THE ART OF THE ANGLO-SAXON GOLDSMITH

Fine Metalwork in Anglo-Saxon England: its Practice and Practitioners
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THE ART OF THE
ANGLO-SAXON GOLDSMITH

Fine Metalwork in Anglo-Saxon England:
its Practice and Practitioners

Elizabeth Coatsworth and Michael Pinder

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Abbreviations

Ancient Monuments Lab Rep
Anglo-Saxon Engl
Anglo-Saxon Stud Archaeol Hist
Antiq J
Archaeol Cantiana
Archaeol J
ASPR
BAR Brit Ser
BAR Int Ser
Brit Libr J
Brit Mus Occ Pap
Bull Hist Metallurgy Group
CBA Res Rep
CCSL
CSEL
East Anglian Archaeol Rep
EEMF
EETS
OS/SS
Engl Hist Rev
Gold Bull
Hampshire Field Club Archaeol Soc Monogr
Hist Metallurgy
Jewellery Stud
J Archaeol Sci

Ancient Monuments Laboratory Reports
Anglo-Saxon England
Anglo-Saxon Studies in Archaeology and History
Antiquaries Journal
Archaeologia Cantiana
Archaeological Journal
British Archaeological Reports [BAR] British Series
British Archaeological Reports [BAR] International Series
British Library Journal
British Museum Occasional Paper
Bulletin of the Historical Metallurgy Group
Council for British Archaeology Research Report
Corpus Christianorum Series Latina (Turnhout, 1989–)
Corpus Scriptorum Ecclesiasticorum Latinorum (Vienna/Leipzig/Prague, 1866–)
East Anglian Archaeology Reports
Early English Manuscripts in Facsimile
Early English Text Society
Original Series/Supplementary Series
English Historical Review
Gold Bulletin
Hampshire Field Club and Archaeological Society Monographs
History of Metallurgy
Jewellery Studies
Journal of Archaeological Science
Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
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<tr>
<td>J Brit Archaeol Ass</td>
<td>Journal of the British Archaeological Association</td>
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<td>J Chem Ed</td>
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<td>J Warburg Courtauld Insts</td>
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<td>Medieval Archaeol</td>
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Glossary of
Technical Terms not Explained in the Text

Many of the most important technical terms are fully explained when they first appear in the text, in relation to the evidence for the objects or techniques to which they refer. They can be accessed, if necessary, through the index. There remain a small number with a more general application, and it is these that are listed here.

**Annealing** Restoring the working qualities of a metal by heating. This is done after the metal has become work-hardened.

**Billet** A roughly cast lump of metal, which is subsequently hammered to form the final shape.

**Conchoidal** A fracture presenting smooth, shell-like convexities and concavities

**Draw-swage** A jig through which wire or strip can be drawn in order to alter its section.

**Flux** A substance used to keep metal clean while it is heated during soldering operations. The traditional goldsmiths’ flux is borax (sodium tetraborate) which fuses when heated to form a glass-like substance. This excludes the oxygen from the surface of the metal, preventing oxidation and encouraging the solder to run into the joint.

**Fabrication** Making by construction, as opposed to casting or carving.

**In-gate** The opening in a casting mould, through which the molten metal is poured.

**Investment mould** A one-piece mould for casting metal, used where the model can be melted out, thus removing the need for a piece-mould. Used in conjunction with lost-wax casting (see below). Two-piece moulds (which are sealed prior to casting) are occasionally wrongly called investment moulds. The process of placing a model in any mould can correctly be described as ‘investing’ it, which is unfortunately confusing and misleading as ‘investment’ in the phrase ‘investment mould’ refers to a specific type of mould only.

**Jig** An appliance that holds a piece of work and guides the tools operating on it.

**Trichinopoly** Sometimes called bobbin or spool knitting, or French knitting. Most commonly done on a spool or bobbin with four or more pins
or pegs around the central hole. (See fig. 17) In the textile version, yarn is threaded through the central hole of the bobbin. The working end is wrapped clockwise around each peg in turn, then carried around the outside of all pegs, either once or twice. As it passes each peg, the loop is lifted over the working thread and dropped over the top of the pin, using a bodkin or bodkin-like implement with or without a wooden handle, or a small hook (like a crochet hook). The cord threaded through the bobbin is pulled down gently as the work progresses, and the process produces a tubular cord. A two-pronged or forked implement can be used to make a slightly simpler cord: objects which could have fulfilled this function in relation to thread have been found in Anglo-Scandinavian York (see A. MacGregor, A. Mainman and N. S. H. Rogers, Bone, Antler, Ivory and Horn from Anglo-Scandinavian and Medieval York, Archaeology of York 17/12 (London, 1999), pp. 1994-96 and fig. 951). We have been able to carry out a wire version made in exactly the same way. The trichinopoly in the Trehiddle scourge (81) is clearly made with the loop lifted over two passes of the working end of the wire. The resulting cord can be compressed and strengthened by being pulled through a smaller hole (in the manner of wire drawing, see chapter 3) after completion.
1

Introduction: the Background to the Study of the Anglo-Saxon Goldsmith

SYNOPSIS: THE PURPOSE OF THE STUDY

It is possible to feel, after reading the chapter on ‘Artists and Craftsmen in Anglo-Saxon England’ in Dodwell’s magisterial study of Anglo-Saxon art from visual and documentary sources, that we already know rather a lot about the Anglo-Saxon goldsmith.¹ He even began his chapter by pointing out that it is the ‘interest of the Anglo-Saxons in resplendence [that] means that much of our information about their artists is weighted in favour of those who worked in gold’. His conclusions to the same chapter are worth quoting in full, for although they purport to be about Anglo-Saxon craftsmen in general, they are in fact largely about goldsmiths, and they are also revealing of both the surprising strengths of the documentary record in respect of this one group, and its limitations, to which Dodwell himself drew attention:

Little indeed is known of any Anglo-Saxon artist as an individual, and none emerges as a fully rounded artistic personality despite the most thorough combing of our sources . . . We are lucky if we can catch a fleeting glimpse of the work of a Mannig or a Spearhafoc [both goldsmiths] in the monastic sphere, which is more than we can discern in the more important secular area. Any conclusions about them must, then, be couched in the most cautious of terms. We can claim a certain versatility which might allow an illuminator to be a calligrapher, and a goldsmith to be a painter. We can see that some artists travelled to different parts of the country, and even abroad, on various commissions. We can deduce that important monastic art treasures were made by secular goldsmiths, and we can suggest that these latter often worked in teams. We get a hint of a fact that craftsmen’s workshops were already being assembled in streets. We can get small insights into the importance to secular craftsmen of their attachment to wealthy households. We can show that some categories of craftsmen were admired abroad, that most received a proper degree of respect at home, and that their prestige was graduated in terms of the costliness of the material used. This probably meant that the finest artists gravitated towards the crafts in precious metals where the social esteem was higher and the rewards greater. This was the area also favoured by the literary sources for . . . the works of art that interested writers most, were those in gold and silver.²

² Ibid., pp. 82–3.
The art of the Anglo-Saxon goldsmith

Dodwell was especially interested in the status of the artist in the tenth and eleventh centuries, and the information he gleaned from the documentary sources was marshalled very effectively to demonstrate the evidence for this. Above all, in the chapter on ‘Jewellery, Silver and Gold’ he demonstrated – in his concentration on the evidence for the variety of categories of object made, their size and splendour (in terms of precious materials used), and, in the sheer quantity of objects of precious metals revealed to us through descriptions in wills, inventories, contemporary histories and other sources – the extent to which the work of the Anglo-Saxon goldsmith that survives is only a remnant of that lost.3

Some evidence of techniques and working practices was revealed incidentally, but this was not Dodwell’s central concern: references are few and scattered and are not summarised or treated systematically, even though a reference to teamworking and organisation is included among his conclusions. Nor did he relate the sources to archaeological sites, or the modern archaeologist’s and historian’s concern with the evidence from their various disciplines for the development of social structures within which his craftsmen and women worked, or even to any great extent to the surviving pieces. The purpose of the present book, broadly stated, is to take a fresh look at the documentary and literary sources; to combine this with a detailed visual and technical study of the surviving jewellery, work-places and tools for evidence of manufacturing and decorative processes; and to consider how these together illuminate the place of the goldsmith or jeweller within the developing structures of Anglo-Saxon society, and his work in relation to other arts.

Whether goldsmiths and jewellers can always be distinguished from other types of smith, either on the ground or in the literary and documentary record, is a question which will have to be raised from time to time, but which it may not be possible to answer conclusively. However, it is important to note that, while workers in all the metals used by the Anglo-Saxons had much in common, the working of iron is markedly different from that of the other metals. This is because iron is most easily formed when red hot: indeed, in this state, it is one of the easiest metals to form by hammering. But iron is also a poor conductor of heat, which fact is exploited by blacksmiths in many hammer techniques. These techniques are not transferable to copper, silver and gold, because these are all good heat conductors. Techniques employed when the metal is cold are virtually the same for all metals. These facts lead to different methods of working, which may show up in the archaeological record, or in the depiction of smiths. Having stated a difference, however, it must be borne in mind that the blacksmith would have to be more adaptable than other types of smith. The day-to-day jobs on an estate or for a monastery would involve many

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3 Dodwell, Anglo-Saxon Art, pp. 188–215.
Introduction
different products, as well as repair work, and the invention of practical solutions to problems. This was very much the role of the blacksmith until the invention of the internal combustion engine. It would therefore be no surprise to find that he could turn his hand to work in metals other than iron. Indications of distinction, or its opposite, will be picked up in later chapters where apparent. Here it is necessary to emphasise that this study concentrates on work which by any criteria would be considered goldsmith’s work, that is objects made wholly or in part of precious materials – largely gold and silver – or in copper alloys when these better illuminate specific techniques, or when the standard of the work, or the use of costly techniques involving small quantities of precious metal, such as inlay, implies the expertise of a goldsmith. Goldsmithing involves skill at small-scale, fine work: we have seen the term ‘Feinschmidt’: ‘finesmith’, employed in German literature on the fine metalworker, to convey this point. In fact, very little work in solid gold, of the vast quantities described in contemporary literature and documents, has survived from Anglo-Saxon England, as we discuss below; but the art of the goldsmith is manifest not only in what has survived in this metal and in silver (always the province of the ‘goldsmith’), but in fine, small-scale work in copper alloys, often gilded to look like gold. For this reason, we also employ the term ‘jeweller’ to distinguish the type of craftsman we mean, although the Anglo-Saxons themselves defined all metalworkers as ‘smiths’, distinguishing them by name, if at all, on the basis of a metal (see appendix A). It is only in the descriptions of the work of individual legendary or historical smiths that we get any idea of the semantic range of terms such as ‘smith’ or ‘goldsmith’, and there is little evidence that ‘goldsmiths’ were seen as confined to one metal, or that any ‘smith’ made only ‘jewellery’ (chapters 7 and 8).

Practice is at the heart of this study, and understanding of practice is clearly fundamental to the achievement of the authors’ aims. Written and visual sources are explored or re-explored from this perspective (below and chapters 7 and 8), but even so the rarity of contemporary documentary evidence for making, as opposed to owning or using goldsmith’s work, or even as opposed to the existence and prestige of a few specialist goldsmiths, is still very apparent. Practice has to be deduced from the made objects themselves, from the marks left on them by particular tools and techniques, and the evidence from part-made, damaged or repaired objects is particularly vital (chapters 3–5). Archaeological evidence of surviving tools (especially those which can only have been used for exceptionally fine work), materials (especially those used in particular processes), and for working areas, are equally important (chapter 2). We have attempted to analyse these sources for the signs which distinguish the goldsmith and his working practices, rather than catalogue them, though we hope we have not missed any significant example. Neither have we attempted encyclopaedic coverage of objects or techniques. The former, if mentioned in the text as
The art of the Anglo-Saxon goldsmith

examples of a technique, are listed in appendix B, with details of where to find them and references to major published sources in which they appear. The effect of technique and methods of construction, as well as social milieu, on design are explored in chapter 6.

An understanding of traditional practice by modern practitioners is very helpful in appreciating much of the work of the past. It has also frequently been pointed out that basic practices and tools have changed little in more than two millennia, with the main changes being in the ways in which modern craftsmen are able to control heat. Anglo-Saxon craftsmen, like their predecessors and their successors for many centuries, had to know the signs which indicated that a correct temperature for a particular process had been reached: that is, their understanding of metallurgical processes was sophisticated, but based on empirical rather than scientific knowledge.\(^4\) This empirical approach would apply equally to their knowledge of chemistry, in the preparation of various materials to make solders and amalgams, for example. It may not therefore be surprising that one type of literature with a long history is the listing of recipes for such purposes, though it is often assumed that these were not compiled for the benefit of craftsmen (below).

However, having said that many of the techniques practised by the Anglo-Saxons could have been achieved empirically, or were the result of long and perhaps still continuing tradition, we can still be surprised by the fact that a particularly fine, small-scale piece of work was achieved without the modern ability to make small-scale precision tools or without magnification. In these cases, the objects themselves and occasionally archaeological finds of tools do indeed provide the only clues.

There are two particular limitations of the surviving material which must be noted here. The first is that the total number of surviving metal objects which can be classed as goldsmith’s work, as a proportion of what must once have existed, must be almost vanishingly small, although it is difficult to find unquestionable statistical bases for this assumption. For example, on the basis that only one known brooch might possibly have come from one of the moulds of a minimum of 218 brooches from the Swedish sites of Helgö and Gene, Hines estimated that the 209 surviving examples of Anglo-Saxon great square-headed brooches represented the remains of perhaps some forty thousand or more originals of this one type.\(^5\) He further supported this opinion with the point that examples of any of the decorative stamps used to decorate this brooch type appearing more than once were scarce indeed. Our modern assumption is that a stamp, capable of being used over and over again, is an obvious labour-saving device. The authors


of the present book would point to a different phenomenon, which suggests a low rate of survival of specifically goldsmith’s work, based on the workshop experience of one of them. This is that the total amount of gold and garnet cloisonné work surviving from the late sixth to the eighth centuries is insufficient to account for a working lifetime’s productivity of even one man. The varying degrees of quality however, including the very high skill level manifest in some of the surviving material as well as its date range and the range of stylistic and constructional differences, prove that we have the remains of the lifetime output of a number of practitioners. On the other hand, the total numbers of working goldsmiths are unlikely to have been very high at any particular point in the period. Goldsmiths worked in precious materials, and must always have worked in a limited market composed only of those wealthy enough to afford them, and their output will only ever have been a small proportion of the total.

The second limitation is related to and indeed arises out of the first. One fact which emerges clearly from a comparison of art-historical work based on the documentary sources and the surveys of surviving metalwork is the chronological imbalance between them. Dodwell, for example, concentrated on the tenth and eleventh centuries, which is the date range of the majority of the written and visual sources he used in his analysis. On the other hand, the bulk of the surviving fine metalwork dates from the period up to perhaps the middle of the eighth century, with the majority of the work actually in gold from the seventh century. This is because the Anglo-Saxons arrived in England in the fifth and sixth centuries as pagans, whose burial rites and customs included burying objects of status and daily use with the dead. In the course of the sixth to seventh centuries, all the Anglo-Saxon peoples were gradually converted to Christianity, and although there was no specific Christian rule against it, the practice of burying objects for the use of the dead gradually died out by some time in the eighth century – although in certain special cases, such as the shrines of Christian saints, it did go on, presumably with a different meaning and purpose. The change in general funerary custom means that after the very beginning of the eighth century, finds of fine metalwork come from a wider range of contexts, but often removed from immediate association with an original owner. They occur for example in Viking hoards or Viking graves as a result of loot, tribute or payment; or they are stray finds of objects which may have been lost or buried by an early owner. Very occasionally, they are unfinished objects from workshop sites; and a few objects have even survived in continental church treasuries, and presumably had a continuous history in such contexts, although the early history is usually unknown to us. The wonderful riches in the sources uncovered by Dodwell can only be imagined: the fate of metalwork not buried with the dead is most often to be melted down and re-used to accord with a later fashion or for its bullion value. In the later period especially, therefore, it is most likely the highest
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status objects which have been lost: in the view of the authors there is no peak of technical achievement in the surviving fine metalwork of either the middle Anglo-Saxon (eighth to early tenth century) or the late Anglo-Saxon period to compare with that reached in the jewellery from Sutton Hoo and a few related pieces (early seventh century).

