strap-ends thusly: “The majority of strap-ends from the Ipswich excavations can be compared with the general 9th-century series, members of which are characterised by their flat convex shafts, a split butt-end, most usually pierced by two rivets for attachment, and a zoomorphic terminal in the form of an animal’s head seen from above.”246 This southern site’s strap-ends share similar zoomorphic motifs with production sites in the north, even more so than the southern trade sites of Hamwic and Lundenwic.

After assessing this large collection of primarily non-ferrous strap-ends, the image of precious and semi-precious metalworking in Northumbria becomes clearer. Despite the unique historical and cultural milieu of Northumbria as distinct from other Anglo-Saxon kingdoms, the non-ferrous metalworking evidence demonstrates that Northumbrian metalworking was virtually homogenous in nature with smithing practices in the rest of Anglo-Saxon England. Given the strap-end evidence throughout Anglo-Saxon England, zoomorphic designs dominated in all regions during the Middle and Late Saxon periods. The connections between the north and south at this time may account for this metalworking homogeneity. In one Lundenwic excavation, archaeologists extracted a hoard of twenty-one Northumbrian coins from a single ninth-century ditch.247 This hoard demonstrates how the northern and southern Anglo-Saxon kingdoms were connected at this point and these ties may have extended to designs used in metal craft production.

The greatest tangible difference in strap-ends between sites is quantity. Except for Hamwic, none of the large trading sites, like Coppergate or Lundenwic, produced many strap-ends. Hamwic also differed from other trade sites in the type of strap-ends produced there; thin strap-ends with various line patterns were the predominant strap-end type uncovered at Hamwic.

However, it should be noted that this site’s strap-end assemblage dates to the period before the ninth and tenth centuries, when most of the strap-ends from Coppergate, Lundenwic, and Ipswich were made.\textsuperscript{248} The smaller sites, the possible trade site of Newbald in Northumbria and the nearby elite site of Flixborough, also produced most of their strap-ends during the ninth century. The site of Hamwic shows signs of economic decline towards the end of the ninth century, directly after the \textit{Anglo-Saxon Chronicle} records Scandinavian invasions in Wessex, the kingdom that housed Hamwic.\textsuperscript{249} Scandinavian disruption may have played a role in this apparent trend. So-called Viking incursions may have affected strap-end production at large trading centers, even ones that were under Scandinavian control like Coppergate. Smaller trading and settlement sites, like Newbald and Flixborough in the north, may have been less harshly affected by Scandinavian influence in the region. Their location within the Danelaw may have allowed them to produce a relatively high number of strap-ends in the ninth century as compared to other Anglo-Saxon regions.

Archaeologists have found additional signs of upheaval and disruption in Anglo-Saxon England at this time. Approaching the end of the ninth century, an increasing number of hoards of metal objects, including strap-ends, were deposited into the ground near York.\textsuperscript{250} These hoards, like the hoard of Northumbrian coins in Lundenwic, indicate a general sense of unease among the people of northern England at this time. If people were burying valuables in the ground to come back to later, they would likely have been less inclined to make or buy new...

\textsuperscript{248} The majority of Lundenwic finds come from c. 770-850, the strap-ends at Coppergate are from the ninth and tenth centuries, and Ipswich’s strap-ends were produced mainly between the ninth and twelfth centuries.


metal items. This cloud of uncertainty could have had an effect on strap-end production in the northern and southern kingdoms.

**Concluding Thoughts**

Analysis of both ferrous and non-ferrous metalworking in Northumbria indicates the absence of distinct, regional metalworking practices. Neither the assemblage of knives nor strap-ends demonstrates differences in design or artistry between Northumbria and other Anglo-Saxon kingdoms. Blade back form C was the most popular type of blade found on all sites I analyzed except for Cottam, where back form A outnumbered C. The relatively small sample size, twenty-one A type and thirteen C type, may have contributed to this site becoming an outlier in knife assemblage. Further excavations and x-ray analysis of the body of Anglo-Saxon knife blades may lead to further insights on this subject.

In the strap-end corpus, one can observe a general trend. Zoomorphic strap-ends were the most common stylistic type during the ninth-century, many of which were decorated in the Trewhiddle style. The artifacts did not demonstrate any cultural distinction between Northumbria and other Anglo-Saxon kingdoms. After assessing the evidence, I see more uniting than dividing factors in the metalwork between the various regions. I found no evidence for distinct regional styles like Gabor Thomas argued for in his work on Northumbrian strap-ends. Initially, I expected Scandinavian designs to prominently feature in the strap-ends from these sites in Northumbria during Scandinavian invasion and settlement, but I did not find evidence of Scandinavian influence in the production sites of this region during the ninth and tenth centuries when the Borre and Jelling style were in use. None of the strap-ends from metalworking sites exhibited definitively Scandinavian decorative styles, such as the Borre style of the ninth and
tenth century or the Jelling style that appeared in Anglo-Saxon England in the tenth century. Instead, I found general homogeneity between the strap-end styles of Northumbria and those of the southern Anglo-Saxon kingdoms at sites where metalworking was conducted in the Middle and Late Anglo-Saxon periods.

Of course, a roadblock for this study is the lack of accessible evidence. Many knives and strap-ends from excavations have not been reproduced in photographs or illustrations that I could access and others still have not been published at all. More evidence from a larger repertoire of sites may change my current interpretation, but given the current field of evidence, no Northumbrian metalworking distinction exists.
CHAPTER III: THE EXTENT AND CHARACTER OF METALWORKING AT BAMBURGH CASTLE

In this thesis chapter, I explore the extent of metalworking at Bamburgh Castle during the Anglo-Saxon occupation. The Bamburgh Research Project has uncovered evidence of a major metalworking area within the bounds of the Anglo-Saxon royal fortress. In the archaeological analysis portion of this study, I focus solely on metal objects within the metalworking area and its immediately neighboring contexts. This research decision has twofold benefits for my methodology – firstly, it reduces the number of archaeological phases and artifacts I had to analyze, and, secondly, this method eliminates metal objects that could not have been produced in the ninth-century smithy building because they date to phases before or after the structure’s construction. Through analysis of individual metal artifacts, assessment of the ferrous and non-ferrous artifacts as groups, and mapping individual objects with QGIS software, I was able to determine the following: the type of metals worked on this site, the variety of objects made there, and the level and type of production conducted on the site.

I have chosen to study the metal artifacts at Bamburgh, not to evaluate the scholarly value of the individual artifacts, but to understand the social and economic processes that produced them. As Lewis Binford, a foundational figure in American New Archaeology,251 once stated, “The loss, breakage, and abandonment of implements and facilities at different locations, where groups of variable structure performed different tasks, leaves a ‘fossil’ record of the actual

251. American New Archaeology is a school of thought that originated during the 1960s based largely on changes in the field of cultural anthropology. This form of archaeological theory: 1) sought to apply the scientific method more rigorously to the field of archaeology; 2) proposed that scientific objectivity was possible in the study of past human cultures; 3) viewed human adaptation to their natural environment as the underlying cause of cultural shifts; and 4) urged archaeologists to use ethnological approaches to find similarities between different cultures. For more on the development and evolution of New Archaeology, see: Bruce G. Trigger, A History of Archaeological Thought, 2nd ed. (Cambridge: Cambridge University Press, 2006), 392-444.
operation of an extinct society.\textsuperscript{252} The metal artifacts in the contexts related to the Anglo-Saxon smithy have implications beyond the walls of this imposing fortress on the North Sea; these objects are traces of real people and their everyday actions. Because we have no texts that describe the smithing practiced at Bamburgh, these objects are the only means through which scholars can assess this practice at the castle. The artifacts left behind near the smithing area, interpreted correctly, tell us what type of objects the smiths made and they indicate the type and level of production occurring on site. Understanding this craft production further elucidates the position of Bamburgh within the broader context of Anglo-Saxon smithing and its place within the North Sea economy. Smithing at Bamburgh, therefore, is of significant archaeological and historical importance.