This is not merely a matter of gold versus silver, although an important economic factor which differentiates the study of the goldsmith from that of the smith in general, is the value (and sometimes scarcity) of the precious material itself, and its social importance in early medieval society. This importance has been underscored recently in a series of studies concerned with the legacy of Rome and the development of early medieval Europe to the ninth century, and others on the significance of treasure in the medieval west. For example, Matthew Hardt looked at ‘royal treasure’ – what it consisted of, where it came from, where it was kept, what it was used for, across the whole of post-Roman Europe. As he pointed out, gold, silver, jewellery and precious stones are among the stereotypes of early medieval historiography and hagiography, when the contents of royal treasuries are being described; and, interpreted in the light of surviving hoards and contemporary descriptions, the specific contents of such treasuries are: minted coins (not necessarily locally minted), ingots, necklaces, bracelets, brooches, belt-sets, buckles, saddle-fittings, table-ware and valuable clothing and vestments, usually gold-brocaded silks. The royal treasure buried in the early seventh century at Sutton Hoo is typical according to this analysis. The sources of the precious materials were rarely local mining: plunder amassed during the period of migration, looting, tribute exacted from defeated enemies, exchange of gifts, some taxation though this was relatively rare in this early period, confiscation from enemies, fines, and even grave robbing are all cited as sources for the raw materials of treasure. The social and economic function of this treasure for a king was to keep plundering neighbours at bay, if necessary by buying them off, and to maintain his household in accordance with his rank, but most importantly to make or exchange gifts: with his neighbouring rulers near and far; to the church; and locally, to reward his retainers. These retainers in turn, important but lesser men, possessed and distributed treasure in the same way. Hardt concluded that this system of exchange was the final late flowering of the system by which the Roman empire had functioned; in fact, it was the drying up of Rome’s gold ‘that led to the feudalisation of the kingdoms of the Middle Ages and the consequent dominance of a royal gift that could not be stored in chests and sacks (except of course in the form of deeds) – namely land’. These views have been endorsed in a recent study of

7 Hardt, ‘Royal Treasures’, pp. 279–80, and see also pp. 228–34, below.
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the meaning of treasure in princely burials in early Anglo-Saxon England, with an additional emphasis that such burials of treasure were symbolic statements of power and prestige, and that therefore they represented not a whole princely treasury, but a carefully chosen selection in order to make a point.\(^8\) It may be recognised, however, that some of the sources of treasure and their functions in establishing political relations were still operating at the time of the wars with the Vikings, for example, while not the least of the attractions of Anglo-Saxon England for William the Conqueror was its riches in treasure.\(^9\) We can expect that makers of objects of such value and status will themselves have been important in their society.

The peak of gold objects in the seventh century has been ascribed to a particular historical phenomenon in the form of subsidies paid to the Frankish kingdoms by the Byzantine emperors – which then became re-distributed throughout Frankia and its allies and neighbours. In this largely non-monetary world, the subsidies of gold coins were converted into portable wealth, mainly in the form of jewellery. The relationship between Byzantium and the Franks did not last and as the eighth century progressed, gold first became increasingly debased and at length was replaced by silver both as the medium of the developing monetary economy and as a major medium for fine metalwork. This is certainly suggested by the survival of fine pieces such as the Fuller Brooch (35, pl. 14) and by the collections of silver in various Anglo-Saxon and Viking hoards, the contents of some of which will be discussed in succeeding chapters. The sources of gold and silver throughout the period are discussed further in chapter 2. On the other hand, the documentary sources, which are concerned mainly with the interests of the religious and secular elite, are replete with descriptions of gold (for religious objects, regalia, and personal jewellery) the items which would most attract the interest of looters and conquerors, and also the ones most likely to be recycled. These considerations suggest that the organisation of the Anglo-Saxon society and economy is important to the present study, as fine metalwork will always be produced for those who hold the wealth. Where, and for whom, goldsmiths worked is therefore important (chapters 7–9).

THE HISTORICAL BACKGROUND

It is impossible, therefore, to analyse the practice without considering the historical circumstances in which it took place. The following study is


\(^9\) Guillaume de Poitiers, Histoire de Guillaume le Conquérant, ed. R. Foreville (Paris, 1952): pp. 224–6, records the enormous wealth in gold and silver, some in the form of jewelled gold objects, made as gifts to Rome and to various churches and monasteries in France.
concerned with the goldsmiths’ work of England within a period beginning in the fifth and sixth centuries with the influx into the eastern and southern parts of the former Roman province of Britain of Angles, Saxons, Jutes and other Germanic peoples, and ending in the conquest of England by William of Normandy in 1066. This period of some six hundred years was subject to considerable social and political change. A society of tribal groups, which brought with them techniques and practices and, of course, artefacts, including jewellery, from their various continental homelands, slowly cohered over time into larger political units that could be termed kingdoms. By the ninth century an initially larger number had become reduced to four such groupings: East Anglia, Mercia, Northumbria and Wessex. At that stage, Northumbria still included part of what is now southern Scotland, but Wessex did not, at the beginning of the century, include Cornwall. It is important to remember that the Anglo-Saxons did not move into an empty country, but into one with a population with its own metalworking traditions inherited either from the native Celts or from their Roman rulers. Another important formative influence, from the end of the sixth century onwards, not only on political and social development but also on the arts, was the gradual conversion of the Anglo-Saxons to Christianity: this brought stylistic and possibly technical influences from the Celtic west, already Christian, and also increasingly from the Mediterranean world, with its continuity from the art of the Late Antique world. This latter source brought new arts of stone architecture, painting, glass and stone sculpture to add to the existing repertoire of metalwork, building and carving in wood, and textiles already practised. Part of understanding all Anglo-Saxon art of this early period is the story of how these various influences – continental Germanic, Celtic, and Mediterranean sub-classical – were absorbed, adapted and changed.

In the ninth century, attacks by Viking invaders led to the establishment of an initially pagan Viking kingdom in the north, based on York. For England as a whole this had a number of effects: East Anglia, Northumbria and Mercia disappeared as independent kingdoms, and England became united for the first time under the kings of Wessex: this unity eventually included the northern Viking kingdom based on York also. This new unity had some important effects on the administrative organisation of England, especially on the development of towns. Although England was for a time again conquered and ruled by a Scandinavian royal house, under Swein Forkbeard and his son Cnut and grandsons, it remained a single kingdom, and as such fell as a whole to its last conqueror, William of Normandy. It also remained a Christian country, with the various Viking groups either converting or already Christians on arrival. It was therefore affected, especially but not only in the south of the country, by a major revival of the arts following a revival of monasticism in the tenth century, which brought a renewed influence from the courtly and ecclesiastical arts of
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western Europe. The art of the elite and the art of the church are in fact closely entwined from the Conversion period onwards: this has implications for our understanding not only of the art works themselves, but also for the contexts in which they were actually produced. One clear implication of the work by Dodwell cited at the beginning of this chapter was the enormous prestige of the products of the goldsmiths. They and the costly materials which they worked must have always lain within the sphere of the elite, whether secular or ecclesiastical, and they must therefore have been centrally involved in and affected by all stages of the evolution of the society briefly outlined above. Their relationship with those elites may have varied, however, either from individual to individual, or over time. If fine metalworkers, including goldsmiths, are found working in towns, for example, this might be considered to have implications for their status in society.

The broad outlines of history, and archaeological and theoretical approaches can suggest possible frameworks within which goldsmiths worked. These however cannot directly answer questions relating to the status of goldsmiths – were they free or unfree; holders of wealth themselves or totally dependent on an elite which had surplus portable wealth in the form of precious metals; fixed within an estate or town; or peripatetic? There is probably no one general answer to these questions for the whole period. The present study may not be able to provide any kind of final answers to these questions either, since techniques could have been shared by workers at different times or within very different forms of social organisation. However, they are important, and the authors have endeavoured not to lose sight of them in what follows, while the non-archaeological evidence on these points is specifically considered in chapters 7–9.

TECHNICAL (WORKSHOP) LITERATURE

There is another aspect of early medieval history which must be considered before an analysis of Anglo-Saxon technical expertise can begin, as it will be frequently referred to in the following chapters. This is a source of documentary evidence which exists only in manuscripts from outside Anglo-Saxon England, although there are a few signs that one compilation might have been known there. It is true to say that in the Anglo-Saxon period, and in contemporary Europe as a whole, there were no historians of the arts for their own sake, but the role of art, and of the artist, were important in early medieval thought in the West (and with a different emphasis in the Byzantine East), and undoubtedly had an impact on the ways in which the arts developed. In particular, there is evidence for the early medieval continuation of a tradition of collecting what are essentially
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recipes for technical materials and processes. The manuscripts in which such compilations survive were, however, not always clearly workshop manuals, and their actual status and use is often quite unclear.

The tradition of providing technical information, in the form either of lists of ingredients or instructions purporting to show how to carry out some technological operation, has been shown to extend at least as far back as the second millennium BC, from which period a set of Assyrian clay tablets has survived with a description of the ingredients for making glass. Recipes which go back to Assyria have been preserved in Egyptian papyri dating from the third century AD, now in Leiden and Stockholm. These have recipes for some alloys, some practical, others improbable. Various later Greek and Roman encyclopaedias included sections on ores and metals, some of which also included some technical information. These very early books were not primarily written for craftsmen, however, but for the educated public. Probably the best known (and most influential) of these is Pliny’s Natural History written in the first century AD, especially books 33, 36 and 37, which included descriptions of many metals and minerals, their uses and preparations for use. Pliny has been shown to stand in a tradition which goes back to Theophrastus On Stones and includes his near contemporary the Greek Dioscorides. The Leiden Papyrus mentioned above also includes material taken directly from Dioscorides.

The relevance of this history to the present study is that it forms the background to a double-stranded manuscript tradition, of which the earliest surviving examples date to the eighth to the ninth centuries. Probably the earliest of one of these strands is a manuscript at Lucca, Compositiones variae (or Compositiones ad tingenda musiva) which has been dated to between 787 and 816, and which contains one recipe which has been translated into Latin apparently directly from the Leiden papyrus. It

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16 Lucca, Biblioteca Capitolare, Codex Lucensis 490. R. P. Johnson, ‘Notes on Some Manuscripts of the Mappae Clavicula’, Speculum 10 (1935), pp. 72–81, esp. p. 72; See also H. Hedfors, ed. and
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contains recipes for alloys and sets of instructions, for example for the
making of gold leaf. The second strand is the *Mappae Clavicula*, first
compiled in the ninth century (the date of the earliest surviving manu-
script), north of the Alps, which was copied, varied and added to down to
the fifteenth century.\(^{17}\) The two strands have many identical recipes, but
the *Mappae Clavicula* contains more technical information. The earliest
mention of this compilation is an entry from the year 821–22 in the
catalogue of the Benedictine Monastery at Reichenau which reads:
‘Mappae Clavicula de efficiendo auro volumen I’.\(^{18}\) It is rather interesting
that Reichenau keeps cropping up in early histories of metalworking: it
must have been a significant centre of excellence in this area over a long
period (see below and p. 25). The earliest surviving manuscript is from the
library of the Augustine Choristers Foundation at Klosterneuberg near
Vienna, which has been dated to the ninth century on palaeographical
grounds, and may have been written in northern Europe: France, Belgium
or Germany.\(^ {19}\) It has seventeen recipes, four of which it shares with the
Lucca *Compositiones variae*. The earliest comprehensive manuscript dates
from the ninth to the tenth centuries and is in the library of Sélestat, Bas-
Rhin, France.\(^ {20}\) It contains all the Lucca recipes, but is only half the
length of the most comprehensive manuscript, dating from the twelfth
century (now in the Corning Museum of Glass, Corning, New York
State) which forms the basis of the edition published by Smith and
Hawthorne.\(^ {21}\) This is known as the Phillips-Corning Manuscript, because
in the nineteenth century it was in the possession of Sir Thomas Phillips
who first published it in full.\(^ {22}\) A tantalising aspect of this is that, though
written in a continental hand of the twelfth century, there are slight hints
that one at least of the earlier versions from which it was copied had
Anglo-Saxon, even Kentish, connections. The evidence for this includes
two runic alphabets. Derolez, who saw the manuscript before it went to
America, drew attention to the similarities between these and runes in two

trans., *Compositiones ad tingenda musiva . . .* (Uppsala, 1932); J. M. Burnam, *A Classical
Technology Edited from Codex Lucensis 490* (Boston, 1920).

\(^{17}\) C. S. Smith and J. G. Hawthorne, ‘Mappae Clavicula, a Little Key to the World of Medieval
128. See also Johnson, ‘Notes on Some Manuscripts’, and idem. ‘Some Continental Manuscripts
of the *Mappae Clavicula*,’ *Speculum* 12 (1937), pp. 84–91.

\(^{18}\) Smith and Hawthorne, ‘Mappae Clavicula’, p. 4; R. P. Johnson, ‘Notes on Some Manuscripts’.

\(^{19}\) Smith and Hawthorne, ‘Mappae Clavicula’, p. 4. Smith and Hawthorne took the opinion of B. J.
Hennessy of the Department of Classics, Harvard, on the date, and his suggestion of the area in
which the manuscript was likely to have been written.

\(^{20}\) MS 17 (formerly Latin 360). Smith and Hawthorne, ‘Mappae Clavicula’, p. 5, reproduced in
facsimile in their Appendix A, pp. 77–93.

\(^{21}\) Smith and Hawthorne, ‘Mappae Clavicula’.

\(^{22}\) Sir T. Phillips, ‘Letter Addressed to Albert Way, Esq., Director, Communicating a Transcript of
a MS Treatise on the Preparation of Pigments, and on Various Processes of the Decorative Arts
Practised in the Middle Ages, Written in the Twelfth Century, and Entitled *Mappae Clavicula*,
Archaeologia 32, pp. 183–244.
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Anglo-Saxon manuscripts. He concluded that the first alphabet was related to the Anglo-Saxon examples. Smith and Hawthorne independently made the same point, although they include a note by E. Hamp stressing that the manuscript is nevertheless German and twelfth century. The text however also includes two words in English, in chapters 190 and 191, which appear only in the Phillips-Corning Manuscript. Chapter 190 is a recipe for green ink and contains the Old English word ‘gate-triu’ (‘goat-tree’), translating the Latin ‘caprifolium’. This word also occurs in the form ‘gate-treow’ in the Old English Leechdoms. Bosworth-Toller translates this as ‘A cornel tree? cornus sanquinea?’ and the Thesaurus of Old English supports this translation: ‘cornel/dogwood cornetrew gateatreow’ but while the translation is likely, it is not certain. The second English word occurs in a recipe for ‘tempering’ green. Chapter 191 describes the use of a plant called ‘greneng-pert’, conjectured by Smith and Hawthorne to be a mistake for an otherwise unrecorded formation ‘grenengwert’ with wynn, the Anglo-Saxon form of the letter ‘w’ replaced by p. This putative form is not recorded in Old English, however, and its only recorded appearance in Middle English is in the Phillips-Corning manuscript. At the most, all these slight indications add up to no more than a possibility that an English, possibly Anglo-Saxon, copyist was one in a long line of transmitters of this compilation, with perhaps a hint that that copyist was seeking native plants to turn the recipes to practical use. There are certainly many later medieval English manuscripts of Mappae Clavicula.

It is not, however, clear what these manuscripts were used for or for whom they were made. It is possible that they were used only as sources of Latin vocabulary, and revered as classical texts. The repetitions of mistakes from one manuscript to another; the development of new errors of a type not likely to have been made by anyone with technical expertise; the repetition of ingredients particular to the Mediterranean world; and the fact that manuscripts often contain several versions of essentially the same recipe, all argue against the use of these manuscripts as workshop manuals. Nevertheless if they were not seen as agents of transmission of some aspects of technical information, it is hard to see why they went on being copied until the fifteenth century. The Prologue, which appears in both the ninth-

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23 Exeter, Cathedral Library, MS 3507; London, British Library, MS Cotton Vitellius A. 12.
25 Smith and Hawthorne, ‘Mappae Clavicula’, p. 117.
28 This practical attitude to unobtainable materials is also attested in Anglo-Saxon medical compilations: M. L. Cameron, Anglo-Saxon Medicine, Cambridge Studies in Anglo-Saxon England 7 (Cambridge, 1993).
29 See McFadyen, ‘Aspects of the Production of Early Anglo-Saxon Cloisonné Garnet Jewellery’, pp. 17–19, for a discussion of evidence that the twelfth-century manuscript at least was added to and corrected by a practitioner.
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tenth century Sélestat manuscript and in the twelfth-century Phillips-Corning version, is ambiguous in its statement of aims. The author says he has many books on these subjects, and intends to disclose to

those who wish to understand these things what the actual processes are that are used in painting and other kinds of work. I call the title of this compilation Mappae Clavicula [lit. a little key to the chart], so that everyone who lays hands on it and often tries it out will think that a kind of key is contained in it. For just as access to [the contents of] locked houses is impossible without a key, though it is easy for those who are inside, so also, without this commentary, all that appears in the sacred writings will give the reader a feeling of exclusion and darkness. I swear further by the great God who has disclosed these things, to hand this book down to no one except my son when he... can keep them secure.\textsuperscript{30}

This is not the only reference to the need for secrecy, but it sits oddly with what seems a clear call to interested readers to try the information in practice. Its recipes have, in fact, been referred to in chapters 3–5. Here it is only necessary to say that the importance of Mappae Clavicula lies in the fact that it provides recipes for certain techniques essential to goldsmithing, but it rarely indicates tools, and its description of process is usually limited.