\textbf{Historical Context for Bamburgh Castle}

Bamburgh Castle, lying on the North Sea shore in northern England (see \textit{Fig. 35}), was a Northumbrian royal site in the subkingdom of Bernicia. The geographic setting of the castle sets it dramatically apart from the surrounding region. The royal complex was built on top of a massive outcropping of dolerite (volcanic rock) that juts out toward the sea. This outcropping measures approximately 300 meters measuring north-west to south-east and 70 meters wide.\textsuperscript{253} This rocky plateau raises the fortress significantly above the surrounding plain. The tallest part, where the Anglo-Norman keep lies, is 30 meters higher than the ground around the dolerite outcropping.\textsuperscript{254} Today, sand dunes separate the castle and its dolerite base from the North Sea, but the Ordnance Survey map of the area from the nineteenth century indicates that the castle’s

\textsuperscript{253} Graeme Young, \textit{Bamburgh Castle: The Archaeology of the Fortress of Bamburgh, AD 500 to AD 1500}, edited by Paul Gething (Alnwick: Bamburgh Research Project, 2001), 6.
\textsuperscript{254} Young, \textit{Bamburgh Castle}, 6.
dolerite outcropping stood directly on the water on one side.\textsuperscript{255} Archaeologists have even found evidence of a harbor that could have allowed ships to dock right next to the castle.\textsuperscript{256} Merchants could have used this harbor to gain access to the castle and trade within the walls of the fortress; the site must have been well known to merchants working in the region. The castle’s height and wall of water on its eastern side would have made it an impressive and notable feature on the Northumbrian landscape. Given the visibility, harbor access, and royal prominence of the castle, the industrial area within the fortress would have been a natural area for merchants from neighboring regions to flock to.

\textsuperscript{255} Young, \textit{Bamburgh Castle}, 21.
\textsuperscript{256} Young, \textit{Bamburgh Castle}, 21.
The site where the castle lies today has been occupied for around two thousand years, but the written evidence only confirms human occupation starting in the sixth century. According to the later tradition of the *Anglo-Saxon Chronicle*, Bamburgh emerged as a political center of Northumbria after the warlord Ida took the stronghold from the Britons in 547.

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Archaeologically speaking, pinning down the foundation of the fortress to a specific year would be impossible and no evidence of sixth century occupation has been uncovered, therefore, the date given in the *Anglo-Saxon Chronicle* cannot be taken at face value. That being said, Bamburgh held a distinguished position during the seventh century as a Bernician administrative center and residence of the royal dynasty.\(^{259}\) This dynasty likely acted as a major player in the formation of the larger Northumbrian kingdom.\(^{260}\) A stone sculpture fragment found at the castle may have been part of a throne (See *Fig. 36*), further evidence for royal occupation. The royal settlement’s name is derived from *Bebbanburh* (Bebba’s Fortress), the name for the site in the Anglo-Saxon era. *Bebbanburh* was purportedly named after King Æthelfrith’s (r. 593-617) wife, Bebba.\(^{261}\) Textual and archaeological evidence indicates that the royal fortress was occupied throughout the Anglo-Saxon period and remained a royal center for the Northumbrian kingdom into the ninth century. Political fragmentation led to one family ruling as earls in Bamburgh while much of the Northumbrian kingdom was swallowed up into the Danelaw.\(^{262}\) In 1095, the castle was taken into direct Norman control from Northumbrian Earl Robert de Mowbray, but the site remained occupied after this transfer of power.\(^{263}\)


\(^{262}\) Kirton and Young, “Excavations at Bamburgh,” 5.

\(^{263}\) Young, *Bamburgh Castle*, 22; Kirton and Young, “Excavations at Bamburgh,” 5-6.
The royal site is mentioned sporadically in chronicles throughout the Anglo-Saxon and medieval period. An early Northumbrian king, the famed king and saint Oswald (d. 642), has a
strong connection to this site in the historical record. In the *Ecclesiastical History of the English People*, Bede writes that the remains of Oswald’s hands and arms were stored as holy relics in St. Peter’s church within the royal fortress of Bamburgh in his own day.\(^\text{264}\) We do not know the extent of Bamburgh’s occupation in King Oswald’s day, but when Bede was writing his history, Bamburgh must have been a major settlement because Bede refers to the site as both an *urbs* and *civitas* in his writings.\(^\text{265}\) The site was also labeled a *burh* before the year 750, an epithet only about ten settlements earned this early in the Anglo-Saxon period.\(^\text{266}\) Bamburgh is mentioned sporadically in the writings of Symeon of Durham (fl. c.1090–c.1128); according to his history of the church of Durham, the Anglo-Saxon King Eadberht held the bishop of Lindisfarne, Cynewulf, captive for a short period in his castle at Bamburgh around the year 750.\(^\text{267}\) Bamburgh appears again in Symeon’s history of the kings of England in the entry for the year 774. In his record of that year, Symeon breaks from his account to marvel at the fortifications of Bamburgh.\(^\text{268}\) He also notes the church that holds relics of St. Oswald and a well on the western side of the castle complex.\(^\text{269}\) Initially, the church was dedicated to Saint Peter,\(^\text{270}\) but after the Norman Conquest, the church was renamed the Chapel of St. Oswald, corresponding with its saintly relics.\(^\text{271}\) While Symeon recorded these events centuries after they occurred, he likely

\(^{264}\) Bede, *EH*, Book III, Chapters 6 and 12.


\(^{266}\) Kirton and Young, “Excavations at Bamburgh,” 4.


\(^{271}\) Kirton and Young, “Excavations at Bamburgh,” 9.
interpolated contemporary, credible sources that presumably presented an accurate representation of eighth-century Northumbria.  

The current appearance of Bamburgh Castle and its fortifications are largely a result of nineteenth-century renovations by Lord William Armstrong. Lord Armstrong had to make substantial repairs after he acquired ownership because the castle sustained severe damage from cannon fire during the War of the Roses in the fifteenth century and previous renovation efforts under Dr. Sharp in the eighteenth century were not holding up. Today, the daunting edifice is a Victorian mansion with a few still-visible medieval features, namely the twelfth-century keep. The grounds of the castle complex are split into the Inner Ward, the East Ward, and the West Ward (See Fig. 37). The Inner Ward and the East Ward hold most of the castle complex’s standing buildings renovated or constructed in the nineteenth through twentieth centuries; The West Ward contains fewer structures and is the location of current archaeological excavations (See Fig. 38). With archaeological excavation still in progress, the layout of the royal fortress in the Anglo-Saxon period is difficult to definitively determine. The Anglo-Saxon settlement appeared to include extensive timber fortifications around the citadel. This past year, archaeologists have uncovered some evidence for a box rampart construction. A box rampart “consists of two parallel upright timber walls joined together and filled with earth or stone.” The benefits of this type of fortification is that the sheer weight of the fill holds the structure

272. For more on the credibility of Symeon of Durham’s annals for the years 732 to 806, see Rollason, *Northumbria, 500–1100*, 15-6.
273. Graeme Young, pers. comm.
upright without digging into the ground to anchor it. The dolerite on which the castle is built is quite hard, thus making it difficult to dig into it.

Figure 37 – Map of Bamburgh Castle grounds today. Illus. 1 in Joanne Kirton and Graeme Young, “Excavations at Bamburgh: New Revelations in Light of Recent Investigations at the Core of the Castle Complex,” Archaeological Journal (2016): 2. Used with permission of Graeme Young.
None of the Anglo-Saxon structures are visible in the castle complex today. According to the Winchester Manuscript of the *Anglo-Saxon Chronicle*, King Ida erected the fortress of Bamburgh after he assumed the throne of Northumbria in 547. This same entry claims that the royal complex was first surrounded by a wooden palisade, which was later replaced with a wall, presumably made of stone.277 Neither form of fortification presently stands, but archaeologists have discovered stone walls underneath the chapel in the Inner Ward that are likely a part of

these early fortifications. Oswald’s Gate (See Fig. 39) was originally an Anglo-Saxon structure from the eighth century at the latest, but the structure was heavily modified in the medieval period. The earliest stonework present in the gate today appears to date to the twelfth-century. The Anglo-Saxon well Symeon of Durham described still exists; it lies within the Anglo-Norman keep constructed in the twelfth century, covered by a more modern wellhead.

Figure 39 – Oswald’s Gate. Taken from “Excavation outside St Oswald’s Gate,” Bamburgh Research Project Blog, entry from Oct. 19, 2011, https://bamburghresearchproject.wordpress.com/2011/10/19/excavation-outside-st-oswalds-gate/. Used with permission of Graeme Young on behalf of the Bamburgh Research Project.