Another treatise which used to be thought of as twelfth century is that by Eracleus or Heraclius: De Coloribus et Artibus Romanorum. The first two books of this three-book work are now thought to date from the tenth century.\textsuperscript{31} It is interesting for the present study, because although in general it is concerned with painting, there are a few sections which deal with relevant topics such as gem-cutting (using lead plates for polishing) and gilding.

The most important development in the history of the workshop manual lies outside England and also outside the Anglo-Saxon period. This is the well-known manual ascribed to the twelfth-century German Benedictine and metalworker Roger of Helmarshausen, who describes himself by the Byzantine-sounding name Theophilus, presumably in honour of the reputation of Byzantine metalworkers.\textsuperscript{32} As a manual, this is far superior to Mappae Clavicula, even though it appears to use some of the same material and still has the occasional appearance of magical, non-realistic ingredients and processes, such as in the strange recipe for turning copper into ‘Spanish gold’.\textsuperscript{33} Nevertheless Theophilus in general does not perpetuate mistakes, explicitly recommends local materials, and in all areas he covers, particularly

\textsuperscript{30} Smith and Hawthorne, ‘Mappae Clavicula’, p. 28.
\textsuperscript{32} C. R. Dodwell, Theophilus, De Diversis Artibus. Theophilus, The Various Arts... (London and Edinburgh, 1961); Hawthorne and Smith, Theophilus, is the text used for reference generally.
\textsuperscript{33} Hawthorne and Smith, Theophilus, p. 119 (III, 48). Other recipes which include odd sounding ingredients are possibly more rational, for example the use of urine to harden steel tools, p. 95 (III, 21), even though the specification of goat’s urine seems odd and unnecessary to us.
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metalworking, writes unmistakably from practical experience. His work includes much that is generally useful in teaching a skill, such as instructions and recommendations on the design of working areas and tools (some ingenious) for specific tasks. His work is interesting, not only because with him the workshop manual emerges clearly into the light of day (and then develops into a long and honourable tradition culminating in the manuals of Renaissance artists such as Cellini) but also because his working methods and the tools and techniques he describes are likely to be very close to those used by his earlier medieval predecessors, and may well cast light on earlier texts and objects. In another way too, Theophilus demonstrates the continuity of earlier ways of working. Dodwell noted that Anglo-Saxon painters are rarely identified in surviving documents, but we know they existed, as some fragments of wall paintings and many manuscript illuminations testify. He speculated that goldsmiths/engravers were also painters with whom they would have shared some techniques and materials in common, and indeed he found examples of similar drawing styles between manuscripts and engraved work (chapter 6).  

Theophilus and indeed his predecessors Eraclius and the compilers of the Mappae Clavicula demonstrate this connection. Theophilus’ manual covers the arts of the painter and worker in glass as well as that of the metalworker: to read through his full text is to become aware of the techniques, processes and materials these arts had in common. His descriptions of the design of the working area (especially of the hearth with its fire screen), of various tools, and his recipes for various processes will be used throughout chapters 2–5.

STUDIES OF ANGLO-SAXON JEWELLERY BEFORE 1978

Such an ambitious study, attempting a synthesis as well as an analytic approach, could not begin without the benefit of much previously published work. Most of these, the most recent and the most directly relevant, will be acknowledged and discussed in subsequent chapters, but the study of Anglo-Saxon jewellery and its makers impinges on several other areas of study which necessarily form the background to any new work, but which may not be sufficiently acknowledged later. Dodwell’s work, for example, represents a particular strand of art history dependent on the collection and listing of primary documentary and literary sources relating to the art of the relevant period: although in this area as well as others one can come upon previously unnoticed material it would be impossible to proceed without these compilations.  

There has been only one work which has attempted to put together all the archaeological evidence for metalworking, from the

34 Dodwell, Anglo-Saxon Art, p. 80 and pls. 14, 15.


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extraction of raw materials through to the processes of production, for the relevant period. K. B. Brown in an unpublished thesis covered a wider geographical area than the present book and also surveyed the published evidence for ferrous as well as non-ferrous metalworking up to the early 1980s.36

The technical study of Anglo-Saxon jewellery also has an earlier history, and it may be useful to look back at its beginnings. It is not necessary, however, to embark on a complete history of Anglo-Saxon jewellery studies. Any work connected with its manufacture, and with the manufacture of contemporary jewellery in Scandinavia and western Europe which is still relevant, will be referred to in the following chapters. It is important to note, however, that excellent descriptions and visual analyses of some pieces of jewellery have been published almost from the period in which they first excited scholarly interest.

An example is a famous gold and garnet cloisonné disc brooch from Kingston Down, Kent, grave 205, now in the Liverpool Museum (44, plate Ib). This owed its discovery to the pioneering archaeologist Bryan Faussett, who excavated about seven hundred and fifty Anglo-Saxon burials near his home at Heppington, near Canterbury, between 1760 and 1773. His notebooks with their impressively detailed drawings and notes survive, also at Liverpool, and one of the finest drawings and first accounts of one of these impressive pieces is of the Kingston Down brooch (pl. 13). Faussett himself, however, did not recognise this or any other of the remarkable material he unearthed and recorded so carefully as Anglo-Saxon, but believed it to be Romano-British.37

A later writer who saw and understood the importance of the study of technique was G. B. Brown. He listed various techniques: engraving/incising; stamping; repoussé; casting; inlaying/plating; enamelling and setting stones.38 His list is a mixture of manufacturing and decorative processes and promises a wide-ranging discussion, but in fact it tends to be descriptive (of individual objects), and comparative, bringing to bear a huge store of knowledge of contemporary continental material, rather than technical analysis. Where he does refer to actual early technical studies (for example in reference to gilding, inlaid jewellery, gem-cutting, chasing and engraving and the composition of the ‘white material’ in the settings of


37 Faussett’s notes were edited and published by Charles Roach Smith long after his death: B. Faussett, Inventorium Sepulchræ, ed. C. Roach Smith (London, 1856); see also S. C. Hawkes, ‘Bryan Faussett and the Faussett Collection: an Assessment’, Anglo-Saxon Cemeteries: a Recraisal, ed. E. Southworth (Stroud, 1990), pp. 1–24. This and other papers in the same volume attest to the fascination of Anglo-Saxon jewellery, particularly the more spectacular gold jewellery, from the eighteenth century to the present.

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some garnet jewellery) he often has something useful to say, based on contemporary technical studies as well as his own observation.39

One of the first to undertake serious, close observation of specifically gold and garnet cloisonné jewellery in this country was T. D. Kendrick. His work is to be found in his two surveys of pre-Conquest art, which are still valuable,40 and in two articles on gold and garnet jewellery. The first of these attempted a stylistic analysis of the gold and garnet jewellery of (mainly) Kent.41 In this study Kendrick was largely concerned with demonstrating a ‘Jutish’ origin for the two styles he identified, and with placing them at what seems now a very early date, centring on c. 500. However, he does start by defining his styles largely by their use or lack of use of specific techniques. Examples of style A, I and II, all have cloisonné garnet settings, and no ‘chip-carving’; they commonly have filigree and settings of blue glass, and make frequent use of settings en cabochon. Niello, on the other hand is rare. Style B never has cloisonné, settings en cabochon or filigree; and usually has ‘chip-carving’, cast settings and niello inlay.42 Another paper a few years earlier made an important contribution to the study of the pectoral cross of St Cuthbert (22, pl. III, a and b and fig. 25) through its detailed study of the structure of the brooch and the repairs it had been subjected to in antiquity.43 Again he dated it unusually early and placed its manufacture outside England, ‘the solitary example remaining to us of the goldsmith’s work of the Britons in fifth-century Strathclyde’, on the grounds that it was too unlike what was known about Kentish gold and garnet jewellery of the time. Both these papers, of course, preceded the discoveries at Sutton Hoo, and indeed of other pieces outside Kent, including two very recent discoveries from Yorkshire, the Ripon Jewel (64) and a cross from Holderness (41), although in any case the Cuthbert cross has features which relate it more closely to the southern English work than Kendrick thought.44

The first major study to demonstrate the importance of technical analysis was that of the jewellery from Mound 1 at Sutton Hoo, under the direction of R. L. S. Bruce-Mitford, published in 1978.45 The detailed technical analyses of this material have remained so fundamental for all later work that they will be referred to frequently in following chapters, and need no

40 T. D. Kendrick, Anglo-Saxon Art to AD 900 (London, 1938); idem, Late Saxon and Viking Art (London, 1949).
42 Ibid., p. 432.
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further discussion here. Bruce-Mitford also undertook a detailed study of the Cuthbert pectoral cross, including its technical aspects, which has remained of value.46

Another strand of the early history of jewellery studies which should be mentioned was more of a popular survey. Jessup began his brief account of Anglo-Saxon jewellery with the ringing sentence: ‘Jewellery is both a mirror of life and a footnote to history.’47 This is still the only study which has attempted to survey Anglo-Saxon jewellery as a topic in its own right. It has been very successful in opening the subject both to general readers and modern practitioners of goldsmith’s work, and it is still very frequently cited as a reference book by academic art historians and archaeologists. It has been one of several starting points for the present work, mainly because it attempts at least to note the range of materials and techniques open to Anglo-Saxon goldsmiths, although in fact it does not cover making in any depth. While the first of his statements might appear to be a truism (if it has any meaning at all) it can only be true for those parts of the Anglo-Saxon period for which jewellery is present in sufficient quantities to be (possibly) statistically significant and is provided with a context for which its social and practical uses can be assessed. In practice, this is the early part of the period, prior to and contemporary with the conversion of Anglo-Saxon England to Christianity, when the pagan custom of burying lifestyle objects with the dead was still practised – from the fifth to the early eighth century. After this period, its status as a ‘mirror’ of contemporary life, in any simplistic sense, is based on much more hazardous assumptions. However, since Jessup wrote, both since his first edition in 1950 and increasingly since the second in 1974, a great deal of work has been published on aspects of the design and manufacture of Anglo-Saxon gold, silver and fine copper-alloy (especially gilt copper-alloy) jewellery, which may help to raise its status from a footnote to a useful appendix.

Part I

THE GOLDSMITH IN ARCHAEOLOGY
AND HIS ART
NOT all archaeological evidence of fine metalworking provides direct evidence of manufacturing areas or practices. Some of the best archaeological evidence concerns processes which must necessarily take place before manufacturing can begin: for example the refining of precious metals. Equally, tools found in graves are an important indication of metalworking as an occupation at some level within a community, at some time preceding deposition, and there are cases (though only one certain example in pre-Conquest England), when it is reasonable to identify the deceased not only as a smith but as a fine metalworker, on the evidence of the grave goods. When tools, remains of hearths, and utensils such as crucibles come together, they are among the most important evidence we have. This is not only for what techniques were practised: the sites themselves, when datable, may provide evidence for the social milieu in which goldsmiths worked at different periods.

EVIDENCE OF WORKSHOPS

For the early Anglo-Saxon period, from the fifth until the early eighth century, much of the evidence for metalworkers and their tools does in fact come from graves, and so will be discussed later in the present chapter. There is evidence of metalworking at village sites, for example Mucking in Essex and West Stow in Suffolk.¹ The jeweller’s rouge from Canterbury, which was stuck to the edge of a fifth-century Visigothic gold coin (see p. 130),² and a seventh-century die from Rochester, Kent (pp. 110, 113–14) may be early evidence for goldsmiths in proto-urban centres,³ but it is not impossible that the Canterbury evidence indicates a monastic or royal base.

¹ References for such sites will be given as specific types of evidence are discussed. Most of the sites to be discussed were listed by J. Bayley, ‘Non-ferrous Metalworking in England’, unless published later than 1992.
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From the early eighth century to the end of the third quarter of the ninth century, metalworking remains are found on a variety of sites. Some of these are clearly classified as monastic, for example Jarrow/Monkwearmouth, Hartlepool, and Whithorn, although the last has also been identified as a wic. 4 Others were proto- or early towns, including those identified as wics, for example Hamwic (Southampton) and Anglian York. There were also rural sites, some possibly settlements and others estates, such as Wharram Percy in Yorkshire, Flixborough in Lincolnshire, and Brandon in Suffolk. 5 It is not always clear whether those identified as estates were monastic or secular, and the actual working area has not been found in all of them, but all provide some useful evidence. A particularly interesting find from the ninth century is of a possible jeweller’s hoard from Sevington, Wiltshire (69), which contains a series of strap ends in several stages of manufacture, some silver and some copper-alloy. It has been surmised that the majority of late Anglo-Saxon metalworking sites are urban, indeed thirty-seven of the sixty-four recorded by Bayley in 1992 are within six towns or cities. 6 There are some very important estate centres from this period, however, particularly the royal estate at Cheddar, Somerset, and the aristocratic estate of Faccombe (Netherton) in Hampshire. This last was left by a noblewoman, Wynfaed, to her son Eadmaer in her will, in which she also assumed another relative to whom she left a gold-decorated cup would have access to a goldsmith (pp. 211, 213). A significant proportion of evidence for silver ingots, and ‘hacksilver’ either for re-use or for payments to or by Viking armies comes from hoards deposited in the late ninth and early tenth centuries.

It may be, however, that some goldsmiths at all periods were to some extent itinerant, as Mannig and Spearhafoc clearly were in the eleventh century, though in their case at a very high level (pp. 208–9). Hinton and White in the first publication on the Tattershall Thorpe smith, who may or may not have been a goldsmith, speculated that he could have been an itinerant trader. 7 Arrhenius also proposed that itinerant goldsmiths would make use of the blacksmithing facilities available on site at all settlements of

4 See for example R. J. Cramp, ‘Excavations at the Saxon Monastic Sites of Monkwearmouth and Jarrow, Co. Durham’, Medieval Archaeol 13 (1969), pp. 21–66; P. Hill, Whithorn and St Ninian: the Excavation of a Monastic Town 1984–91 (Stroud, 1997). Wics are sites identified as early trading places, and much discussion of the beginnings of urbanisation centres around them. They are discussed in chapter 9, below.


Plate 1. Plan of St Gall (St Gallen, Stiftsbibliothek, Klosterplan Cod. Sang. 1092). The craftsmen’s quarters are on the right-hand (southern) boundary, just above half-way.
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any size. If casting was required, a working area with hearths would have been necessary, otherwise an Anglo-Saxon goldsmith did not need much of the equipment which is regarded as essential today. Before the advent of mains utilities, it is probably fair to say that all that was strictly necessary, apart from hand-tools, was some kind of shelter from the wind and rain. Heavy tools, such as a blacksmith’s anvil, were not needed, and everything else required was either portable or easily obtained. Comparison with modern-day jewellers in India, for example, shows that highly sophisticated gold jewellery can be made with a very minimal set of tools and equipment. Personal experience supports this. A jeweller from Jaipur demonstrating at Cartwright Hall in Bradford in 1988 was able to make fine, articulated, stone-set and enamelled gold filigree jewellery with two pairs of pliers, some tinsnips, a few small files, a charcoal block, a blowpipe and a spirit lamp. Such manufacturing is likely to leave few significant traces for the archaeologist and thus, even if a goldsmith worked for a single patron, we need not expect to find many traces of his activity, particularly if he worked alongside other smiths.

This does not mean that sites at which jewellery and fine metalwork were produced cannot be identified: there are a number of significant British sites, in Ireland, Wales and Scotland which have been identified as major production centres of comparable date to parts of our period: for example, Moynagh Lough and Lagore Crannog in Ireland, Mote of Mark and Dunadd in Scotland, Dinas Powys in Wales, and these and important Scandinavian sites such as Helgö in Sweden, will be cited to show both similarities and differences from the Anglo-Saxon evidence where appropriate. Absence of, or minimal, evidence does not mean a lack of activity, however, but only that either activity at some periods was low in intensity and not always done at a permanent site, and/or that major production sites have not yet been found (all those square-headed brooches must have been made somewhere). It is also important to be clear what evidence we are looking for. Fine metalworking and jewellery-making always mean working on a small-scale, rather than in small quantities. The important indicators include utensils which imply the refining of precious metals: moulds and fragments of moulds for objects such as brooches; small ingot moulds; and crucibles for melting and pouring small quantities (preferably with traces of the metals used); or other decorative materials requiring heat, such as enamel. Small tools are also required for fine work.

In working areas where production in large quantities was carried on, one

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9 See, for example, O. Untracht, Traditional Jewellery of India (London, 1997), figs. 674, 675, 710.
Archaeological evidence for goldsmiths and their tools

Plate 2. Detail of the St Gall plan showing the smiths’ quarters on the right in relation to other craftsmen.

might also expect evidence of separation between fine metal and other working areas, but this is by no means always clear. The reasons for such separation, however, do seem to have been known. Certainly the ninth century plan of the Carolingian monastery of St Gall places the goldsmith’s workshop next to but separate from those of the blacksmiths and fullers.11 This plan was traced from a lost original between 820 and 830. It apparently originated in the scriptorium of the monastery of Reichenauf, with the explicit purpose of regulating monastic planning within the Frankish Empire.12 The background to this plan lies in the Rule of St Benedict

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(c. 480–c. 547), and its reform in the ninth century. The rule (57) stated: ‘If there be craftsmen in the monastery, let them practise their crafts with all humility, provided the abbot give permission’.\textsuperscript{13} In practice, the rule was ambiguous about the location and status of the craftsmen, and the synod of Aachen (816) clarified the position: henceforth craftsmen were to ‘be instructed to perform their work . . . in the future within the confines of the monastery, and not without, as was the custom in the past’.\textsuperscript{14} The date of the plan is obviously relevant to this development, as it gives form to the ruling. It does not seem to mean that the craftsmen were themselves necessarily members of the order, although the plan makes clear that they were under the day-to-day control of the Chamberlain, and that most were collected together in one large building and its annexe, to the south of the monastery’s refectory (see pls. 1 and 2). Working and living areas were reserved specifically for goldsmiths (\textit{aurifices}) in the annexe, distinguished from but next door to the blacksmiths (\textit{fabri ferramentorum}), and separated from the main building by an enclosed courtyard. The most likely explanation for this is, as analysts of the plan have suggested, that the fullers also housed in the annexe required pits for ley and fullers’ clay, while the smiths were noisy and were a constant fire risk. The same arrangement certainly prevailed at Corbie in the early ninth century, where Abbot Adalhard had six blacksmiths and two goldsmiths together with other workers in his second workshop.\textsuperscript{15}

Unfortunately, the St Gall plan is not detailed enough to show any interior fittings, but Theophilus in the twelfth century described what is obviously a similar arrangement, and his design for the working area emphasised fire protection. He gave a detailed description of a permanent workshop, which is likely to have been based on his own facilities at the monastery at Reichenau, the very monastery in which the copy of the St Gall plan originated. This showed that the working of copper, lead and tin, and casting operations were carried out in the same well-lit building, but separated from precious metalworking by a wall. Within this area, gold and silver working were also separated by a wall.\textsuperscript{16} Although he gave no reason for this, it was a simple and practical answer to the problems of contamination. When working precious metals, all scrap, off-cuts and filings are collected and recycled. If silver and gold became mixed, it would be necessary to go through the laborious process of parting (below, p. 36).

\textsuperscript{13} J. McCann, ed., \textit{The Rule of St Benedict. Latin and English} (London, 1952), pp. 128–9. The passage continues: ‘But if one of them be puffed up because of his skill in his craft, supposing that he is conferring a benefit on the monastery, let him be removed from his work and not return to it, unless he has humbled himself and the abbot entrust him again.’

\textsuperscript{14} Horn and Born, \textit{Plan of St Gall}, I, p. 23. The craftsmen specified are fullers, tailors and shoemakers, but the siting of metalworkers as well as fullers in the main workshop on the plan implies that craftsmen in general were meant.

\textsuperscript{15} Horn and Born, \textit{Plan of St Gall}, II, p. 195.

\textsuperscript{16} Hawthorne and Smith, \textit{Theophilus}, p. 81.
Archaeological evidence for goldsmiths and their tools

Both these metals needed to be kept separate from the other metals for the same reason. Besides this, tin and lead are very easily absorbed by both silver and gold if they melt on the surface of those metals, and if there were traces of them on the hearth, for example, or on tools such as files, the precious metals would be contaminated during any heating process which exceeded about 230°C. Theophilus also described how the work benches should be sunk into the floor, and how the windows should be arranged – as many as possible, but with at least five feet between them. They should be three feet high and two feet wide, with their bottom edges no more than one foot above ground level. This was presumably because the craftsmen were seated on the ground. No evidence of any such arrangement has been found.
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at any Anglo-Saxon (or other) site, monastic or otherwise, but that working areas had to be near hearths and well-lit must always have been true.

It is very likely that a lot of the work was done outdoors, and reasons for this might have been both fire risk and the need for good light. At tenth-century Faccombe, many of the heating areas were apparently outside the workshop building, and, outside our area, the early eighth-century Irish site at Moynagh Lough, Co. Meath provides a useful parallel. Here, an apparently outdoor heating area is associated with post-holes, which form no regular pattern, but are likely to represent a shelter or wind-break. It is therefore unsurprising that we are rarely able to identify any buildings in or around which precious metalworking took place. Such buildings have, nevertheless, been identified at, for example, tenth-century Faccombe, ninth/tenth-century Cheddar, early ninth- to eleventh-century Coppergate, York, and from the late tenth to late eleventh centuries at Flaxengate, Lincoln. At Lower Brook Street, Winchester, a ninth-century stone building has been identified tentatively as a precious-metal workshop.

In her elegant summary of current knowledge of precious metalworking in Anglo-Saxon England, Justine Bayley mapped seventeen sites where silverworking took place (fig. 1). At some of these, there were also indications of goldworking. At most sites where traces of gold and silverworking have been found, these represent a tiny fraction of the total metalworking evidence, the bulk of which usually concerns copper alloy. Since the majority of techniques used to work these metals for small-scale objects are identical, this is not surprising. Indeed, it is only at Coppergate that we see any signs of real segregation, to the extent that the majority of silverworking evidence came from one tenement, while the bulk of that for gold came from the property next door. If most such sites have evidence for working copper alloy, several are also in close proximity to ironworking. Ironworking may have been separated from goldsmithing at the royal

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palace of Cheddar, although the ironworking on this site may have been not only separate, but also later, even post-Conquest. The usual proximity reinforces the theory that there was some element of co-operation between craftsmen, or perhaps less specialisation than we would expect nowadays. Scull has suggested that in the pre-Viking period at least, there is no reason to assume that specialised craft activity was full-time, and it may be that there were some smiths who were capable of both fine- and large-scale work, as the need arose. Swordsmithing, for example, comprised a vast range of metalworking skills, from the specialised forging and pattern-welding involved in making the blade, to the finest of goldworking for some of the more richly decorated hilts and scabbard mounts. Where weapon-smiths are referred to in Anglo-Saxon literature, there is no indication that any aspects of their trade were ‘farmed out’.

Hearths

Throughout the Anglo-Saxon period, the main traces of fine metalworking are the debris resulting from the processes which involve intense heat. These mainly consist of remains – often vestigial – of hearths and furnaces, and fragments of utensils such as cupels, parting vessels, crucibles and moulds. The source of heat was some kind of hearth, but we have little evidence to tell us what an Anglo-Saxon goldsmith’s hearth looked like. Some of the best evidence is from the tenth century at Facombe (Netherton). Here, within a wooden building, approximately 12.5m long by 7.5m wide, were a number of features with apparently different functions. There were three hearths, which appear to have been used successively, each approximately 3m by 2m. They had been dug down to the natural clay level beneath the floor, which had fired red. They had been swept clean, but did contain fragments of charcoal. Around these were four smaller hearths, the largest of which was approximately 50cm in diameter. One of these contained crucible fragments. Another held a complete crucible sitting upright on a bed of charcoal and containing some small globules of gold. Outside, and to the west of the building, further features were found, including two more large hearths. Associated with these were eight small charcoal-filled pits, which varied from circular to ovoid, and were from 41–46cm in diameter and 10–20cm deep. They also contained copper-alloy waste and burnt earth.

The use of these various hearths and pits is far from obvious, but the close association between the large hearths and the charcoal-filled pits is of

27 Fairbrother, Facombe Netherton, pp. 244–52. See also pp. 211–13 below.
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interest. It is quite easy to melt the small amounts of metal required for fine metalwork in a small and simple charcoal hearth. 28 Indeed, a small, compact hearth is easier to heat up and to control. For a good clean casting, the mould needs to be heated at the same time to prevent the incoming metal solidifying before it has had chance to fill it. Modern practice is to cast into moulds which have been heated to between 350° and 400°C, which is considerably lower than the temperatures required to melt the metal. Such temperatures are easily obtainable with an ordinary fire, especially one which is charcoal-fuelled, and herein may lie an explanation for the close association of the large and small hearths at Faccombe. An open fire would be capable of heating up a number of moulds, and there is no reason to doubt that the goldsmith would sometimes do castings in batches to economise on fuel and time. Having the moulds in the pre-heating fire adjacent to the melting hearth would be a very practical arrangement.

It seems likely from the rather slender evidence that there was little more to an early Anglo-Saxon hearth than lining a small pit with clay, filling it with charcoal, and providing it with an air supply. At the Irish site of Moynagh Lough a small hearth was excavated, and dated to the mid to late seventh century. 29 It has been speculated that this was a more sophisticated design, possibly even a small furnace. Measuring a maximum of 35cm in diameter and 14cm in depth, this tiny structure had a stepped floor, rising away from the rounded entrance. This could suggest a roofed structure but more evidence is needed. The bowl-shaped clay base was set into a prepared hollow in the ground which was lined with sand and tiny pebbles. From the charcoal spreads deposited in association with this putative furnace, it appeared to have been used repeatedly. There seems to be nothing from Anglo-Saxon contexts as permanent as this which has been directly associated with goldsmithing.

Theophilus’ description of the design of a forge concentrates mainly on the construction of a fire screen. 30 This is a very simple vertical construction of wood, lined with a thick layer of clay. It is about three feet square, through which a hole is pierced to take the bellows, and in front of this the hearth is built (fig. 2). Unfortunately for us, Theophilus seems to assume that his readers will know what this hearth looks like, and simply says ‘build up the forge and a hearth for it’. 31 A charcoal fire was probably laid on a flat area in front of the screen, so that the bellows could supply the air to raise the temperature as needed. This arrangement, particularly the screen for the bellows, fits remarkably closely to the manuscript illustrations in the Harley

30 Hawthorne and Smith, Theophilus, pp. 81–3, fig. 8.
31 Ibid., p. 83.
Archaeological evidence for goldsmiths and their tools

Fig. 2. Reconstruction of Theophilus' firescreen and hearth. The upper figure is a plan, the lower shows a vertical section.

and Utrecht Psalters (chapter 7 and plates 33, 34 and 36), although in two of these the hearths appear to be raised off the floor.

Bellows

In order to raise the temperature sufficiently to carry out such operations as melting and soldering, an air supply of some kind is needed. For operations requiring only localised heat, such as soldering, the small hearth necessary could easily be raised in temperature by the use of a blowpipe.32 For this purpose, a slim hollow bone, alder cane or straw would have sufficed; they were doubtless disposed of into the fire when no longer of use. There is a wall painting from Pompeii showing a cherub using a blowpipe at a quite

32 As suggested by J. Bayley, ‘Non-ferrous Metalworking from Coppergate’, p. 789.
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substantial hearth, and small brass blowpipes are still used in the Birmingham jewellery trade in conjunction with a gas flame.

For larger or more prolonged heating operations such as melting the metal, bellows would have been necessary. Theophilus’ description of how to make bellows out of a whole goatskin and wooden boards is rather difficult to interpret, and he omits to mention the non-return valve which is necessary to prevent hot gasses being sucked back into the bellows when they are being refilled with air. Bellows are illustrated in some early manuscripts (pls. 39 and VIIb) where they appear little different to those with which we are still familiar. None have survived, being probably made of leather and wood. We do, however, have evidence of them in the form of tuyeres. These are clay nozzles or plates with tapered holes in them, which were placed between the bellows’ mouth and the fire, thus preventing the end of the bellows being burnt. They have been found in Anglo-Saxon contexts, for example at Ramsbury, Jarrow/Monkwearmouth and Coppergate, the last being chunks of fired clay approximately 3cm thick, with a hole piercing them at an oblique angle. They were presumably built into the firescreen of the hearth, and would no doubt be replaced periodically as the side nearest the fire, being at the hottest point of the hearth, would suffer excessive vitrification after repeated use. Tuyeres are most frequently associated with ironworking and smelting sites, where prolonged heating in fairly large hearths was the norm. As mentioned above, however, there is very often close association between ferrous and non-ferrous metalworking, and there is no real way of telling from the tuyere what metal was being heated. In the twelfth century, Theophilus used an iron pipe instead (although the fire screen he describes is in effect a tuyere). He clearly used a smaller, hand-held set of bellows for fine work, however: when describing the process of enamelling, he tells the craftsman to ‘take the bellows with both hands and blow from all sides’. Some idea of the subtlety of heat control that was needed can be gained from his suggestion at the same place to use the wing of a goose or other large bird to fan the fire, or to cool the surface of the fire temporarily. Cellini describes the use of bellows even in such delicate operations as soldering gold minuterie, and they continued in use until very recent times; one of the first experiences in silver soldering by one of the present authors was with foot-powered bellows.

34 Hawthorne and Smith, Theophilus, pp. 83–4.
36 J. Bayley, pers. comm.
37 Hawthorne and Smith, Theophilus, p. 127.
Archaeological evidence for goldsmiths and their tools

Cupels and parting vessels

It is not within the scope of this work to discuss current knowledge of Anglo-Saxon non-ferrous smelting techniques. In any case, there is little or no evidence to show that such activity was carried out on the same sites as the jewellery making, apart from the fact that it seems certain that the main source of precious metals was coinage or the reuse of earlier material, either scrap metal, or old and damaged objects of precious metal, perhaps the client’s own or inherited jewellery (see pp. 210–14). A difference has been noted in the early Anglo-Saxon centuries between the copper alloys available to Celtic and Anglo-Saxon goldsmiths, with the former having access to supplies of new metal, while the latter were dependent on Roman scrap and imported metalwork.\(^39\) It is almost certain that the gold used by the Anglo-Saxon goldsmiths was originally derived from coinage. Brown and Schweizer compared analyses of gold alloys in sixth and seventh century jewellery with those from the contemporary coinage. They were able to show a strong correlation between the dates derived from these analyses with those derived from contextual evidence.\(^40\) Webster makes the important point that Britain was on the periphery of the area subsidised by massive infusions of Byzantine gold which fuelled the Merovingian Empire, the only exception being Kent which, from the sixth century at least, was linked to the Merovingian world through dynastic marriages and gift exchange.\(^41\) This makes it more likely that precious metals outside this area were recycled Roman material, with relatively small supplies of new metal from abroad, sometimes via Kent. The difference between Kent and other areas shows up in the surviving metalwork. When supplies of gold from Byzantium dried up in Europe, which they did by the eighth century, silver became the basis of both currency and much of the jewellery (although silver coinage started earlier than this, see p. 231). Little is known about the origin of the silver, and few analyses have been carried out which might help to identify its source. In the early period, Roman coinage was still available, as well as mined silver as a by-product of lead mining, and imports were probably also involved. In the post-Alfredian period English silver derived from lead mining was available, as well as imports. These imports could have come from as far away as the Near East, as a result of Viking trade.\(^42\) There is no evidence that the Anglo-Saxon goldsmith was involved in smelting silver, and thus he would have worked with any available metal, already smelted and to some extent refined.

\(^{41}\) Webster, ‘Ideal and Reality’, pp. 53–4.
\(^{42}\) We are grateful to Dr P. Northover for a helpful discussion on the sources of silver.
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Although all this metal would have been previously worked, if only as ingots, it is still likely to have contained some impurities, therefore it was important for the goldsmith to understand some methods of refining. Although hoards of gold and silver of Anglo-Saxon date are known, it seems possible that they had little direct connection with the working goldsmith, other than as the manufacturer of items within them. Possible evidence for this is also provided by the character of the cut-up pieces (hacksilver) in such early-tenth-century Viking-period hoards as that from Cuerdale, Lancashire, which were clearly neither worn out nor badly damaged. It, like other hoards, may therefore represent wealth rather than a silversmith’s working material. Even quite late in the period there were goldsmiths tied to royal or noble estates who were not free men, and it is probable that such goldsmiths did not own their own stocks of silver and gold but only worked with metal supplied by their masters or commis- sioners. Viking-period hoards such as Cuerdale do, however, give some clues as to what a goldsmith had to work with as raw material. Even native gold is not pure and usually contains some silver. He may have had to refine the metal, as the recycling process involves a high risk of impurities being included in the melt. We have direct evidence for two refining processes, namely cupellation and parting.

The principle of cupellation is to melt the metal to be refined in a shallow ceramic dish (a cupel) together with lead, a thin sheet of which normally forms a wrapping. While the mixture of metals is molten, a draught of air is blown across the surface. The lead oxidises to form litharge, which becomes an oxidising agent itself, thus causing any other base metals to oxidise. These oxides then either volatilise, or soak into the ceramic dish, and they can also be scraped from the top of the melt. Most of the evidence is for silver, but the method works equally well for gold, and is still used in the testing of gold at the London Assay Office. Theophilus described the process in the twelfth century. The cupels (or heating trays as they are also called) are usually small, often between 5cm and 10cm in diameter, and made of fired clay (fig. 3a). In eighth-century Hamwic one was shown to have been used for gold, and two for silver, and from Coppedge in York there are mid-tenth-century examples which were used for gold and for silver. Others have been found in Winchester, where some larger late examples were found which measure approximately 140mm in diameter.

44 For a fuller discussion of the social position of smiths, see chapters 7–9.
46 Hawthorne and Smith, Theophilus, pp. 96–7.
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Fig. 3. (a, above) Cupel and probable cupel from Coppergate, York. Left: purpose-made clay cupel; right: probable cupel of vitrified and fused quartz chips. Max. width 5.2cm. (b, below) Reconstruction of a parting vessel.