279. Young, Bamburgh Castle, 31.
280. Young, Bamburgh Castle, 34-5; Gething and Albert, Northumbria: The Lost Kingdom, 137.
Bamburgh was one of two Anglo-Saxon royal sites in Northumbria that have been excavated to date. The other royal site, Yeavering, lies west and slightly south of Bamburgh (see Fig. 35), and, similarly to this fortress, is located in what was once the subkingdom of Bernicia. Both Bernician royal sites share another similarity: the archaeologist Dr. Brian Hope-Taylor excavated at both sites. He was the principle excavator of Yeavering in the 1950s and -60s and had the same role at Bamburgh in various years between 1959 and 1974. At Yeavering, the excavations under Hope-Taylor led to the discovery of several timber halls, an industrial area, and a myriad of finds, including pottery, loom-weights, an imported Merovingian gold coin, and nails. Based on this constellation of evidence, Brian Hope-Taylor concluded that the Anglo-Saxon occupation of the site began in the mid-sixth century and ended with the abandonment of the site in the first half of the seventh century. Sadly, archaeologists found little evidence of metalworking at the royal compound, therefore excluding it from this study of Northumbrian metalworking. Nearby, archaeologists found crucible fragments and pits that could indicate non-ferrous metalworking, but the evidence was quite sparse and inconclusive.

The nobility of Bamburgh may have been in contact with those at the Yeavering royal complex. Lindisfarne, home to the Lindisfarne gospels and prominent bishops in the Anglo-Saxon period, is visible from the dolerite outcropping on which Bamburgh rests. The short distance between the two sites would have enabled nearly effortless communication between the secular and religious powers in the north. Bamburgh’s proximity to other major settlements, like Yeavering and Lindisfarne, places the site within a network of influential Northumbrian

settlements. The castle’s dramatic place in the landscape and its nearness to these sites may have also put the fortress in a uniquely favorable position for economic activity. The site would have been visible for miles around and could have been a natural meeting place for those in the surrounding region. There is substantial evidence of craft production at an industrial scale on the site and it would be logical for merchants and others to come here for trade, especially for residents of other prominent settlements nearby.

**History of Excavations**

Excavations have been conducted intermittently at Bamburgh Castle since 1959. Hope-Taylor conducted excavations on the site of the castle from 1959 to 1962 and again from 1970 to 1974. After Hope-Taylor’s work at Bamburgh, there was an extended interim where no archaeological investigation took place; in fact, no further excavations took place at the castle until the efforts of Bamburgh Research Project.

In the summer of 2016, I traveled to Bamburgh to participate in the Bamburgh Research Project’s excavation of the Anglo-Saxon site. The Bamburgh Research Project, founded in 1996, has been painstakingly uncovering archaeological remains in northern England. One of their first major projects was the excavation of an Anglo-Saxon burial ground, the Bowl Hole cemetery, near the castle. Approximately 119 skeletons were uncovered and, after genetic testing, the archaeologists were able to determine that a few of these individuals had come from as far as North Africa and the Mediterranean region. This geographic spread of these

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individuals buried so closely to the castle indicates the wide reach of the royal court at Bamburgh. Radiocarbon dating and finds evidence indicates that these individuals lived during the Middle Anglo-Saxon period, the seventh through the ninth centuries, the period when the industrial complex at Bamburgh was in operation.

The Project soon commenced excavation at the castle and has continued to excavate there since. The team seeks to excavate the area within the Bamburgh Castle complex and catalogue previous unpublished excavation efforts in order to discern the importance of the castle within the history of Northumberland. A 1999 geophysical survey of the Inner Ward of the castle suggests the existence of several large, rectilinear structures that could date to the Anglo-Saxon period. There may have been up to three different buildings in this area according to the survey; they would most likely have been constructed out of wood in the seventh century and rebuilt out of stone later in the eighth century. Evidence of stonework as early as the eighth century indicates the early prominence of the site in the sociopolitical landscape. Building in stone in Britain at this time was rare, expensive, and invoked the legacy of Rome, especially in situations where Roman masonry was reused in an entirely new building. We do not know the source of the stone in these buildings, as they have yet to be extensively excavated, but their

290. Gething and Albert, Northumbria: The Lost Kingdom, 165.
292. Young, Bamburgh Castle, 15.
presence clearly demonstrates that Bamburgh had access to substantial resources. The dynasty at Bamburgh may also have wanted to highlight their connections to Rome through receiving the “inheritance of the authority of Rome” in their architecture, but this is impossible to definitively prove. The survey also found possible evidence of the Anglo-Saxon crypt and church underneath the remains of the Chapel of St. Oswald, a ruin with twelfth-century and post-medieval stonework, but subsequent excavations found no remains of a crypt beneath the chapel.

In 2004, the Bamburgh Research Project excavated a few strategic trenches in the Inner Ward. They set up trenches that lined up with interesting features from the ground-penetrating radar survey that may have been indicative of the Anglo-Saxon church (See Fig. 40). These efforts were taken up again in 2008 when the castle stuff dug up flowerbeds near the church and discovered evidence of a wall (See Fig. 40). In the 2008 excavation efforts, the excavators investigated this area and found walls that predated the Anglo-Norman walls of the chapel. These walls were constructed two phases before the Anglo-Norman walls, and although there are no artifacts of known dates to help date the walls, they likely date to the Anglo-Saxon period. One of the walls may have been the wall marking the northern perimeter of the Inner Ward in the early medieval period, given its location at the edge of the downward slope of the

295. Wood, “Geophysical Survey at Bamburgh Castle, Northumberland,” 308-10; Young, Bamburgh Castle, 12-3
296. Graeme Young, pers. comm.
300. Archaeological phases refer to periods of time in relation to physical context layers. Phases can be made up of one or more layers.
301. Kirton and Young, “Excavations at Bamburgh,” 53.
After these investigations in the vicinity of the chapel ruins, the archaeologists concluded that they had likely found the remains of an earlier church underneath the present ruins. The first church was likely built in timber and later replaced by stone, possibly the stone uncovered by archaeologists in the 2004 and 2008 dig seasons.

Further archaeological investigation occurred in 2010 when Time Team used resistivity survey and ground-penetrating radar survey methods to study the evidence of possible

Figure 40 – Location of trenches excavated in the Inner Ward of the Castle. Illus. 4, in Joanne Kirton and Graeme Young, “Excavations at Bamburgh: New Revelations in Light of Recent Investigations at the Core of the Castle Complex,” Archaeological Journal (2016): 14. Used with permission of Graeme Young.

304. Time Team was a British television program devoted to carrying out archaeological investigations over the course of a few days. The series ended in 2014.
structures underneath current buildings in the Inner Ward. In this same dig season, Time Team set to excavate one particular abnormality from the survey in the Inner Ward’s lawn and opened Trench 11 (See Fig. 40). The investigation yielded evidence for various manmade cuts into the dolerite bedrock, but no major structures. Today, the Bamburgh Research Project conducts archaeological research at the castle and, since 2010, they have extended their investigations to an ancient site in the Bradford Kaims, a matter of kilometers from Bamburgh.

Current excavations at the castle occur in two separate locations in the West Ward of the castle, Trench 1 and Trench 3. Trench 1, located on the northern side of the eighteenth-century windmill, was started to discover the extent of the Anglo-Saxon fortifications and further investigate St. Oswald’s gate, which stands on the northwest side of the trench. The Bamburgh Research Project opened Trench 3 just south of the windmill in 2002. This trench overlaps with former excavations under Brian Hope-Taylor. Part of the Project’s goals in this trench is to document Hope-Taylor excavation efforts, as portions of the records of these ventures have been lost. In Trench 3, the Project and Brian Hope-Taylor uncovered evidence of a major industrial area, including a metalworking building and a mortar mixer, which serves as further evidence that major stonework buildings were constructed at Bamburgh during the Anglo-Saxon period. My research in this thesis is focused on the smithing area in Trench 3.

305. Kirton and Young, “Excavations at Bamburgh,” 2, 16, 32.
308. Castling and Young, “A 9th Century Industrial Area at Bamburgh Castle,” 312.
309. Kirton and Young, “Excavations at Bamburgh,” 7; Graeme Young, pers. comm.
**Smithy Building**

The smithy building (see *Fig. 4I*), likely in use during the ninth century,\textsuperscript{311} lies on the southern end of Trench 3 in the West Ward and the structure is oriented north-west south-east (see *Fig. 42*).\textsuperscript{312} During excavation in 2010, archaeologists found linear groups of stones within contexts containing high concentrations of iron objects, copper-alloy finds, and hammerscale.\textsuperscript{313} They labeled this feature ‘building 3313’ and suggested that it was used for metalworking after discovering the frequency of burning patches, hammerscale, and metal finds in the vicinity. In the 2012 dig season, the Bamburgh Research Project resumed the excavation of building 3313 and investigated its related contexts. The team may have identified evidence of slots for timber beams in 2010, but when excavation began in 2012, these slots were no longer apparent.\textsuperscript{314} Packing stones (context 3291) were uncovered on all four sides of the presumed smithy building during the 2010, 2012, and 2013 dig seasons.\textsuperscript{315} A possible door was identified in the southwest wall where ash and burnt material was observed to spread outside the building in this apparent opening in the wall.\textsuperscript{316}  

\textsuperscript{311} Graeme Young, pers. comm.  
\textsuperscript{312} Castling and Young, “A 9th Century Industrial Area at Bamburgh Castle,” 314; C. Durgeat, “1.1. Occupation Sequence of the Metalworking Area,” Bamburgh Research Project, unpublished material, 1.  
\textsuperscript{313} Castling and Young, “A 9th Century Industrial Area at Bamburgh Castle,” 313-4.  
\textsuperscript{314} Durgeat, “1.1. Occupation Sequence of the Metalworking Area,” 1.  
\textsuperscript{315} Durgeat, “1.1. Occupation Sequence of the Metalworking Area,” 1.  
\textsuperscript{316} Castling and Young, “A 9th Century Industrial Area at Bamburgh Castle,” 314; Durgeat, “1.1. Occupation Sequence of the Metalworking Area,” 2.
Figure 41 – Picture of the remains of the Anglo-Saxon smithy in Trench 3. Fig. 11 in Castling, J. and G.L. Young, “A 9th Century Industrial Area at Bamburgh Castle,” *Medieval Archaeology, Medieval Britain and Ireland, Northumberland* vol. 55 (2011): 311-317. Used with permission of Graeme Young.
Figure 42 – Phase plan of Trench 3 that shows the smithy building in relation to other features in the trench. Created by Graeme Young and used with his permission.
Within the building, archaeologists identified a pit (context 3269) full of clinker slag (the waste product of metalworking) and burnt materials, which appears to have been part of the metalworking process.\textsuperscript{317} The remains of a mortar floor (3367) were also uncovered within the building.\textsuperscript{318} On top of this floor, archaeologists first had to remove layers of burning patches, likely produced by smithing operations.\textsuperscript{319} Flagstones (3376) were also found associated with the building, lying just west of the packing stones for the structure. The Bamburgh Research Project theorized that the flagstones could have been used to hold tools, such as a bellows, within the smithy building.\textsuperscript{320}

Material excavated in contexts neighboring the smithy building itself hint at metalworking production. Just north of the smithy building, the excavators identified a hearth (context 3274), surrounded by stones in a square formation, which may have been related to the metalworking operations of the smithy.\textsuperscript{321} Given the hearth’s proximity and the iron and copper objects recovered within it, the structure could have been used in the metalworking process. In context 3368, east of the stone linear (2262), archaeologists found a clay fragment that was likely a crucible sherd, which could have been used for melting down non-ferrous metals. Throughout the entire metalworking area, a high concentration of metalworking waste was recorded; the excavators found slag, hammerscale, and charcoal “in industrial quantities” according to site director Graeme Young.\textsuperscript{322}

\textsuperscript{317} Durgeat, “1.1. Occupation Sequence of the Metalworking Area,” 2. 
\textsuperscript{318} Durgeat, “1.1. Occupation Sequence of the Metalworking Area,” 1. 
\textsuperscript{319} Durgeat, “1.1. Occupation Sequence of the Metalworking Area,” 1. 
\textsuperscript{320} “Contexts Description,” unpublished material, 4. 
\textsuperscript{321} Durgeat, “1.1. Occupation Sequence of the Metalworking Area,” 1. 
\textsuperscript{322} Graeme Young, pers. comm.


**Approach to Artifact Analysis at Bamburgh**

The hefty small finds register for Bamburgh Castle’s West Ward contains unearthed artifacts from the Bamburgh Research Project’s dig seasons back to 2001. This voluminous collection contains 7194 entries as of March 2017; all artifacts in the database were uncovered between the years 2001 and 2015. Individual entries may include more than one item, typically if an item is fragmented or several similar items found very closely together or fused into one object, like coins joined through corrosion. Because of the ambiguity and uncertainty, especially with items fused together but not x-rayed, I dealt with all entries as though they were one object.

The first step in my analytical process was to determine which contexts were relevant to my study. In my research, I have chosen to investigate only the contexts related to the operation of the Anglo-Saxon smithy. These contexts are the structures, natural and man-made features, and soil depositions within or neighboring the smithy building while it was in use. I identified these contexts with the help of the Bamburgh Research Project’s reports on the smithy and Graeme Young, a director of the project. My methodological decision to focus on these contexts was beneficial in that it reduced the number of contexts, and, therefore, artifacts, I had to analyze, but it also eliminated many metal objects that pre- or post-dated the smithy structure. As my study of metalworking at Bamburgh was only one chapter in a master’s thesis, I did not have the time or resources to analyze all metal objects on the site and determine whether they were produced by smelting operations at the castle. I also do not have access to all site records because they have not all been digitized yet. This paucity of digitized records would make analysis of all uncovered metal artifacts nearly impossible. Fortunately, though, by analyzing only contexts in or related directly to the smithy building, I have been able to paint a more accurate picture of smelting at the Bamburgh fortress in the Anglo-Saxon period.
After selecting contexts, I had to decide which artifacts I should include in my study. I excluded all non-metal objects; they do not flesh out any details of metalworking at the castle. I decided I would study the ferrous and non-ferrous objects separately for two reasons: 1) I took this approach in studying the metalworking of Northumbria in the previous chapter and I should attempt to be methodologically consistent, and 2) non-ferrous and ferrous metalworking were not conducted using the same methods and are, therefore, not entirely comparable.

The next step in my process was determining how I wanted to analyze the artifact data. I decided that I wanted to look at the collection of objects from the smithy contexts as an assemblage. I wanted to look for significant patterns or relationships in the collection. As previously stated, I counted entries as individual artifacts, even if they were fragmented into pieces or several objects fused together. In pulling ferrous and non-ferrous entries from the register, I was able to discern the different types of metal objects and what percentage they comprised of the total number of objects from the smithy-related contexts. I also wanted to determine any relational patterns in the distribution of the metal artifacts; using QGIS software, I placed the objects on a map of Trench 3. I entered the Easting and Northing grid coordinates for each object into the software. These coordinates placed the artifacts within the grid system used in the excavation of Trench 3. The QGIS software produced an accurate representation of the artifact distribution on a map of this site.

A few obstacles impeded me from fully completing my goals. One substantial issue was the absence of Easting and Northing grid locations of many of the metal finds. Sadly, the small finds register was missing many artifact locations. These absent locations were presumably recorded on paper, but never transferred over to the digital database. Because of this lacuna in my data, I could not make fully accurate maps of the various metal finds from the smithy
contexts. I entered the iron and non-ferrous artifacts that had grid locations, but this created only a partial picture of the metalworking finds.

Another problem I encountered was my access to artifact drawings and photographs. The Bamburgh Research Project is making great strides towards digitizing all of their records, but this exceedingly slow and meticulous process has not been completed in time to aid my research. The Bamburgh Research Project team was generous with what digitized information that they possessed and they were able to provide me with pictures of ferrous blades from the excavation, but not all ferrous and non-ferrous objects from smithy-related contexts.323

The documentation of slag finds at Bamburgh was the final major issue I encountered in my study. Slag, the by-product of ferrous and non-ferrous metalworking, can serve as a reliable indicator of smithing at a site; however, at an industrial site like Bamburgh, the amount of slag recovered in excavation was staggering. At Bamburgh, the archaeologists decided to stop recording slag in the small finds register after it became such a ubiquitous item. The Bamburgh Research Project team deemed slag unremarkable and found that recording it as a small find to be too time consuming. They argued that recording the grid location and level for every scrap of slag would not add to the interpretation of the site. While this decision saved the project time, it has reduced the number of relevant artifacts for analysis in my study. I pulled the few pieces of slag from the contexts related to the smithy building out of the register and added them to my analysis, but these paltry few items do not accurately represent the level of metalworking production at the Anglo-Saxon fortress in the ninth century.

Below is a table of the finds from context layers in use during the lifetime of the smithy building. I divided the metal finds into separate categories, tallied up the total for each type of

323. A sincere thank you to Des Taylor, Jeff Aldrich, and Graeme Young for granting me access to these photographs.
artifact, and calculated the percentage for each group out of the total number of objects found from the smithy-related contexts.