There is evidence from Anglo-Scandinavian Coppergate that, in the tenth century, cupellation of gold was carried out using vessels made either of a more refractory clay (i.e. a clay with the ability to withstand higher temperatures) than those used for silver, or from fused quartz. The latter were made of small, angular, white quartz chips which were mixed with a flux and then fused together into blocks about 5cm across. Gold melts at
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1063°C, whereas silver melts at 960°C, and so there are clear advantages to the use of both these more refractory materials for the metal with the higher melting point. Theophilus describes cupsels made of bone-ash and beech-wood ash, presumably mixed with clay, which he used for removing copper from gold, but we have no evidence of anything similar from Anglo-Saxon sites. Because it is so unreactive, gold in small quantities can also be refined without the use of lead, simply by blowing air over the molten metal, thereby oxidising the contaminant metals.

So-called litharge cakes are often found in association with these cupsels. These are small masses of about 10–15cm diameter, 2–3cm thick, and often with a slight central depression, largely composed of lead oxides. The exact process by which they are formed is not yet understood, but they are clearly a by-product of cupellation, and often contain traces of silver, as well as the oxides of the other metals which were removed during this process.

Parting is a way of separating a mixture of silver and gold, usually after cupellation. Theophilus’ method was to hammer the metal into thin sheets, then interleave them with a mixture of ground-up tile or furnace lining, salt and urine. They were packed into a clay container, which was then sealed up, and heated in a furnace to below the melting point of the metal. It was kept at this heat for some time (a day and a night), and the whole process would be repeated twice more. The salt is the active constituent in the process, and produces silver chloride which volatilises, and soaks into the ground-up ceramic layers and into the vessel itself. The silver can be recovered by smelting, the gold is left in the parting vessel as metal.

Examples of parting vessels have been found at a number of late Anglo-Saxon sites, including Coppergate, where they are sub-rectangular, and measure approximately 9cm along each side, by about 6cm deep (fig. 3b). They were discovered in contexts dating them from the mid ninth right through to the eleventh centuries. Fragments of parting vessels were also identified from tenth-century sites in Winchester.

Another process which must take place prior to manufacture is the alloying of metals. It is difficult, however, to know how deliberate were the alloys we find in Anglo-Saxon jewellery. Gold and silver seem always to have been in an alloyed form, although as we have seen efforts were made to refine them. These two metals in very pure form are, however, too soft for practical use, so there are therefore good reasons to alloy them to some degree to improve working qualities and durability. A series of analyses of gold alloys in various objects roughly contemporary with the Sutton Hoo...
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regalia show a wide range of gold content, from approximately 27% to approximately 96%.54 The average of the thirty five analyses gives a figure of about 75%, with twenty three of the objects showing values of 70% or more. The alloy for gold work preferred by a modern goldsmith, because it is easily workable and has a good gold colour, is 18 carat (which has a 75% gold content): a lower gold content is more intractable, a higher is too soft and too easily damaged. The parallel with the Anglo-Saxon alloys is likely to be more than coincidence.55 The difficulty in discussing alloys in other non-ferrous metals is indicated by the now general use of the catch-all term ‘copper alloy’. In late Saxon metalwork the different colours of alloys were clearly exploited, however, in the fashion for metal inlays (chapter 4). The re-use and mixing of earlier metalwork possibly accounts for many of the actual alloys encountered. Work on defining alloys is essentially beyond the scope of this study but there has been some notable work in this field.56

Crucibles

Crucibles, which are simply ceramic containers for melting and pouring metal, have often been found at a number of sites, either whole or fragmentary. Analysis can often show what metals were melted in them, and where the crucibles are small, this is probably an indicator of fine metalworking. The forms of these vessels cannot be discussed without the practicalities of working with them: they are fully discussed in chapter 3.

Moulds

Moulds or mould fragments are a certain indicator of non-ferrous metalworking and, with the exception of fragments from bell moulds, they indicate fine metalworking activity. The nature of the casting process ensures that we do not find complete moulds, since they have to be broken open to remove the casting (see chapter 3), but sometimes enough of an impression remains visible for us to be able to recognise the object that was cast, and even to date it on stylistic criteria. Unfortunately, we have very few recognisable moulds from Anglo-Saxon contexts and, indeed, very few moulds at all. Recognisable moulds from England comprise those for a

55 It is not clear where on individual objects samples were taken from. The range of values could suggest that some of the softer alloys were deliberately chosen for particular components.
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sixth-century great square-headed brooch from Mucking, Essex,57 a free-armed cross and two decorative panels from the seventh to eighth centuries at Hartlepool (pl. 3),58 and a late Saxon strap-end from Carlisle.59 We have no sites to rival production centres such as Helgö in Sweden, or even Dunadd in Argyll, where over nine hundred mould fragments were excavated, dated to the seventh century. Dunadd, interestingly, however, produced some fragments of moulds believed to be for Anglo-Saxon buckles, although the authors conclude there is no evidence for Anglo-Saxon smiths working there.60 In fact many of the Dunadd moulds were well enough preserved to identify the objects cast, and a good many – far more than all the known Anglo-Saxon examples put together – had at least one valve largely intact.

Ingot moulds (fig. 4)

Ingot moulds are another sign of fine, non-ferrous metalworking, and were used to cast suitably shaped ingots for hammering into rod or wire. They are usually made of stone. Examples have been found at the mainly eighth-century site at Hanwic, which produced two made from limestone,61 and another such came from the eighth- to ninth-century site at Fishergate in York. We also have a sandstone mould from the same site.62 Coppergate has produced nine stone ingot moulds of various sizes and forms, from dates between the mid ninth and the eleventh centuries. These were made of either steatite or talc schist – both forms of soapstone.63 At Thetford, some fragments of ingot moulds made of chalk were found. Although pewter and lead are the most likely metals to be cast into these, the low heat resistance of chalk would still allow the possibility of casting copper, silver or gold at least a few times into such a mould.64 They can

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Plate 3. Three moulds from Hartlepool, Co. Durham, seventh–eighth century.
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Fig. 4. Ingot Moulds. Nos. 1 and 3 are from Coppergate, York; 2 is from Hamwic (Southampton).

also be made of other materials such as re-used Roman tiles and bricks, like some found at Hamwic,\(^65\) or at Coppergate, or fired clay, again from Coppergate.\(^66\) Ingot moulds are regularly found on Late Anglo-Saxon and Anglo-Scandinavian sites.\(^67\) To find earlier examples, we need to look at an area of Anglo-Saxon influence such as Whithorn, Galloway, where they


\(^{66}\) Bayley, ‘Non-ferrous Metalworking from Coppergate’, fig. 332, nos. 3991, 3993, 3996.

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were found throughout a long period of occupation from the later sixth century onwards.68

TOOLS

It is of note that only a few tools have been found at the sites where fine metalwork is known to have been carried out. A small but significant assemblage comes from the Anglo-Scandinavian workshops at Coppergate, York, but this is an exception.69 Most such sites contain either no tools, or a very poor and random selection. The explanation is probably simple enough – the tools needed for fine metalworking are mostly small and easily portable. They are also the life-blood of the craftsman, and highly prized. They would be used until thoroughly worn out and, unless the workshop was suddenly and violently destroyed, the craftsman would take them with him if he moved away. Even in Scandinavia, where a number of smith’s graves have been found, it is rare for these to include many tools which could be ascribed to fine metalworking.70

There is however an especially interesting grave from Hérouvilllette (Calvados) in Normandy. This cemetery is of particular interest because some of the brooches found there are thought to be Anglo-Saxon, actually Kentish, and have been used to date the cemetery to the first half of the sixth century.71 The body in grave 10 was disposed surrounded by weapons, coins and tools. The weapons were a spear, an axe, a sword and a large knife. The deceased also had a normal disposition (for a rich male) of personal jewellery and garment fasteners. A small hoard of coins of the early sixth century was found in the position usually associated with a belt purse, and these have been interpreted as personal wealth. Of most interest however is the heap of tools, an ingot and scrap metal, including Roman coins dating from as early as the first century AD, at the feet of the corpse where they were presumably in a bag or box. A container with some mercury for the gilding process was included in this collection, and there was also some glass, implying the working of this material, perhaps to make imitation gems. Decaens believed that this grave cast considerable light on the rural society of Merovingian Gaul. He noted that the number of weapon graves in the cemetery coincided with what seemed likely to be the number of generations represented there (although the chronological succession of these graves had not been firmly established) but that in any

68 Hill, Whithorn and St Ninian, pp. 402 ff.
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case the body in grave 10 presumably represented someone pre-eminent in his community in his generation. The tool-kit however implies that this leader figure was also a smith and a goldsmith.

There are a small number of recognisable goldsmiths’ tools from widely scattered sites throughout England. These come either from graves or as stray finds from settled sites; we have no tool-hoards to compare with some of those from Scandinavia. The most important collections of tools come from the seventh-century grave at Tattershall Thorpe, Lincolnshire, the late-ninth-century estate at Flixborough in South Humberside, and both Anglian and Viking-period York. The Tattershall Thorpe find was a single burial, away from any known graveyard, and with only slight traces of a body remaining.72 The tools from Flixborough were discovered in a rubbish-filled ditch, and seem to be a fairly random selection of cast-offs and accidental losses.73

The basic hand tools of the smith – hammer, tongs, anvils and stakes – appear to have changed little from their first development through to the present day.74 For example, the forms of hammers vary very little, not only historically, but also geographically. The small hammers from eighth-century Staraja Ladoga, Russia,75 bear a remarkable resemblance to those from the Merovingian grave at Hérouvillette in Normandy,76 seventh-century Tattershall Thorpe, Lincolnshire,77 c. AD 1000 at Mästermyr in Sweden,78 and ninth- to tenth-century Coppergate, York.79 A fifteenth-century illustration shows a goldsmith using a hammer of exactly comparable form.80

It may be most useful to discuss each type of tool in turn. Evidence for the use of these tools in manufacturing processes is presented in chapter 3, and for decorative processes in chapters 4 and 5.

Hammers (fig. 5)

Hammers have an important role in the making of fine jewellery. For example, the Anglo-Saxon goldsmith would have had to hammer out all his own sheet, strip and rod from cast ingots. He also needed to close rivets with a hammer and punch, and punched decoration and carving also

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72 See p. 234.
73 We are grateful to Dr C. Loveluck for giving us access to this material.
76 Decaens, ‘Un Nouveau Cimetière du Haut Moyen Age’, fig. 18.
77 Hinton, A Smith in Lindsey, figs. 11, 12.
79 Ottaway, Anglo-Scandinavian Ironwork from Coppergate, fig. 196, pl. XXXVI.
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Fig. 5. Hammers. Left, top to bottom: Tattersall Thorpe; Tattersall Thorpe; Coppergate, York. Right, top to bottom: Staraja Ladoga; Staraja Ladoga; Hérouville. Largest hammer 11cm long.

require the use of hammers. Theophilus gives rather broad descriptions of the hammers he deems necessary for goldsmithing, and does not specify their uses. In general terms, hammers are a controlled means of applying force. The weight of a hammer affects the amount of work it will do with each blow – a heavy hammer will be able to deform large sections of metal, while smaller ones will only be capable of smaller changes of section. The shape of the face of a hammer dictates the way in which it will move metal when it is hammered directly. Those which are narrow in relation to their width will stretch the metal at right-angles to the long axis of the face, while broad, square or round faces are good for smoothing hollow forms and for spreading metal evenly. These may also be used for punch-work, and in fact any hammer with a flattish face can be used for this purpose, although modern western practice is to use specifically designed hammers which are broad-faced and of medium- to light-weight, while in contemporary practice in Japan and the Indian sub-continent small-faced hammers are favoured.

81 Hawthorne and Smith, Theophilus, p. 85.
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It can be said that, while large hammers can be used for both heavy and fine work, the smaller hammers can only be used for fine work. The smaller hammers from Tattershall Thorpe could only have been used for very light, fine work: indeed, it is hard to see much use for the smallest. It is only 7 × 1 × 1cm in size and weighs just 33gm in its present state. Such a small hammer might have been used for very fine riveting, but other uses are hard to suggest since most hammer operations rely upon rather more weight. A hammer which is comparable in size, however, comes from Coppergate. It is clear that this last was made by forging. This must have been the case with all hammers of Anglo-Saxon date, but whereas most seem to have begun life as rectangular bars, this was clearly hammered from a bar of round or elliptical section. Away from Anglo-Saxon contexts, Islandbridge and Kilmainham, both Dublin, have produced small- to medium-sized hammers, while others have been found at Mästermyr, Sweden, Bygland, Norway, and Staraja Ladoga, Russia.

Stakes and anvils

Stakes are used for forming hollow vessels, for smoothing and adjusting forms and for light forging, all in conjunction with various hammers, and have been in widespread use since at least the Bronze Age. They are pieces of iron, steel or bronze of various forms, usually cast. They are not normally massive, and thus need additional support to provide stability in use. Before the invention of the bench-vice, they were driven into a tree stump or piece of heavy wood, and for this purpose they were provided with a substantial shank or tang. In older versions, this shank is often tapered to facilitate wedging into the wooden support. Stakes may also be dropped into a square hole cut into one end of an anvil, and modern craftsmen also use various straight and cranked holders which are mounted in the vice. Anvils are massive, free-standing, flat-topped castings with one end of the top conical, a form which has not been found from Anglo-Saxon England. They are used for the heavier jobs, particularly forging. The conical end is used for curving iron bar or rod with a hammer. What appears to be an anvil stone was discovered on a fine metalworking site at Dunadd in

82 McFadyen, Aspects of the Production of Early Anglo-Saxon Cloissoné Garnet Jewellery, p. 23.
83 Hinton, A Smith in Lindsey, p. 20.
84 Ottaway, Anglo-Scandinavian Ironwork from Coppergate, fig. 196.
85 S. Youngs, ed., The Work of Angels: Masterpieces of Celtic Metalwork, 6th-9th Centuries AD (Austin, 1989), p. 213; H. Shetelig, Viking Antiquities in Great Britain and Ireland, III, Norse Antiquities in Ireland, ed. J. Boe (Oslo, 1940), fig. 27.
86 Arwidsson and Berg, The Mästermyr Find, pl. 6.
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Argyll. 90 This is a massive, flat-topped piece of stone, approximately 60cm in diameter, and the combination of the polished surface with irregular scoring across it, together with signs of its having been in contact with hot materials, strongly suggest it was used for hammering hot metals. Although it is larger than any goldsmith would require, it raises the possibility that smaller versions as well as other stone tools may have been in use. Anvils of any size, while being indispensable to the blacksmith and farrier, are rarely of use to the goldsmith, and certainly not essential.

Theophilus devotes a chapter to anvils and stakes. 91 He is mainly concerned with anvils, of which his interpretation is rather broader than is common today. The only things he differentiates by name (he calls them in Latin nodi instead of incudes) are small, domed forms, commonly known today as mushroom stakes or ‘heads’. Stakes are of most concern here, since these, especially the smaller ones, are more associated with fine work.

It is not really necessary for a fine metalworker to have more than one or two medium-sized stakes for such processes as small amounts of forging and sheet-making, swaging wire, and ‘trueing up’ rings and other circular bands. The jewellery itself provides little evidence of the use of stakes. It is only on hollow vessels of which only a few Anglo-Saxon examples survive, such as the Ormside bowl (60, eighth century, pl. II a and b), the Hexham chalice (40, eleventh century), and the Trewhiddle chalice (80, ninth century), that any intensive use of stakes would have been necessary. The simple forms of these Anglo-Saxon vessels, however, would only require one or two very simple stakes, whereas a modern silversmith may have an extensive collection, of a vast range of forms. Also, until recent times, it was common practice for Danish silversmiths to do the first stages of making a hollow vessel on wooden formers. It may be, then, that there never were very many stakes in Anglo-Saxon goldsmiths’ workshops, and the fact that we have only discovered two so far could be a true reflection of their scarcity. These stakes are from the seventh century at Tattershall Thorpe, 92 and from the mid tenth century at Coppergate, York (fig. 6). 93 The first is quite a small item. It is heavily corroded, but its form is well preserved, and it is approximately 10cm tall, with a roughly square top 7.6cm by 6cm. The Coppergate stake is even smaller and is L-shaped, with a rectangular-section shank which is fairly heavily tapered over its length of 8.5cm. The working end tapers away from the shank to a chisel-shaped tip, and on the upper surface, near the elbow, are three narrow parallel grooves, or swages. These would be used for forming ridges on strip metal, and for working on thin wire (see chapter 3). Away from England, a small stake came from the

90 Lane and Campbell, Dunad, p. 192 and fig. 4.103.
91 Hawthorne and Smith, Theophilus, pp. 84–5.
92 Hinton, A Smith in Lindsey, p. 23 and figs. 9, 14, 15.
93 Ottaway, Anglo-Scandinavian Ironwork from Coppergate, pp. 512–13, fig. 194.
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Fig. 6. Stakes. Left: Coppergate, York. Right: Tattersall Thorpe. Largest stake 10cm long.

seventh- to eighth-century ring fort at Garryduff, Co. Cork.\textsuperscript{94} while the eighth-century production site at Moynagh Lough, Co. Meath produced an object which has been described as a stake, but which may have had some other purpose.\textsuperscript{95} It has been suggested that it was used to raise small metal vessels, but this would be extremely difficult, in view of its tiny size and lack of any positive fixing point such as a shank. There are several other examples from Scandinavian contexts, notably Mästermyr and Staraja Ladoga.\textsuperscript{96}

Punches

The word ‘punch’ normally refers to a tool, made from a length of iron or other hard metal, with one shaped end, which is applied to the work-piece


\textsuperscript{95} Bradley, ‘Moynagh Lough’, p. 76; Youngs, ‘Work of Angels’, p. 213.