*Table 1 – Finds from smithy-related contexts at Bamburgh Castle*

<table>
<thead>
<tr>
<th>Metal</th>
<th>Number of Artifacts</th>
<th>Percentage of Finds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron/Iron Alloy</td>
<td>195</td>
<td>33.854%</td>
</tr>
<tr>
<td>Iron Slag</td>
<td>1</td>
<td>0.174%</td>
</tr>
<tr>
<td>Iron Ore (Hematite)</td>
<td>1</td>
<td>0.174%</td>
</tr>
<tr>
<td>Clinker Slag</td>
<td>3</td>
<td>0.521%</td>
</tr>
<tr>
<td>Copper/Copper Alloy</td>
<td>171</td>
<td>29.688%</td>
</tr>
<tr>
<td>Copper Slag</td>
<td>1</td>
<td>0.174%</td>
</tr>
<tr>
<td>Lead</td>
<td>66</td>
<td>11.458%</td>
</tr>
<tr>
<td>Lead Slag</td>
<td>3</td>
<td>0.521%</td>
</tr>
<tr>
<td>Vitreous Slag</td>
<td>7</td>
<td>1.215%</td>
</tr>
<tr>
<td>Non-Metallic Objects</td>
<td>128</td>
<td>22.222%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>576</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**Iron Objects**

The iron artifacts recovered from the smithy-related contexts of Bamburgh can be divided into the following categories: structural fittings, difficult-to-identify iron objects (be they fragmentary or corroded), tools and weapons, wearable and decorative items, and general metalworking debris. This assemblage of iron objects fits within the general framework of ferrous objects at other Anglo-Saxon production sites and will be outlined below.
Nails constitute the largest percentage of structural fittings found in the smithy contexts and were the most frequently found class of iron objects in these contexts overall. Nails were classified into separate categories in a few rare instances in the small finds register. The vast majority of entries are simply ‘nail’ or ‘nail shaft’ indicating a nail fragment. Seventy-four artifacts were identified simply as nails. The majority of the nails found on site were intact or at least intact enough to identify them as a nail; only twelve nail shafts and two nail heads were uncovered. Three horseshoe nails were found in contexts related to the smithy building. Other minor finds classified as nails in smithy contexts were one nail found connected to a washer, a single hob nail, and one fiddle key nail (a D-shaped nail used for attaching horseshoes).324

In addition to nails, three keys and a single door fitting constitute the remaining objects connected to building and construction. The iron artifact assemblage also contains a few more various, seemingly utilitarian objects, like four iron hooks and three iron plates that were likely part of a now lost object. Many iron fittings and utilitarian objects were likely attached to organic materials such as wood or leather that have degraded since their deposition into the soil.

After structural fittings, unidentified iron objects were the next substantial group of iron objects; they amount to sixty-eighty finds. Fragmentary iron finds and difficult to identify objects also belong in this category. Without drawings or photographs, I cannot reliably analyze these iron objects as a cohesive group.

Not many tools or weapons were uncovered near the smithy building. Only two knife blades were recovered from smithy-related contexts. One of these artifacts, small find 6654, was exceptionally well-preserved and contained the mineralized remains of a wooden handle. No

swords or weaponry were recovered from the phases related to the smithy building in Trench 3, but a single chainmail link was uncovered.

An iron pendant, a ring, and the iron from a bone comb handle constitute the few decorative ferrous items uncovered in the smith-related contexts. Iron was not typically used as a means of decorative expression or adornment on non-ferrous objects as the majority of jewelry and decorative clothes fittings in the Anglo-Saxon period were comprised of copper, silver, and gold.

In addition to completed objects, the physical evidence of ferrous metalworking was also uncovered in the smithy building. The expected, various metalwork debris and slag provide further indications of ironworking at the site. Without records of the slag recovered from the site, though, this artifact type cannot be used as evidence for the scale of blacksmithing conducted here.

**Interpretation**

Overall, the iron objects uncovered in the contexts connected with the smithy are typical for an Anglo-Saxon production site and match the iron object assemblage of other similar sites. Nails constitute the majority of iron objects uncovered in the relevant contexts. Lacking photographs or drawings of these artifacts, I cannot fit the nails within a typology of Anglo-Saxon nails. Many were likely made for building construction, but it is difficult to confirm. As evidence of various timber buildings has been discovered on the site, iron nails would naturally be expected, as builders used them to hold these structures together. On the other hand, the ninth-century context in which the smithy building arose did not produce much evidence of grand timber buildings. The number of nails uncovered was too high to have come solely from
the small smithy building. Additionally, some of the nails found on site were made for other reasons and were entered into the finds register as ‘horseshoe’, ‘hob’, or ‘fiddle key’ nails, all of which had their own purposes beyond holding structures together. The proximity of the entire nail collection to the metalworking area indicates that many of the examples found were produced by a smith to be bought and used elsewhere.

Knives were not found as frequently in the smithy building contexts as I would have imagined at the onset of my study in this chapter. Only two examples were uncovered in smithy-related contexts. One heavily corroded blade, small find 8315 (See Fig. 43), was found in context 3261 and one knife with an extant wooden handle, small find 6654 (See Fig. 44), was excavated from context 3241, the matrix deposit which contains evidence of burning and appears to have formed after the smithy building. Neither of these blades is easy to identify by their blade back forms. In the case of 6654, the blade with the mineralized wood handle, the handle obscures where the shoulder and tang meet, a vital feature for identifying blade back form. If I had to assign a back form without the help of an x-ray to see the blade shape through the handle and the corrosion, I conjecture that the knife is part of the blade back form C category. The part of the blade where the tang and the shoulder meet appears to be straight and the blade curves in a concave shape down to the tip. This example possesses a similar blade back form and cutting edge as a knife blade uncovered at Flixborough that was categorized within the C1 blade back form grouping (See Fig. 45). The other knife blade uncovered from the smithy-related contexts, small find 8315, was so corroded that it is impossible to assign a back form without the help of an x-ray.
Figure 43 – Knife blade of indeterminate blade back form found in context 3261. Small find 8315 in the Bamburgh Research Project’s small finds register. Photograph provided by Des Taylor of the Bamburgh Research Project and used with his permission.
Figure 44 – Knife blade with mineralized wood handle, small find 6654, found in context 3241. Possibly a knife in the blade back form C category. Photograph provided by Des Taylor of the Bamburgh Research Project and used with his permission.
Figure 45 – Blade number 2133 uncovered at Flixborough. This blade has a C1 blade back form. Illustration from Figure 5.29 in Life and Economy at Early Medieval Flixborough, c. AD 600-1000: The Artefact Evidence, edited by D.H. Evans and Christopher Loveluck, Excavations at Flixborough, vol. 2 (Oxford: Oxbow Books, 2009), 217.

Even if I extend my search for knife blades to include the small finds database in its entirety, the Bamburgh Research Project has uncovered only about 25 blades, many of which
were recovered from contexts much earlier than that of the building. For comparison, the production site at Cottam produced thirty-six knives from archaeological investigation and the elite site Flixborough just outside of Northumbria yielded 250 knives. Further investigation at the fortress should yield more knife blades.

Given the smithy building’s location at an elite, royal complex, more evidence of weapons and armor might be expected, but their absence in the archaeological record at the castle is not unexpected. The small iron rings that would have made chainmail armor easily disintegrate in the soil of northern Europe and plate armor was not in use this early in the Middle Ages. The Bamburgh Research Project has not uncovered any swords, but they have found at least one seax during their excavation and Brian Hope-Taylor discovered a sword in his Trench 8, which connects to the project’s current Trench 3.325 The Bamburgh Research Project contends that the sword came from a level very near to that of the smithy building and it could very well be contemporaneous with the structure.326

The effort and cost required to forge a sword may explain the dearth of fine weaponry in the smithy-related contexts at Bamburgh. An expensive item like a pattern-welded sword would serve not just as a weapon, but also as a status symbol. Such an object would not often be dropped absentmindedly or misplaced. Even if a sword breaks, it could be forged anew or melted down to make an entirely new sword. The cost alone would likely prohibit a sword from ending up in a trash pile or dropped without notice like the majority of objects uncovered at the site.

Another reasonable explanation for the absence of upper-class weaponry could be that these goods were only made at the industrial complex and were primarily used elsewhere. The

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326. Graeme Young, pers. comm.
social elite would have occupied the area of the Inner Ward, not the West Ward where metalworking took place. Archaeologists would be more likely to find swords in areas inhabited by these upper-class warriors where the swords would presumably be used and possibly stored with other weapons in an armory. Intact weapons would rarely be found in the metalworking area; once the smith completed a weapon, it would quickly be transported from the metalworking area to the Inner Ward.

An additional explanation for the absence of weapons may be that Bamburgh’s fine weaponry may have been produced at a metalworking area separate from the ninth-century smithy building the Bamburgh Research Project uncovered. The possibility of another metalworking area cannot be discredited. The archaeological team at Bamburgh could extend the trench and look at the various ninth-century contexts for further evidence of metalworking, but until this occurs, the prospect of another metalworking area for swords and weapons remains merely a conjecture.

Turning attention back to the iron object assemblage, 3933 iron artifacts, or 54.67% of the entire corpus of 7194 small finds from the Bamburgh excavations to date is comprised of iron objects. The percentage of iron finds from the metalworking phases is lower than this figure by about twenty percent. This discrepancy between the percentage of iron finds from the whole small finds register and the percentage of iron objects from just smithy-related contexts could be explained by two distinct factors.

One possibility is related to the nature of metalworking on site. Many of the metal finds from the smithy-related contexts were non-ferrous; the number of copper alloy styca coins327 uncovered is especially noteworthy. As no coin dies have been uncovered from the site, it is

327. Stycas, or styca coins, were Northumbrian coins of little monetary value and were typically comprised of copper alloy. They began to be minted in the ninth century.
unlikely that Bamburgh was the site of a minting operation. These coins may indicate that the smithy building was a recycling center; they may have been brought to Bamburgh to be melted down and made into new objects. If the smithy operations were more focused on producing non-ferrous objects, it is likely that ferrous metalworking would have slowed for this period.

A second explanation for the dip in the number of iron objects in smithy phases may be related to timber building construction. Anglo-Saxon timber buildings required many nails to hold the structures together. In all phases recorded at this site, nails constitute one of the largest groups of iron artifacts. If no larger timber buildings were constructed close to the smithy building while it was in operation, archaeologists would find few nails. In the tenth-century phase, after the smithy building ceased to be used, an impressive timber hall was constructed in the area of Trench 3. This building alone may account for the large percentage of iron objects recovered by archaeologists before the smithy building was excavated.

The distribution of iron objects from the smithy-related contexts I analyzed in Trench 3 shows a concentration of iron artifacts in the southern portion of the trench (See Fig. 46). This higher density of iron objects in the south is to be expected given the location of the metalworking area. The higher concentration grows more apparent when these contexts are compared with phases that existed before the smithy building was erected and after the structure fell out of use. In these phases, the concentration of artifacts in the area was much lower than when the smithy structure was in use. The northern half of the trench has consistently held a low number of artifacts, even when the smithy building was at its height of operation, but the number of artifacts increased dramatically in the south during the ninth century when metalworking was conducted on site.

328. Graeme Young pers. comm.
329. Graeme Young, pers. comm.
Figure 46 – Distribution of iron objects from smithy-related contexts in Trench 3. Points plotted using QGIS software. Map courtesy of Graeme Young and used with his permission.
Non-ferrous Objects

The non-ferrous objects from Bamburgh can be separated into copper, copper alloy, and lead objects. These non-ferrous artifacts can be further divided into the following categories: stycas, copper metalworking evidence, copper decorative items, lead offcuts and other metalworking debris, and unidentified metal objects.

Stycas constitute the bulk of the copper and copper alloy finds from the smithing contexts, amounting to 95 copper coins in total. In 2009, excavations at the castle uncovered a hoard of seventy-seven copper alloy stycas, which were sent to the British Museum for analysis under the purview of the Portable Antiquities Scheme. The researchers at the British Museum found that the coins were minted in Northumbria during the period c. 810 to 867. In their initial investigation, the British Museum conservation team concluded that the stycas “were embedded within a very dark organic-like material with a fibrous component that was thought to represent a packaging material.” The styca collection has received scholarly attention in J. Castling and Graeme Young’s “A 9th Century Industrial Area at Bamburgh Castle” published in a 2011 volume of Medieval Archaeology. Since the publication of this article, however, more stycas have been uncovered sporadically during the Bamburgh Research Project’s annual field school.

Only one piece of copper slag was uncovered and recorded in the finds register, but as was previously stated, the project did not typically record slag as it was a ubiquitous find that would drown out the other artifacts in the finds register. This single artifact is certainly a

fraction of the countless fragments of copper slag uncovered at Bamburgh. Three entries in the finds register are for copper metalworking debris, which also evinces the copper smithing conducted at this site.

The copper artifacts that are given only the designation ‘object’ or ‘fragment’ constitute the second most substantial group of copper objects after stycas. Forty-three fragments and nineteen unidentified objects constitute this category. Without pictures or illustrations, it is nearly impossible to interpret this group or extrapolate meaningful data from it.

The only decorative items made of copper in the smithy-related contexts were two rings and a single pendant. These artifacts constitute the smallest subset of the copper or copper alloy finds at Bamburgh.

In phases related to the smithy building, lead did not constitute the primary material as often as copper or iron. Lead artifacts only constitute approximately 12% of the finds from these phases; while it is a rather minute collection, this body demonstrates the variety of metalworking conducted at the fortress and, as such, it retains value for the present study. These lead artifacts from the smithy contexts at Bamburgh are primarily related to the metalworking process. Of the sixty-nine lead artifacts uncovered, thirty of them are either lead off-cuts or lead metalworking debris. Three pieces of lead slag found also indicate lead metalworking in the area of the smithy building.

The next major category of lead artifacts is broad and difficult to interpret. In this group are twenty lead artifacts labeled simply as objects and another twelve as fragmented pieces of lead. Without drawings or photographs, even hypothetical interpretations of these artifacts are impossible to make.
Interpretation

The preponderance of copper stycas within the metalworking area suggests that these coins were somehow used in the smithing or smelting process; these copper-alloy coins were likely melted down and fashioned into new objects. These coins were of such little value that melting them down into new decorative items may have been more beneficial to a metalworker than using them as coinage. It is not likely that coins were minted on site. There is no indication in the written records of a mint at Bamburgh, stycas were never stamped with their mint location unlike coinage in the southern kingdoms, and, as stated earlier, no evidence of coin dies have been uncovered through excavation. A small-scale minting operation run by itinerant moneyers is also possible, but no coin dies have been uncovered nor have archaeologists found a high preponderance of coins stamped with the name of only a few moneyers, which would support this hypothesis. If Trench 3 investigation is expanded beyond the current trench area, evidence of a previously undocumented mint may be revealed, but it would be unlikely as coin dies are such a rare find in Anglo-Saxon contexts, especially if Bamburgh was a small mint worked solely by itinerant moneyers. Given the current state of the archaeological evidence at Bamburgh, I would argue that the styca collection likely points to a recycling operation at the industrial complex in the fortress.

333. Castling and Young, “A 9th Century Industrial Area at Bamburgh Castle,” 313.
334. Ian Stewart states that many later Anglo-Saxon coins are stamped with the name of where they were minted; see Ian Stewart, “Reflections on Some Wessex Mints and their Moneyers,” The Numismatic Chronicle, seventh series, vol. 15 (1975): 221. E.J.E. Pirie has pointed out the absence of mint locations on stycas, which therefore makes pinpointing mint locations more difficult and based on stylistic conjecture; see E.J.E. Pirie, “Phases and Groups within the Styca Coinage of Northumbria,” in Coinage in Ninth-Century Northumbria: The Tenth Oxford Symposium on Coinage and Monetary History, BAR British Series 180, edited by D.M. Metcals (Oxford: B.A.R., 1987), 104.
336. Graeme Young, pers. comm.
The recycling hypothesis adequately explains the multitude of coins deposited at the metalworking site, but it raises questions about the relationship between royal authority and the minting of coins. Many of the coins contain the image of the Northumbrian king and as such, were representative of his authority. Melting these coins down to make other metal objects would seem to challenge his rule. The answer may not be so simple. Numismatist Mark Blackburn observes that in ninth-century Northumbria, governmental instability and physical separation from the southern kingdoms affected coin production within the kingdom. In the ninth century, the copper sceattas or pennies of previous periods were cut with so much zinc that they essentially became brass coins known to historians today as stycas. Concerning these Northumbrian stycas, Blackburn notes that they were “of such low value that they were used and hoarded in vast numbers,” and in his estimation “[t]heir circulation was essentially limited to the Northumbrian kingdom.”