\textsuperscript{96} Arwidsson and Berg, \textit{The Mästermyr Find}, pl. 21, no. 75; Vierck, ‘Ein Schmiedeplatz aus Alt-Ladoga’, abb. 2, no. 12.
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Plate 4. Flixborough, Lincolnshire, lining punch, FLX89 11157, two views.
Max. length 10.5cm.

while the other end is struck with a hammer. The main use of punches in
Anglo-Saxon fine metalwork was for decorative effects generated by the
repetition of simple impressions, but they may also have been used for
making linear designs (see pp. 103–5). When freshly done, the latter
 technique, for which the technical term is chasing, is distinguishable from
engraving by the slight ‘walls’ which are raised at either side of the line.
These are formed as the metal is displaced either side of the punch. Punches
can also be used to make three-dimensionally modelled repoussé decora-
tion. This is done by working from the back of the metal as well as the front,
and was very popular in the later Middle Ages, although there is very little
unambiguous evidence for it in Anglo-Saxon metalwork. The term
‘repoussé’ has been used incorrectly in connection with some decorative
plaques of thin metal, but these are stamped in a single action using a die,
and are really examples of what has become known as Pressblech (see
chapter 4).

As they are simple, straight lengths of bar, often quite small, punches can
be difficult to identify, but repeated use will cause the hammered end to
spread in a distinctive way, and as a result, we have some recognisable
examples to study. From the ninth-century dump at Flixborough came a
number of short lengths of iron, some which are identifiable as punches.
One of these (pl. 4) has an obvious striking end, while the other end is
flattened off to a chisel-like terminal, which is curved gently across the end,
and rounded off.97 It is well enough preserved to be able to say with some

97 Find no. FLX 89 11157 (context 6469).
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certainty that it resembles a modern chaser’s lining punch. This is used to trace out the design initially, and to refine the fine linear detail at later stages.

The punch from the Early Anglo-Saxon site at Pakenham in Suffolk is a substantial 1cm square-section bar, 8cm long, tapered strongly to the hammered end, and more gradually to a point at the other.\(^98\) This tool is most likely to have been used in rather basic operations, but it may have been a cold drill, for punching holes in hot iron. It might have been used for fine metalworking, in which case it would produce simple dots on a surface. It could also, however, have acted as a centre-punch prior to drilling operations; it bears a close resemblance to the hand-made centre-punches which were in use until very recently. Such centre-punches have other uses, such as making the centre-point from which circular designs can be marked out (see under Dividers/callipers below). A similar punch was found at Coppergate, although this is slightly longer and thicker.\(^99\) Another twenty-two punches were found at Coppergate, where they seem to have been present in occupation layers from the ninth through to the eleventh century. Varying in length from 14cm down to 4.6cm, they are of round, square or rectangular section, and all show signs of having been hammered repeatedly at one end. All taper towards their tips, which are rounded, pointed or chisel-shaped. Ottaway interpreted the neck near the top of three of the larger punches as being the place where they were held in tongs for use on hot iron. He also pointed out that it is the smaller punches which are most likely to have been used in fine metalwork, and one of these still has some flecks of copper alloy adhering to it. Two more small punches were found nearby at Fishergate, where they date from the late eighth to the early ninth century.

Tanged punches

The term ‘tanged punch’ is used to cover a wide variety of forms, which clearly had different functions. They vary in length between 4.8cm and 14cm, in thickness from 0.4 to 1.2cm, and are characterised by tapering toward each end; one taper is usually longer than the other. It seems fairly certain that the shorter taper, which especially on the smaller examples often has a shoulder on it, was driven into a handle of some softer material such as wood, bone, horn or antler; one of them has part of its wooden handle still adhering to it. The majority of those surviving come from the ninth to the eleventh centuries at Coppergate, York.\(^100\) Many of these tools could have served as awls or borers for materials such as bone, wood or


\(^{99}\) Ottaway, Anglo-Scandinavian Ironwork from Coppergate, fig. 197, no. 2204.

\(^{100}\) Ibid., pp. 517–19, fig. 198.
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Fig. 7. Tanged punches, possibly engraving tools, from Coppergate, York (after Ottaway, Anglo-Scandinavian Ironwork from Coppergate). Left to right: nos. 2230, 2231, 2234, 2235, 2240, 2241, 2243. Longest punch: 9.4cm.

leather, but the fact that they were found in association with a large amount of metalworking evidence opens up other possibilities. Ottaway suggested that the four larger punches, nos. 2232–3, 2237 and 2239, were used for chasing, and this seems a very reasonable interpretation, with the exception of no. 2239, the curled-over end of which (if not later damage) would be very difficult to use with a hammer.

Ottaway suggested uses for the rest in various punching operations such as making holes in thin metal sheet, cleaning up decorative details on metal, and for punch-work decoration. We would like to propose an alternative interpretation for seven of the smaller items classed under this heading. Nos. 2230–1, 2234–5, 2240–1 and 2243 would make very good engraving tools (fig. 7 and pl. 5). Their small size and narrow section imply this strongly, and the slightly bent tip of 2235 is very compatible with use as a graver. The fact that they probably had wooden handles is a factor in the argument; a handle on a punch which is to be used with a hammer is a positive disadvantage, since it will absorb a lot of the energy of the hammer blow. Engraving tools are pushed into the metal by hand pressure, and a wooden handle is thus of great help in enabling a heavy pressure to be applied without discomfort. We know that the craftsmen at Coppergate were fine carvers of bone, and these would be the ideal tools with which to do that work, but it should also be borne in mind that the metals used by the Anglo-Saxon goldsmith were all relatively soft, and iron tools would easily cut them. One would, therefore, expect to see little difference between tools used to engrave wood, bone, ivory or metal. A small iron object found in the Tattershall Thorpe burial has been tentatively identified
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Plate 5. Modern engraving tools. Length of longest is 12.5cm.

as a graver.\textsuperscript{101} This is a narrow iron bar of roughly elliptical section, 7.3cm long, with an area of non-ferrous plating at one end, which also has a short protruding spike. In its length and section it bears a slight resemblance to one form of modern graver. Rather confusingly this type of graver is often called a burin, which is the term used by Hinton for the small, wooden-handled tool from the same burial, which is too small to be a graver but which was possibly used as a scriber (chapter 6).\textsuperscript{102} As with the punches discussed above, other excavated examples of this type of tool could easily survive as unidentified pieces of iron from Anglo-Saxon sites: they must have been relatively common, from the evidence of the jewellery.

\textit{Tongs and pliers (fig. 8)}

Tongs have a number of general uses in the smith’s workshop, including holding hot metal while working on it with a hammer; transferring items to and from the hearth; manipulating hot items while in the hearth. Theophilus describes a number of different tongs and their uses,\textsuperscript{103} but because of the rather open-ended descriptions he gives, it is not possible to relate these to any of the tongs which have been found in Anglo-Saxon contexts. His translators have interpreted the word \textit{forcipes} in an informed way, since Theophilus is clearly talking about the full range of tongs, pliers and

\textsuperscript{101} Hinton, \textit{A Smith in Lindsey}, p. 37 and figs. 22, 24H.
\textsuperscript{102} \textit{Ibid.}, p. 34 and figs. 22, 24F, G.
\textsuperscript{103} Hawthorne and Smith, \textit{Theophilus}, p. 86.
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Fig. 8. Plain and locking tongs. Left to right: Tattersall Thorpe; Hovgårdsberg; Staraja Ladoga. Longest tongs 22cm.

tweezers. Müller-Wille suggested that tongs below 30cm in length are most likely to have been used by a fine metalworker,\footnote{Müller-Wille, ‘Der Frühmittelalterliche Schmied im Spiegel skandinavischer Grabfunde’, p. 153.} which, given the small hearths at which the tongs are likely to have been used, is a reasonable hypothesis. One of the reasons for longer tongs is to be able to work further away from the heat of the hearth. At the ironworking site at Ramsbury, Wiltshire, however, which was occupied from the eighth century onwards, two broken pairs of tongs were found of which the most complete set are only about 18.5cm in length.\footnote{V. I. Evison, ‘Iron Finds’, in J. Haslam, L. Biek and R. F. Tylecote, ‘A Middle Saxon Iron Smelting Site at Ramsbury, Wiltshire’, \textit{Medieval Archaeol} 24 (1980), pp. 1–68: pp. 35–9, esp. p. 37 and fig. 21, 7 and 8.} The other pair measures approximately 14.5cm in its present truncated state, and has shorter jaws than the other set, which might imply that it originally had fairly short handles. This was a site where there was intensive iron smelting and smithing, which is clearly where the use of both these pairs of tongs lay. There was therefore some overlap in the sizes of tongs used by goldsmiths and blacksmiths – or it may
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be evidence of goldsmiths making use of blacksmithing facilities when necessary, as we suggested above.

Smaller tongs, such as those found at Tattershall Thorpe, Lincolnshire,\textsuperscript{106} which measure only 22cm long in their broken state, may have been used in the way that pliers are used today: that is the pliers can act as a hand-clamp to hold the piece being worked on, or to bend and shape the metal directly. Their suggested original length (c. 26cm), while quite large, does not rule out their use in fine work. The chunky section, and accurate alignment of the jaws on the Tattershall Thorpe tongs suggests they were used primarily for gripping pieces of metal, rather than moving work around at the hearth. Some of the chunkier tongs, such as these, might also have served to grip and pull metal, for example in pulling strip through a draw-swage. Some larger, heavier tongs have one handle curved back on itself to provide a form of grip, and these could also have been used to pull metal through draw-plates or dies, for which purpose similar tongs are still in use in England and elsewhere, but none have survived from Anglo-Saxon sites.

An interesting pair of tongs was found in grave 115 at Sibertswold, Kent.\textsuperscript{107} Each of the two arms is strongly angled either side of the rivet, an effect which would increase the leverage they applied. None of the other tongs show this feature. Unfortunately, we have only the barest description of the grave contents, and Fairholt’s plate gives no scale, so we are unable to draw any firm conclusions about them.

Theophilus described a ‘medium-sized’ pair of locking tongs, used for holding anything that has to be filed. Hawthorn and Smith reconstructed this as having a separate plate with a number of holes drilled in it, through which the ends of the tongs can be passed, according to the thickness of the work being held.\textsuperscript{108} Such tongs rely on one at least of the handles being thin enough to flex slightly. A small pair of well preserved iron tongs, recently discovered in an early ninth-century context at Flixborough, Lincolnshire has a similar locking plate attached to the end of one of the handles by a loose rivet (see pl. 6).\textsuperscript{109} These would be eminently useful as a hand-clamp, for holding small items of metalwork during such operations as filing or forging. No other examples are known from England, but a similar sized pair was found in the Vendel-period goldsmith’s grave at Hovgårdsberg, Sweden.\textsuperscript{110} Larger examples are known from the mid-eighth-century Scandinavian trading centre at Staraja Ladoga, Russia.\textsuperscript{111} A number of iron plates with a few rather large holes in them have been found at several

\textsuperscript{106} Hinton, \textit{A Smith in Lindsey}, p. 24, and figs. 15, 16.
\textsuperscript{107} Faussett, \textit{Inventorium Sepulchrale}, pl. XV, 29.
\textsuperscript{108} Hawthorne and Smith, \textit{Theophilus}, p. 67.
\textsuperscript{109} Find no. FLX 89 12169, context no. 3758.
\textsuperscript{110} B. Arrehnus, ‘Ein Goldschmiedegrab von Hovgårdsberg’, see fig. 11 and especially fig. 12 for a reconstruction.
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Plate 6. Flixborough, Lincolnshire, locking tongs, FLX 12169. Max. length 16.2cm.

continental sites, which have been variously interpreted as draw-plates (see below) or as nail-irons.\(^{112}\) It is possible that they may in some cases be the locking plates from such tongs or pliers. A heavily corroded plate 10cm long, with a groove down one side and pierced by at least five holes, was found corroded to the shears in the Tattershall Thorpe hoard.\(^{113}\) This may well be such a plate, but the tongs from the same site apparently have rectangular ends (see above), and thus are unlikely to have fitted into these holes.

The majority of tongs found away from England are quite large, and are most likely to have been used in heavy smithing. A few, however, such as the smaller ones from the tenth century hoard at Bygland, Norway (16cm long)\(^{114}\) and those from the eighth- to tenth-century site at Mahee Island, Co. Down (14.7cm long)\(^{115}\) would be suitable for much more delicate work, and may have been used as pliers.

Tweezers

Fine goldsmithing often requires the movement of small, often hot components, and tweezers perform this task admirably. Theophilus describes ‘very small tongs joined together at one end and slender at the other, for arranging beads and any other tiny things’.\(^{116}\) These are clearly tweezers. They can be used in a variety of circumstances, but the essence of

\(^{112}\) Hawthorne and Smith, *Theophilus*, p. 92 and pl. VI; Arwidsson and Berg, *The Mästermyr Find*, p. 16, figs. 23, 86.


\(^{116}\) Hawthorne and Smith, *Theophilus*, p. 87.
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their use is to pick up small items. A large number of tweezers survive from occupation sites and graves. Because of their decorative nature, and because they are often personal items from graves, they are usually interpreted as items of toiletry equipment. In addition, these tweezers are normally of copper alloy, which is a very good conductor of heat, so they are not well suited to handling hot items. The iron object described as ‘clips’ in the Tattersall Thorpe grave, which measures 30cm in length, are, however, ideal as tweezers for a goldsmith working at a small hearth. In any case, they are very easy to make, and it was the tradition until well into this century for apprentices in all kinds of crafts to make their own tools.

Files/needle files

Files are used to remove material from an object by abrasion. Theophilus described the making of files but was vague about their shapes, sizes and uses. Heavy shaping is done with large, coarse files, while smaller adjustments are made with finer-toothed files. Such files, often called needle files, are used for delicate work in small or awkward locations. The presence of needle files can be taken as a good indicator of fine work taking place. Large files can be used for fine work, but small ones are of little use for coarse work. It should be remembered, of course, that files can be used on materials other than metal, such as bone, horn, ivory and wood.

One of the three files found in the Tattershall Thorpe tool-hoard is certainly a needle file. It is c. 3.7cm long by 0.5cm wide, the width being the defining feature. These tools are such small items that heavily corroded examples could very easily have been overlooked in earlier excavations on other sites. A similar needle file from Hovgårdsberg, Sweden is described by Arrhenius. Two more small files, with a working length of about 6cm have been found at Flixborough in an early ninth-century dump. While these are not needle files in the modern sense, they are small, with apparently fine teeth, and could only have been used for fine work. The few other files we have are mainly from Anglo-Scandinavian contexts at York. Three small files were found at Coppergate, the only complete one of which has rather sparse teeth, and was probably for use on bone or horn. The other two are broken but the smallest, which is only 13.3cm long and

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118 Hinton, A Smith in Lindsey, p. 26 and figs. 15, 17.
119 See Untracht, Traditional Jewellery of India, pls. 647 and 710, for illustrations of jewellers from Gujarat and Rajasthan using long tweezers at small-scale hearths.
120 Hawthorne and Smith, Theophilus, p. 93.
121 Hinton, A Smith in Lindsey, p. 34, and figs. 24C, D, E.
123 Ottaway, Anglo-Scandinavian Ironwork from Coppergate, pp. 521–3, fig. 200, nos. 2246–8; pl. XXXVII.
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0.3cm wide is clearly part of a needle file. This was found in a mid-ninth- to early-tenth-century context. Another similar file at Fishergate, York, came from an eleventh- to twelfth-century ditch. It is again of rectangular section, and in its broken state is 9cm long. A larger file came from the Anglo-Saxon settlement at Thetford to which, unfortunately, no precise dating can be attached. This is 21cm long, and has a rectangular section of 1cm by 0.6cm. A slim, rectangular-section file such as this could be used for a wide variety of purposes, but would certainly be of value to any goldsmith. Most of these files could easily have been fitted with a wooden handle, and the last two examples have suitable tangs for handles to be fitted.

Shears or tinsnips (fig. 9)

Shears, or tinsnips, are used for cutting sheet metal. They have two blades, pivoted together, and work with a shearing action in the same way as scissors. Theophilus only mentions shears in passing, and does not describe them. The type of one-piece sprung shears used for sheep-shearing or cloth finishing, of which many Anglo-Saxon examples survive, are not robust enough to cut through any but the thinnest and softest metal. The longer the handles on the shears, the more leverage may be applied, and thus thicker sheet can be cut. They would probably not be used for cutting wire, since this tends to force the blades apart, rendering them ineffective for cutting sheet.