If Northumbrian royal authority was degrading in this century, the king may simply not have had enough regal influence to monitor moneyers as closely as previous rulers had. Political upheaval may have led ninth-century Northumbrian rulers to have greater concerns than if a few crude, practically useless coins went out of circulation. No Northumbrian laws were issued at this time, thus there is no evidence of royal efforts to prevent or hinder the tampering of coinage. The only law codes issued at all in the ninth century were in the southern kingdom of Wessex, the first issued by King Alfred and a later legal code by his son, Edward. However, it is also important to note that in ninth-century Northumbria, there is a general dearth of written records, not just law codes, so an absence of laws may point to an absence of surviving evidence, not necessarily evidence of absent royal authority in the kingdom.

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Fewer jewelry and decorative items made of copper were uncovered than I initially expected. Elite sites like Flixborough produced numerous examples of copper alloy strap-ends and pins. A royal complex such as Bamburgh would be expected to produce similar finery in an excavation. The limits I placed on my study, eliminating contexts not directly related to the smithy building, likely manipulated my dataset to eradicate many of the decorative artifacts. At least twenty-two ferrous and non-ferrous strap-ends were entered into the finds register at Bamburgh, none of which were uncovered from smithy-related contexts. Even if I wanted to extend my study to these strap-ends, I would be unable to comment on their stylistic features and compare them to strap-ends at other metalworking sites because I did not have access to photographs or drawings of these examples from Bamburgh. More jewelry pieces may also be found if excavations are undertaken outside the West Ward. Jewelry items were likely worn by the elite inhabiting the Inner Ward and would be more likely uncovered in this space than where these objects were made, in a similar fashion to swords and other fine weaponry, as noted in an earlier discussion.

The concentration of ferrous objects in the south is mirrored in the concentration of non-ferrous objects in these contexts as well (See Fig. 47 and 48). Two copper and two lead artifacts lie outside the limits of the trench on the map; these objects were likely assigned an incorrect grid location when they were entered into the registry. The Bamburgh Research Project primarily conducts their excavations at the castle as a summer field school. Many students have no prior field experience and are learning excavation techniques for the first time. Errors are to be expected and measuring Easting and Northing locations on the grid is not exempt from this expectation.
Figure 47 – Distribution of copper and copper alloy objects from smithy-related contexts in Trench 3. Points plotted using QGIS software. Map courtesy of Graeme Young and used with his permission.
Figure 48 – Distribution of lead objects from smithy-related contexts in Trench 3. Points plotted using QGIS software. Map courtesy of Graeme Young and used with his permission.
In the entire small finds catalog, 854 objects, or 11.87% of the finds, are composed of either copper or copper alloy. The percentage of copper artifacts from the metalworking area is almost three times as high. This significant spike in copper objects compared to previous dig seasons indicates that metalworkers at Bamburgh likely worked with copper. The frequency of copper alloy stycas and absence of coin dies in the smithy-related contexts imply that the metalworking area was likely used to melt down stycas and refashion the coins into other objects, as previously stated.

Lead objects make up 5.46% of all objects in the Bamburgh Research Project’s finds register. This percentage is less than half of the percentage of lead objects from smithy contexts. This increase in lead objects can again be explained by the presence of the smithy building in these contexts, especially given the character of the assemblage. The overwhelming majority of lead objects in the smithy phases are directly related to crafting lead objects, namely offcuts, metalworking debris, and slag.

**Concluding Thoughts**

The frequency of metal objects and the location of these artifacts (See Fig. 49) bolsters the theory that metalworking occurred at Bamburgh Castle within a ninth-century building that was uncovered in the Bamburgh Research Project’s Trench 3 during dig seasons from 2010 to 2013. The ferrous and non-ferrous finds indicate the level and nature of smithing conducted at the fortress in the Anglo-Saxon period. The smithing activity at Bamburgh in the ninth century can be characterized as pragmatic and utilitarian. Most of the ferrous objects made on site were goods useful for everyday purposes, such as nails. While the fortress was a royal complex at this time, the goods uncovered here were not elaborately decorated status symbols or items made of
precious metals accessible only for the elite, such as gold or silver. The metalworkers at
Bamburgh may have been making goods that were sold to the general populace who visited the
castle. The metalworking building is enmeshed in a larger industrial area that may have attracted
regular visitors with commercial interests besides metal objects. The location of the fortress on
the coast of the North Sea may have enabled marine access to the site by merchants and
craftsmen from the surrounding region. In addition to visiting merchants and craft workers,
other craftsmen who routinely worked within the industrial complex uncovered in Trench 3 may
have been the main customers of the ninth-century smithy.
Figure 49 – Distribution of all metal objects from smithy-related contexts in Trench 3. Points plotted using QGIS software. Map courtesy of Graeme Young and used with his permission.
The most unusual aspect of the non-ferrous finds assemblage at Bamburgh is the high frequency of copper and copper alloy stycas, despite no written or archaeological evidence of a mint at the site. Unless evidence of coin dies are uncovered in future excavations, these coins were likely struck elsewhere and brought to Bamburgh as material to be refashioned into new copper alloy objects. The political disorder of ninth-century Northumbria afforded metalworkers the opportunity to take coins of little monetary value, melt them down, and craft new objects without the fear of royal retribution. Future scholarship on the coins themselves may lead to new insights on the metal content, date, and issuer of the various coins. Understanding the cultural context of the coins themselves may indicate the reasons they were brought to the castle and how they were recycled.
CONCLUSION

Inspired by my research and fieldwork at Bamburgh Castle, I sought to investigate metalworking practices in Anglo-Saxon England and how this Northumbrian smithing site fit into that broader context. In studying metalworking debris and a portion of the assemblage of metal objects from the Middle and Late Saxon periods in this thesis, I have come to a number of conclusions about metalworking practices and the deliberate decisions smiths made in their work.

Thesis Summary

The first chapter outlined the steps of the metalworking process from mining to crafting finished products. Drawing mainly from the archaeological remains of metalworking sites, I analyzed mining, smelting, and smithing practices for both ferrous and non-ferrous metals. I also assessed the type of ferrous and non-ferrous metal objects from the entire assemblage of Anglo-Saxon metal finds uncovered up to this point. The various categories of metal objects and their respective uses can illustrate the needs of Anglo-Saxon society that could only be met with metal tools, weapons, or wearable items. I also investigated the perception of the smith in Anglo-Saxon society, drawing mainly from textual sources that mention smiths and others that were written about the mythical smith Weland. Understanding these conceptions of the smith help us to determine how the smith was viewed and what place the metalworker held in society. This chapter acted as the foundation on which I could build arguments about metalworking decisions and habits of smiths in the next two chapters of the thesis.

In the second chapter, I discovered that neither ferrous nor non-ferrous metal objects from Northumbria exhibit regional distinction during the Middle and Late Saxon periods, despite
my initial hypothesis that Scandinavian influence would have an impact on stylistic features of
the metalwork. In limiting my analysis to the two groups of commonly found metal objects on
archaeological sites, non-ferrous strap-ends and knives, I was able to investigate regionality in
relation to metalworking without analyzing every metal object from the Middle and Late Saxon
periods. I further honed my investigation by eliminating objects that were not uncovered at
known metalworking sites. By assessing artifacts that were found solely at smithing sites, I
diminished the possibility of analyzing objects that could not have been made at the site. I
especially did not want to include objects that might have been brought into Anglo-Saxon
England through trade. It is difficult to prove where an object was made unless it was uncovered
at a site with evidence of production, and I did not want to include objects that were merely used
on a site because these items would not necessarily lead me to any conclusions about the
metalworking practices in a given area.

In my study of Bamburgh Castle’s Anglo-Saxon metalworking site, I found that the vast
majority of ferrous finds from the site was comprised of artifacts related to building and
construction on site. The number of nails far exceeds the building needs of Bamburgh’s
industrial complex area during the ninth century and, therefore, these items must have been made
for construction elsewhere. These nails could have been used in other areas on the castle
grounds or they could have been sold to merchants or others visiting the fortress. The non-
ferrous metal finds assemblage was divided into the two major categories of copper alloy objects
and lead objects. Depending on which non-ferrous metal group was selected, the makeup of the
assemblage differed vastly. The largest category of copper and copper alloy artifacts from the
smithy-related contexts was made up of stycas, which were likely produced at an entirely
different site in Northumbria. The bulk of lead objects, on the other hand, were offcuts or waste related to the metalworking process, not finished objects.