Shears are relatively rare finds anywhere in northern Europe during our period, and show considerable variation in form and size. A set of shears was found in the hoard from Tattershall Thorpe. These are 18.3cm long, and this small size means they could only have been used to cut relatively thin (c. 1.5mm) silver, copper or gold. They are also asymmetrical, like most modern scissors, which makes it easier to cut across larger metal sheets. The only other shears so far discovered were found on the Anglo-Scandinavian site at Coppergate, York. These are a symmetrical set, even smaller than those from Tattershall Thorpe, being only 10.5cm long, and are clearly designed for small-scale work. Shears have been found in other contemporary, or near contemporary, tool hoards and in other contexts. A slightly larger set of shears, 21cm long, were found in the Merovingian graveyard at Hérouvillette in Normandy. A much larger set, 46cm long, formed part of the Mästermyr hoard. Both these last are asymmetrical.

124 Rogers, *Anglian and Other Finds from 46–54 Fishergate*, pp. 1242–3, fig. 613, no. 4941.
127 Ottaway, ‘Anglo-Scandinavian Ironwork from Coppergate’, p. 523, fig. 201, no. 2249.
128 Decaens, ‘Un Nouveau Cimetière du Haut Moyen Age’, fig. 19, B3.
129 Arwidsson and Berg, *The Mästermyr Find*, pl. 6; pl. 22, no. 45.
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Fig. 9. Shears. Left to right: Tattersall Thorpe; Coppergate, York; Mästermyr. Longest shears c. 46cm. Mästermyr shown at 1/2 of the scale of the others.

Dividers/callipers (fig. 10)

We are really concerned here with dividers in the modern sense – adjustable two-armed implements capable of scribing circles and arcs on to a metal surface. They would be used to lay out designs directly on to the metal, or other materials such as bone or stone ‘trial pieces’. They are only briefly mentioned by Theophilus. A great deal of Anglo-Saxon decorative design work is based on the circle, so dividers would play a vital role in the early stages of the goldsmith’s work. To draw a circle on metal, it is necessary to punch a small dent at the centre, into which one leg of the dividers can be placed. Such a dent can clearly be seen on, for example, the composite brooch, Faversham (28, pl. 7). There seem to be no Anglo-Saxon dividers left to us, but what are possibly parts of three survive from a seventh/eighth-century context at Garryduff, Co. Cork. These are all approximately 9cm in length, flat, with a hole drilled in one end, and a pointed tang end at the other.

130 Hawthorne and Smith, Theophilus, p. 93.
131 O’Kelly ‘Two Ring-forts at Garryduff’, fig. 4, nos. 7, 95 and 581.
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Fig. 10. Dividers. Left two from Dunadd; right two from Garryduff. Max. length 9cm.

Plate 7. Faversham, Kent (28), composite disc-brooch.
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They were probably riveted together in pairs. There is no reason to doubt O’Kelly’s identification. The Dalriadic site at Dunadd has also produced an object which has been tentatively identified as dividers or shears.132

Cold chisels

These are sharp-edged punches, used to cut metal on the flat of an anvil or stake, or on a sheet of lead or a flat stone, and are often used on hot metal, particularly in blacksmithing applications. They would be used to cut thick wire and bar, and if sharpened well, they will cut thin gold and silver wire very cleanly. Chisels were also used to cut sheet metal crudely and quickly, and from personal observation this appears to be the case on some items from the Cuerdale Hoard, which show a deformation of the edges which is different from that obtained from shears (which pull one edge down) or a saw (which gives a clean cut). The characteristic trace of the cold chisel is that it pushes the metal to either side to form walls, in a manner similar to the use of the punch for chasing. This wall or edge remains, even when the metal is cut completely through. The quality of this edge on the Cuerdale items suggests that the cutting might have been done when the silver was red-hot. This would make the cutting easier, since silver is extremely soft when heated to red heat. A small chisel from Anglian Fishergate in the eighth century is about 5cm long, and about 1cm by 0.7cm in section at the heaviest end.133 This could only have been used on cold metals or possibly on very small masses of hot metal since radiated heat would otherwise have caused discomfort to the goldsmith. Another example from late tenth- to early to mid eleventh-century York is even smaller, and could only have been used on small sections of cold, non-ferrous metals.134

Saws

Saws were certainly in use by the Anglo-Saxons to cut skeletal materials such as bone and antler as well as wood.135 None appear to be known from Britain but a small, fine-toothed saw was found among the tools from Mästermyr.136 This closely resembles a modern hacksaw, but is only 24cm long, which indicates that it was only for light uses (if indeed it was used on metal). The blade is about 10mm wide, so it would only cut in approximately straight lines – curves would be very difficult to achieve. Hacksaws would be most useful for cutting off lengths of bar.

132 Lane and Campbell, Dunadd, p. 164 and fig. 4.71, no. 427.
133 Rogers, Anglian and Other Finds from 46-54 Fishergate, p1, 242, fig. 613, no. 4939.
134 Ottaway, ‘Anglo-Scandinavian Ironwork from Coppergate’, p. 531, fig. 200, no. 2245.
135 A. MacGregor, Bone Antler, Ivory and Horn: the Technology of Skeletal Materials since the Roman Period (Beckenham, 1984), pp. 55–8 and fig. 31.
136 Arwidsson and Berg, The Mästermyr Find, pls. 7 and 22.
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Fig. 11. Antler clamps. Left and centre: two plates, possibly from the same clamp, from Coppergate, York; right: proposed reconstruction, in section.

Clamps (fig. 11)

Theophilus mentions clamps very briefly in passing, but these seem to be simple clips, made as and when needed. More sophisticated clamps of antler have been found in Anglo-Scandinavian contexts at York,\(^{137}\) and in Scandinavia itself at Hedeby (Jutland).\(^{138}\) These comprise two identical pieces of antler of D-shaped section, thickest at the centre where they are held together by an iron rivet. One end of each element tapers towards the tip, while the other has the inner edges spreading apart. It seems certain that the rivet would originally have been loose, which would allow the two halves to move. A wedge (probably wood) would have fitted between the broad ends, allowing a small item to be clamped at the narrow end. A clamp made of iron was also found at Hedeby, so it is not impossible that clamps of this material were known in Anglo-Saxon England as well. All these examples are quite small, those mentioned being between 9 and 10.3cm in length, and could thus only have been used for fine work. Similar clamps are used by jewellers today to hold small items while working them. These are of wood, a steel ring rather than a rivet being used to hold them together under pressure from the wedge. They measure c. 16cm long by 3cm wide and are most frequently used to hold small

\(^{137}\) A. MacGregor, A. Mainman and N. S. H. Rogers, Bone, Antler, Ivory and Horn from Anglo-Scandinavian and Medieval York, Archaeology of York 17/12 (London, 1999), fig. 953.

\(^{138}\) MacGregor, Bone, Antler, Ivory and Horn: the Technology of Skeletal Materials, pp. 171–72, fig. 91.
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items of jewellery, such as rings, during filing and stone setting and similar operations (pl. 24).

Draw-plates and related tools

Modern draw-plates are iron or steel plates, normally about 0.5cm thick, perforated by a series of tapered holes of graduated sizes. Wire is drawn through the holes successively from the largest to the smallest, with the aid of a lubricant which will act under pressure, such as tallow or beeswax. This reduces the wire in thickness, and evens out or alters its section. Theophilus describes draw-plates, but does not explain how they are used.\textsuperscript{139} Interestingly, he describes the draw-plates as being ‘narrow at the top and bottom’. If he means at each end, then this matches some finds sometimes interpreted as draw-plates, for example one from Bygland, Norway.\textsuperscript{140} There are also later illustrations of such draw-plates, as for example in the 1576 engraving of a silversmith’s workshop by Stephanus in the British Museum (pl. 32)\textsuperscript{141} Some other potential draw-plates have a long tapered spike at one end, which may well have been driven into a substantial piece of wood to anchor them in use. Examples come from Birka, Sweden and Bygland, Norway.\textsuperscript{142}

No indisputable draw-plates have been identified from Anglo-Saxon contexts, but the possibility that the plate from Tattershall Thorpe, discussed under tongs and pliers above, might be a draw-plate has been discussed extensively by Whitfield.\textsuperscript{143} This is a length of thick steel, about $11.4 \times 1.4 \times 0.6$ cm, through which at least five quite large holes have been made. Whitfield pointed out that, although filled with corrosion when she was writing, the holes appeared to be too large for wire to be drawn through them manually. Now that it has been cleaned this can be seen to be true. Two of the holes are c. 4mm, and two others 3mm and 1mm in diameter and only the smallest would be suitable for hand-drawing. A number of similar plates have been found at sites in northern Europe and have been variously described as nail-irons or draw-plates. In view of the size of the holes, and the very coarse (or non-existent) graduation in size, none of them is likely to have been a draw-plate, however. Wire of more than about 3mm diameter needs more than normal strength to pull it through a draw-plate. The process also requires very gradual reduction in size from one hole to the next – as little as 0.1mm on a modern draw-plate in the 2mm range. Furthermore, the holes must be tapered or the extrusion process does not work.

\textsuperscript{139} Hawthorn and Smith, Theophilus, p. 87.
\textsuperscript{140} Graham-Campbell, Viking Artefacts, cat. 414, gg.
\textsuperscript{141} Hawthorn and Smith, Theophilus, pl. IV.
\textsuperscript{142} Graham-Campbell, Viking Artefacts, cat. 414, 000.
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A nail-iron is used to form a flat head on a short, tapered length of thin iron bar, to turn it into a nail. The rod is pushed through one of the holes until its taper causes it to jam, and the head is formed by hammering. This remains a possible identification. There is a groove down the centre of one side on many of the plates under consideration here, however, the purpose of which, for any of the functions discussed, is at present unclear. The possibility that some of these may be part of locking tongs has been discussed above under ‘Tongs and Pliers’. Some of them are tapered at one end, and if they were part of locking tongs, this would be a useful adjunct, since they could be driven into a solid tree-trunk or a wooden bench, in which case they would act almost as a ‘third hand’. A more plausible explanation of their use, however, is offered by Whitfield, who suggested that, when driven point first into a wooden base, they could be used to cut wire and rod, in conjunction with a chisel. The wire to be cut would be pushed through one of the holes, which would support its section. This would enable the smith to cut the wire, by means of a sharp chisel, with less distortion than on an anvil or stone block.

What appears to be a true draw-plate, now dated to the mid eighth century, comes from Staraja Ladoga. This rather thin plate, which measures 11.0 × 2.0 × 0.1cm, contains seventy eight holes ranging from 2mm to 0.2mm in diameter which is more holes than are strictly necessary for this kind of reduction. Nothing comparable to this appears to have been found in Anglo-Saxon contexts, or indeed in any contemporary context within the British Isles. Another plate, from the Black Earth area at Birka, measures only 9.0 × 0.7 × 0.35cm. This has only seven tapered holes in it, which are all lined with softer metal; unfortunately, the corrosion is too far advanced to allow the diameters to be measured. This is an even more sophisticated tool than at first appears, since it is made of seven laminated layers of iron. Duczko believed both of these to be true draw-plates, and illustrated them side by side.\(^{144}\)

Scales

Scales had not been found in conjunction with a smith or a smithing area, until the discoveries at Tattersall Thorpe, where two balance pans and a possible weight were among the finds.\(^{145}\) A goldsmith would have needed to weigh quantities of precious metal, but so would their patrons, moneyers and merchants, therefore their discovery does not necessarily identify a goldsmith.\(^{146}\)


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Touchstones

Touchstones, like scales, are not exclusive to the goldsmith, though they would obviously be very useful to him and his patrons. They are stones chosen for their fine abrasive qualities, and are used to test the quality of gold. Gold is scraped on the stone, and this is compared to a scraping of gold of known quality.147

‘Missing’ tools

Sometimes the skill level demonstrated by the Anglo-Saxon goldsmith and his contemporaries seems almost beyond explanation on the available evidence. The extreme fineness and detail evident on much Anglo-Saxon metalwork make a strong impression on anybody who studies it. For example, while there are always people with exceptional eyesight, one cannot avoid the conclusion that, for some techniques, some means of magnification would have been at least useful. To take a simple example, the making and testing of the dies used in the manufacture of the fine waffle patterns on the foils which back most garnets would have been made much easier if a lens were available. Lenses in the form of spectacles, however, do not seem to have been invented until the thirteenth century.148 These were made of glass, but rock crystal is often extremely clear, and was cut and polished from ancient times. A number of rock crystal spheres survive from Anglo-Saxon graves, such as that from Sarre, grave 4.149 Spheres are themselves lenses, although of little use in this connection, and the technology of making them is much the same as that for making useful lenses, which makes their existence at least theoretically possible. Any stone cutter who made any kind of cabochon out of a transparent or semi-transparent stone could hardly fail to notice its optical properties. The recent identification of some possible lenses in tenth-century Scandinavia may indicate that magnification was possible, although we await further details.150 Nothing resembling a lens has yet been identified from an Anglo-Saxon context, but a lens would be a useful tool for a goldsmith and, perhaps like the best tools, would probably pass to another goldsmith on the death of the original owner. In this way, they could have continued in use for a considerable period. Damage would inevitably occur, but the lens

148 D. C. Davidson, Spectacles, Lorgnettes and Monocles (Aylesbury, no date), p. 3.
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would continue to be effective even when broken. Perhaps, if any existed, they were used until there was nothing left.

Another explanation, however, might be that some goldsmiths suffered from extreme myopia, which would enable them to focus very closely and, in effect, magnify fine details. They may alternatively have used some kind of simple reduction machine, such as that proposed by Meeks and Holmes for producing the dies that impressed the waffle patterns onto the gold foils which were set behind garnets in cloisonné work, although this would have limited uses.\footnote{N. D. Meeks and R. Holmes, ‘The Sutton Hoo Garnet Jewellery: an Examination of Some Gold Backing Foils and a Study of their Possible Manufacturing Techniques’, \textit{Anglo-Saxon Stud Archaeol Hist} 4 (1985), pp. 143–57.}

Another example of a tool, without which modern jewellers and goldsmiths would find it difficult to replicate some of the fine Anglo-Saxon work, is some form of vice. There seems to be no evidence for the development of the screw needed for such a device in the pre-Conquest period. The evidence for clamps was noted above, but screws would be useful in operating a draw-swage (see p. 120), and for holding small stakes, for example. The chapters on decorative techniques (chapters 4 and 5) leave us with many unanswered questions concerning tools. For example, we have found no evidence of the scrapers which would be needed for one of the two most likely techniques for producing reeded strip, nor any firm evidence for the draw-swage which would have been needed for the alternative method, although we are able to show how both could have been made (pp. 118–25). Rather more puzzling is how the stamps for impressing gold foil could have been made (pp. 141–3). If such tools, or reasonable substitutes for them were really not available, then the modern jeweller and fine metalworker can only admire his predecessor’s ingenuity in finding ways around their lack.
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Manufacturing Techniques

TAKing the Anglo-Saxon period as a whole, the goldsmiths had an extraordinary range of sophisticated manufacturing and decorative processes at their disposal. Some of these were known in Roman times and before, and some of them have continued in use up to the present day. The archaeological evidence for some of these processes is very clear, but for many of the rest, we need to deduce their use from the products themselves. For the purposes of this book, manufacturing and decorative techniques are dealt with in separate chapters. This division is not always clear-cut, but we feel it is helpful in dealing with such a large vocabulary of skills.

CASTING

Casting is a vital part of the repertoire of skills used by the Anglo-Saxon goldsmith, but it will be seen that the evidence we have remains somewhat enigmatic. There is a range of evidence in the form of crucibles and ingot moulds, but the moulds used to cast the objects remain exceptionally scarce, even on the known workshop sites. It is too broad a generalisation to say that every piece of metalwork starts life as a casting, but this is close to the truth, and must certainly have been the case in Anglo-Saxon England. Whatever the goldsmith intended to make, he must first have cast the metal into a convenient form, as close to the final design as possible. If rod or wire was to be made, then the metal would have been cast into a simple open mould, in order to produce a convenient ingot for hammering out. If a small amount of sheet was required, the metal would only need to be melted into a globule, which could then be hammered out on a stake or anvil. The very few remaining examples of Anglo-Saxon hollow ware such as the Ormside Bowl (60, pl. II a and b), Trewiddle chalice (80), and the Hexham chalice (40), would need larger areas of sheet, but they offer no clues as to how the sheet was originally made. The most likely method would be to cast the metal into a thick disc, using a temporary mould, and then hammer it out to the required thickness. This was common practice in more recent times, before rolled sheet became available. Theophilus appears to have used an iron mould to

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Manufacturing techniques

cast the basic billet from which sheet was hammered, as part of the process of making a silver chalice.\textsuperscript{1} It is possible that some hollow vessels were cast in their final form, leaving only the surface to be cleaned up afterwards. This should be compared to the treatment of more complex forms which would have been cast into carefully constructed moulds in order to produce objects which needed as little finishing as possible (see below). In his study of Viking-age bowls from Gotland, Trotzig showed that microscopic analysis of sections of the metal will reveal crystal structures which enable us to distinguish between a cast and lightly finished object and one hammered from a billet.\textsuperscript{2} The technique is a destructive one, and no analysis of this type has been carried out on the Anglo-Saxon vessels. The fact that the Ormside Bowl (60) is double-skinned, however, makes it probable that both layers were hammered from sheet.