Many of the ferrous and non-ferrous metal artifacts uncovered at Bamburgh up to this point were not the high status items that would be expected from the site of a fortress occupied by the upper classes of Northumbrian society. This assemblage of mainly utilitarian metal artifacts opposes my modern expectation of a royal site and highlights the industrial nature of this area within the castle complex. Weapons may not be present in context layers related to the smithy building because they were stored in an armory closer to the center of the fortress or these items may be absent because these goods were so valuable that they would not be dropped mindlessly or left broken without repair. Without more archaeological investigation within the Inner Ward of the castle, these hypotheses cannot be supported. Given the current state of evidence in the West Ward, the ninth-century metalworking area at Bamburgh Castle made utilitarian objects like nails that could have been used by other craftsmen in that industrial complex or sold to merchants or citizens visiting the castle. The location of the fortress on the water and the archaeological evidence of a possible harbor further bolster the idea of trade occurring on site. These metal objects are the only evidence for economic activity at this site and suggest the castle’s significance within the Northumbrian economy.

**Future Research Areas**

In my research for this thesis, I have encountered a number of research areas that require more archaeological investigation and scholarly analysis before any lasting conclusions can be drawn. Further investigation of these subjects could alter the conclusions of this present study, but, as of now, that will simply remain a possibility, not a reality,
The evidence for mining in the Anglo-Saxon period remains insufficient, as I stated in the first chapter of this thesis. Archaeological investigations may discover more evidence of ferrous and non-ferrous deep mining in the future, but this is only a conjecture. If the Anglo-Saxons relied more heavily on surface mining and recycling older metal objects than deep mining, the archaeological record will likely not offer much evidence. Surface mining would not have left a deep impression in the soil. The recycling of objects too can be done without producing tangible evidence, as may be the case with the styca recycling at Bamburgh Castle. The preponderance of stycas in a metalworking area without dies suggests recycling, but no conclusive evidence has been produced to confirm this theory.

In the second chapter, I focused primarily on the assemblages of Middle and Late Saxon knives and strap-ends; these collections will invariably change as future archaeological excavations are launched. As more knife blades are uncovered, the most popular blade back forms may no longer be back form C. Additionally, as more strap-ends are discovered, the larger repertoire of these objects may lead archaeologists to a more accurate representation of ninth-century consumer tastes in decorative metalwork and the various metalworking practices that created these goods. Regional differences in metalworking styles that are not currently visible may grow more apparent within the context of a larger body of evidence.

In addition to further archaeological investigation, continued metallographic analysis of the known Middle and Late Saxon knife blades will change our understanding of metalworking during these periods. This type of analysis will indicate the hardness and quality of the iron used in these weapons, which will naturally lead to insights on the skill level and deliberate choices of the smiths who made these items. Metallographic tests on knives from these periods may
demonstrate blacksmithing trends or differences between iron smithing techniques between kingdoms or regions.

The continued digitization of information from the excavation efforts at Bamburgh will also aid future research of Anglo-Saxon metalworking and metal objects, as I indicated in chapter three. The more photographs and illustrations of objects available to researchers, the more researchers can incorporate the fortress’s assemblage into discussions of metalworking and economic activity in Anglo-Saxon England. If more grid locations of objects are recovered and entered into the Bamburgh Research Project’s finds register, the distribution of metal finds in the smithing area can be mapped far more accurately. The Bamburgh Research Project’s team of archaeologists and researchers are working diligently to compile more data and digitize it for these purposes. With additional time and funding, the team could also x-ray metal items and identify some of the objects that remain unidentifiable because of corrosion. Using my examples from chapter two, knife blades could be x-rayed to better determine the shape of the blade back form and strap-ends could also be x-rayed to make designs appear more clearly. X-ray analysis has already helped the Bamburgh Research Project to distinguish identifying features on stycas. Durham University lab technicians conducted x-ray analysis on many stycas from the industrial area; this work significantly helped to identify the writing and images of rulers stamped upon them. If the Bamburgh Research Project received more funding and aid from outside laboratories, they could continue to analyze stycas in their finds assemblage.

Further excavations beyond the current area of Trench 3 may lead to new conclusions on metalworking conducted at Bamburgh Castle. Current excavations within the confines of this trench are now concentrated on phases earlier than the ninth-century smithy building and will likely not yield useful data about this structure and its metalworking operation at its apex.
Uncovering earlier contexts and their relation to the smithy building’s construction, however, could lead to a long-term understanding of the milieu in which the structure arose. The development of the industrial center at Bamburgh Castle likely has a history that extends for several centuries and the smithy building must be understood within this broader context of Northumbrian settlement throughout the Anglo-Saxon period. Excavations beyond the current boundary of Trench 3 may provide evidence of further metalworking areas or a mint in the ninth-century industrial area within the palace complex. These efforts may also lead to a more nuanced contextualization of the castle settlement within the historical, political, and economic landscape of the Northumbrian kingdom.

Increased archaeological excavation in Northumbria, especially in the area surrounding Bamburgh Castle, will also reshape the current understanding of the metalworking area at this Anglo-Saxon fortress. Other metalworking sites could be unearthed in the nearby region that could further illustrate the economic network that included the smithy at the castle. A larger assemblage of strap-ends with clear stylistic features could offer more compelling evidence of styles tied to a specific region or set of workshops around the castle complex. Ultimately, more archaeological investigation in the surrounding region of the castle would help to elucidate the fortress’s place in the historical landscape and economic history of Northumbria.

**Implications of this Study**

In my analysis of knife blades and non-ferrous strap-ends recovered from metalworking sites in Northumbria and other Anglo-Saxon kingdoms during the Middle and Late Saxon periods, I did not find regional differences in the stylistic features of knives or strap-ends. This finding was unexpected, but it furthers the study of metalworking in the Anglo-Saxon world.
Scandinavian incursions, most heavily concentrated in the north, did not appear to have an effect on the stylistic features of knives and strap-ends produced in the Anglo-Saxon kingdoms. As strap-ends and knife blades are two of the most common metal finds on Anglo-Saxon sites, they can be used as an indicative measure of the metalworking industry in this region.

If I were to extend this work, I would compare my findings in chapter two to the assemblages of strap-ends and knife blades from the Early Saxon period. For strap-ends, I would expect to see more geometric designs than zoomorphic ones throughout the Anglo-Saxon kingdoms, but I might find regional distinctions that I did not find in the later periods. I would pay particular attention to the Northumbrian assemblage in the early period and compare it to the Northumbrian collection from the later periods in search of differences and evolutions. The differences between the earlier and later Northumbrian assemblages may not match with the stylistic progression of metal objects in the southern kingdoms from the Early to Late Saxon periods.

No other work has so directly sought to investigate the metalwork production at Bamburgh Castle and to fit this metalworking area within the network of metalworking sites in Anglo-Saxon England. The only major study of the ninth-century smithy building at Bamburgh was the article “A 9th Century Industrial Area at Bamburgh Castle” by Castling and Young. This article focused on the physical layout of the metalworking area and the collection of stycas uncovered here, but it did not offer an analysis of the other metal finds from the context layers related to the smithy building. A more thorough understanding of the metal finds assemblage indicates the level of production and type of metalworking conducted at this Northumbrian royal site.

The primary use of this metalworking area was utilitarian; the majority of ferrous goods were used as structural fittings, not elaborate weaponry. The non-ferrous finds, too, were not ornately decorative items. Stycas constituted the bulk of copper alloy finds and the majority of lead finds were the remains of the metalworking process. If archaeological excavation is extended to other portions of the castle complex, more elaborate and expensive artifacts from the ninth century may be uncovered in areas occupied by the nobility and social elite. Weapons were likely stockpiled in an area close to the heart of the fortress rather than near the smithy building. The wealthy and noble residents of the castle likely wore finery like jewelry and ornate strap-ends in buildings and structures not located near the industrial area. Finds such as these would be dropped or broken and thrown in a midden close to the occupation area. Without further investigation uncovering such evidence, I have outlined the metal artifact evidence and assessed the nature of metalworking at this site. This metalworking site likely provided goods to other workers within the industrial area surrounding the smithy. The scale of metalworking suggests that merchants from the surrounding region, and possibly a few who travelled by sea into the harbor, also patronized the smithy when they visited the area for trade. Given the cultural significance of metal objects and the importance of the smith in Anglo-Saxon society, having a smithy building at all on the site of the fortress, let alone one that operated on an industrial scale, indicates Bamburgh’s preeminent status in Northumbria. The site likely held significance beyond its capacity as a royal fortress; Bamburgh served as a prominent economic center for craft production and, presumably, trade within the Northumbrian economy during the ninth century.
Primary Sources


Secondary Sources