Where evidence of fine metalwork has been found, analysis can often tell us what metal has been melted in a crucible, or cast into a mould, and in the vast majority of cases, copper alloy has been shown to be the metal involved. We do have crucibles in which gold was melted, for example the tenth century find at Faccombe,\textsuperscript{3} and also from the tenth to eleventh centuries at Cheddar where silver was also melted.\textsuperscript{4} Silver was melted at five sites within eighth-century Hamwic,\textsuperscript{5} and at Hartlepool in the seventh to eighth centuries.\textsuperscript{6} The practicalities of casting are essentially the same whether one is casting gold, silver or a copper alloy. This could, in truth, be said of the majority of metal-working processes which will be discussed here, and where we only have evidence for a technique being used with copper alloy, it is usually safe to assume that the same could be done with silver or gold. There are a few exceptions to this, such as the various methods of soldering, and where these differences occur, attention will be drawn to them.

The basic principle of casting is very straightforward: molten metal is poured into a prepared mould which is a negative of the desired form. The cooled metal is removed from the mould, and can then be worked on further, if necessary. In order to do this simple thing, the goldsmith needed some fairly sophisticated understanding. Firstly, the melting points of copper, silver and gold – 1083°C, 960.5°C and 1063°C respectively – are higher than those achievable in an unassisted fire, even a charcoal hearth such as those for which we have evidence. To reach such temperatures, it is

\textsuperscript{1} Hawthorne and Smith, Theophilus, III, 25, p. 99.
\textsuperscript{2} G. Trotzig, Craftsmanship and Function (Stockholm, 1991), pp. 37, 46–7.
\textsuperscript{3} Fairbrother, Faccombe Netherton, p. 263.
\textsuperscript{4} Rahtz, The Saxon and Medieval Palaces at Cheddar, p. 253.
necessary to increase the amount of oxygen available, and this was done by using bellows, a blowpipe, or other simple means.

Hearth's and bellows have been discussed in the previous chapter, but it is worth reiterating that it is not necessary to have a large or sophisticated hearth to reach the temperatures required. While some items of jewellery are relatively large, it is very unusual for any single component to be of any size, and so only small amounts of metal were normally required to be melted. The Taplow buckle (79, pl. 1a) and the great gold buckle from Sutton Hoo (74), both dated to the late sixth to the early seventh centuries, embody the largest single gold castings of any surviving Anglo-Saxon jewellery. They also represent two of the very few castings of any kind in gold. The extremely economical use of gold is a feature of much of the surviving jewellery of the Anglo-Saxon period, as evidenced by the prevalence of gilding, and, as cast objects normally use more metal than fabricated ones, these two buckles must have represented enormous wealth in their own right. The evidence for the casting of silver is far more common, and we have numerous examples for study throughout the period, such as some of the great square-headed brooches, the back-plates of plated disc-brooches, the loops and tongue-plates of buckles, and some of the richer strap-ends.

Crucibles (fig. 12)

The Crucibles in which the metal was melted had to be tough enough to withstand both the heat of the hearth, and being picked up with tongs while containing the molten metal without cracking. We are fortunate that many fragments of crucibles, and some complete examples, have survived to us. Indeed, they are by far the most frequently recognised evidence for fine metalworking. Early crucibles were not wheel-thrown, and were probably made as and when needed from the locally available clay, mixed with quartz to improve its ability to withstand the high temperatures. At Ribe, in Denmark, crucibles were found to be made of sand, held together with clay. This implies a very loose and crumbly material with which to work, but the simple shapes of crucibles would still be achievable with care and, of course, once fired, the crucible would be much more robust. At the fifth- to sixth-century site at Helgö in Sweden, the clay, which was probably local, was mixed with 10 to 60% of finely divided quartz which appears to have been ground up for the purpose. It may well be that some crucibles were made of untempered clay, and were

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![Illustration of manufacturing techniques](image)

Fig. 12. Crucibles. Top four, clockwise from top left: Thetford (10th/11th century); Southampton (8th/9th century); Flaxengate, Lincoln (late 10th/11th century); Coppergate, York (10th/11th century). Lower three, clockwise from left: Wharram Percy (8th century); Hartlepool – part of a crucible lid, and a plain dish; both c. 700. Maximum diameter 6cm.

then coated with the quartz dust, perhaps by rolling the finished shape, still damp, in the powder.\(^{10}\)

Anglo-Saxon examples of these simple handmade crucibles have very rarely been dated to much before AD 700, but thereafter they are much more frequent, especially in the late Anglo-Saxon and early post-Conquest periods, when wheel-thrown Stamford-ware crucibles became available in

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addition to those that were hand-made locally. Stamford-ware crucibles were used over a considerable area, from London to Lincoln and York. The clay from which they are made is an almost ideal material for the purpose.\(^\text{11}\)

The variety of crucible forms developed during the period was perhaps a reflection of regional traditions, or the personal preferences of the goldsmiths. Analysis has shown that at some sites outside England, such as Dunadd, there was at least a preference for one type of crucible over others, for melting precious metals.\(^\text{12}\) A form which has a lug on the back, top or side, to facilitate handling with tongs, is represented by a fragmentary example from the seventh- to eighth-century site at Hartlepool, where it had been used to melt silver.\(^\text{13}\)

While there were many different forms, however, they were usually small (often tiny), deep in relation to rim diameter, and round bottomed (see fig. 12). The form of these crucibles is a result of practical necessity. They are usually thick-walled, so that even at high temperature they are able to stand up to being moved around with tongs while holding the weight of the molten metal. They are deep because this will retain the heat better, reduce the surface area of the molten metal and thus reduce the amount of oxidation which can take place with silver and copper. Even though the heating of the metal takes place in the reducing atmosphere of a charcoal hearth, once the crucible is lifted out of the fire to pour the metal into the mould, oxidation could take place. The deep form helps to protect the metal from accidental cold draughts, while retaining the reducing atmosphere provided by the burning charcoal. This is important because silver, in particular, is very prone to absorbing oxygen while molten, which gives a porous casting if allowed to persist.

Crucibles are small because gold and silver were almost always melted in small quantities, and a small compact shape makes it easier to melt the metal. They have rounded bottoms because they would be heated in charcoal hearths, and this feature would make them more stable when resting amongst the fragmented charcoal. A late tenth- to early eleventh-century thimble-shaped example from Coppergate is only 2.4cm in diameter by 3.8cm deep, while an eleventh- to twelfth-century bag-shaped one from Flaxengate, Lincoln is approximately 8cm deep, with the same diameter at the belly.\(^\text{14}\)

A very small number of sites have produced fragments of lidded crucibles, one example of which has already been mentioned, that from Hartlepool. Another advantage of these small, deep forms is that they make it easier to keep the metal molten during the all-important transfer of the crucible from

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the melting hearth to the mould. An open form is much more likely to allow the metal to solidify too early. The efficiency of such crucibles was shown by McFadyen.\textsuperscript{15} His experimental crucibles were modelled on sixth-century examples from Helgö in southern Sweden, where they were used for copper alloys, gold, and a few for silver.\textsuperscript{16} The compact shape and enclosed form made it a relatively easy task to melt silver, using the simplest of charcoal hearths and a pair of bellows. It was not necessary to use any flux to protect the molten surface, which remained bright and oxide-free inside the crucible.

Moulds

Evidence for the casting of non-ferrous metals in the form of moulds or fragments of moulds is, as we have seen in chapter 2, extremely scarce in Anglo-Saxon England. This is in stark contrast to such British and Irish production sites as Dunadd, Dinas Powys and Moynagh Lough, and Scandinavian sites such as Helgö and Ribe. The evidence of the surviving Anglo-Saxon objects, however, is that fine casting was in use from the earliest times through to the Conquest, and at certain periods would seem to have been done in relatively large quantities.

The casting process requires some kind of mould into which the metal can be poured. For simple open moulds like ingot moulds, stone of some kind was usually used (fig. 4). To cast an ingot, all that is needed is a simple groove of an appropriate profile cut into a heat-resistant material. Where the surfaces of Anglo-Saxon ingot moulds have been analysed before washing – as for instance at York and Lincoln – good results have been obtained, and at these sites the majority had been used to cast silver.\textsuperscript{17} It is a simple matter to cast into such a mould; the metal is melted in a crucible, which is then held with tongs and the metal poured into the mould. The skill lies in the rapidity and smoothness with which the whole operation is carried out. If too long is taken between hearth and mould, the metal may chill too soon. If the metal is poured into the mould too rapidly, splashing will result. Modern ingot moulds are of cast steel and Theophilus, although discussing the casting of a blank to be hammered into sheet rather than for rod, briefly describes the use of an iron ingot mould.\textsuperscript{18} He says the mould should be heated on the fire, and then dressed with melted wax. Modern practice is to coat the mould with lubricating oil, which helps prevent the cast metal adhering to it. Heating the mould aids the flow of the metal by keeping it liquid for a little longer.

\textsuperscript{15} McFadyen, ‘Aspects of the Production of Early Anglo-Saxon Cloisonné Garnet Jewellery’, pp. 41–58.


\textsuperscript{17} Bayley, Non-ferrous Metalworking in England, p. 79.

\textsuperscript{18} Hawthorne and Smith, Theophilus, p. 99.
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Fig. 13. Basic mould construction. (1) Model pressed face down into pad of clay. (2) Second pad of clay pressed over top of model. (3) Model removed, in-gate made, and mould ready to be dried, fired and cast.

There is a limit to the fineness of detail and form which is obtainable from this kind of mould. The surface tension of molten gold or silver is very strong, the effects of which increase in inverse proportion to the mass of metal. Small amounts of cast metal are, therefore, unlikely to fill an open mould properly, but if there is a sufficient weight of metal, then a good clear casting can be obtained. A closed mould overcomes this problem fairly well, as it then becomes possible to have a reservoir of molten metal above the entrance (technically known as an in-gate) supplying both pressure and extra metal to top up the mould while the metal cools and shrinks. Additional advantages are gained in the slower cooling of the metal, and an enclosed atmosphere in the mould.

For more complicated shapes therefore, such as buckle loops, strap-ends and brooches, moulds in two or more parts were made. Such moulds were used from Roman times onwards, and were very widely used in early medieval Europe, but the evidence is very slight in early Anglo-Saxon contexts – a two-part mould for a great square-headed brooch of the sixth or seventh century from Mucking, in Essex.¹⁹ There are a few more

¹⁹ Webster, ‘The Brooch Mould’, pp. 62–3. See also a possibly Anglo-Saxon buckle mould from Dunadd in the discussion of models below.
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examples from later in the period, but moulds with recognisable impressions remain very scarce (pp. 37–8 and pl. 3).

The making of two-part moulds from models (see below) is relatively simple in concept, and has been frequently described (fig. 13).\(^{20}\) The basic clay used for moulds is likely to be the same as that employed for the crucibles, except in cases where imported Stamford-ware crucibles were in use. The clay for moulds needs to be finer than that for crucibles, however, in order to give sharper definition to the casting, so the clay is likely to have fewer additions. Having prepared a flat pad of suitable clay, the model, which has been sooted or dusted with finely powdered stone to prevent it sticking, is pressed in, making sure a good clean impression is made. Any ‘dowels’ or other locating devices would be put in at this stage. These are not apparent on the few examples from Anglo-Saxon sites, and were only rarely used at the fifth/sixth-century production site at Helgö in Sweden; registration of the two parts of the mould was achieved by the form of the two inner faces of the valves.\(^{21}\) The clay is than allowed to harden further. The surfaces are then dusted or sooted again, and another pad of soft clay is pressed over the top. The mould is gently eased apart to enable the removal of the model, and is then left to dry. This is by no means an easy operation, and requires much experience and extreme care so as not to distort the mould in any way. A funnel-shaped entry in-gate is necessary to allow the molten metal to reach the inside of the mould, and this could be carved out at this stage, or it could have been made by incorporating a conical piece of hard material in the appropriate place in the mould, which, once removed, would leave the required entry. Mortimer suggested that the mould may have been built up in layers of increasing coarseness.\(^{22}\) Where the model was very finely detailed, this may have been necessary, and it is not impossible that the first layer would have been of liquid clay.

There may be another reason to use piece-moulds, aside from the need to remove the model: at Ribe, the clay from which the moulds were made is very impervious. If moulds were made in one piece, which would be feasible given that wax models seem to have been used there,\(^{23}\) the lack of porosity would have caused imperfections in the casting, as air could be trapped while the metal tried to fill the mould. With a piece mould, the air can escape via the tiny imperfections in the fit between the parts, and the problem is solved.


\(^{21}\) Lamm, ‘Manufacture of Jewellery’, p. 3.


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Although most of the moulds were made to cast single items, there are efficiency gains if groups of small items are cast together in one mould. An eighth-century mould for casting five, possibly six, nail-headed pins was found at Whithorn, in Dumfriesshire;²⁴ and a similar mould, for four pins, comes from the fifth/sixth-century production site at Helgö in Sweden.²⁵

The casting of silver by the investment process, however, is the only small-scale casting method Theophilus deals with, and it would seem that, by the twelfth century, this was the predominant method. It involves the complete enclosure of the model in a single piece of clay. In Theophilus’ version of this technique, the mould is made by covering a wax model in clay, which is then fired to produce a one-piece mould, the wax having melted out in the firing.²⁶ The molten metal is poured in and, once this has solidified, the mould is broken open to extract the casting. This method (also known as ‘lost-wax’ casting) works well and has an ancient history, but the disadvantage is that both the model and the mould are destroyed in the process. All the identifiable Anglo-Saxon mould fragments known to us are from two-part moulds, and we have as yet no firm evidence that the early- to mid-Anglo-Saxon goldsmith was aware of the investment technique. Sites such as Helgö in Sweden have also produced evidence only for the use of piece moulds.

It seems certain, however, that the method was known in the tenth century, as the copper-alloy censer covers from London (52), Canterbury (18) and Pershore (63, pl. 8), for example, could only have been cast by this method. This can be deduced from the fact that they are made from a single piece of metal, which incorporates a considerable amount of fine detail and openwork into a very complex three-dimensional form. Although it is not possible, without an attempt at replication, to say with certainty what material the original model was made from, the quality of modelling of these censers shows many characteristics of a soft material such as wax.²⁷ While lead cannot be ruled out entirely, the nature of this metal makes it more suited to very crisp and sharply detailed work. Adding pieces to the model, such as the tiny animal heads, while not impossible with lead, is much easier with wax. The softness of wax also enables forms of modelling which are far more difficult to achieve in lead, and this is especially clear on the cover from Pershore (63 and pl. 8), where the tiled effect on the gable appears to have been made up of strips of soft wax which had been impressed with a curved tool and then trimmed to form the curved edges of the tiles. Each strip was then applied at a slight angle to the vertical, so

²⁴ P. Hill, Whithorn and St Ninian, p. 401, fig. 10.84.
²⁵ Lamm, ‘Early Medieval Metalworking on Helgö in Central Sweden’, p. 110, fig. 3a.
²⁶ Hawthorne and Smith, Theophilus, pp. 105–6.
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Plate 8. Pershore censer cover (63).

that the second layer appeared to overlap the first, in imitation of roofing tiles. These censer covers are most likely to have been built up on a clay core, over which the wax model was built up bit by bit. This would have given both stability and strength to the model during its making, and would have formed part of the final mould.

Models

As can be seen from the preceding paragraphs, to make the mould for an object of any sophistication, it is necessary to have some kind of model with which to make the impression in the mould. The material from which these models were made, and the casting process in which they were used, have both been the subject of much debate over recent years in both Anglo-Saxon and north-west European contexts.

We have a very small number of Anglo-Saxon lead items, which have been identified as probable models, as well as a few others from neighbouring
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regions. Their use is not yet fully explained, but there are some advantages to using lead as a modelling medium. Lead is easy to cut and impress into, and thus sharply defined detailing can be achieved whereas with wax, as Dickinson has pointed out, the tendency is to produce softer-edged results.28

These lead models themselves begin as castings, but they need only be roughly shaped, since fine detail can be added later. McFadyen devised a very simple method of casting a lead disc from which to make his model, by laying a circular strip of copper on a surface such as the flat top of a stake, and pouring the molten lead into the open shape. There are likely, however, to have been a number of different methods for making lead models, depending on the form of the item to be cast. For example, Mortimer suggested that three objects she identifies as lead models for Early Anglo-Saxon brooches might have been made by cutting sections from cast lead sheet, which were then soldered together in sections, and cleaned up and decorated thereafter.29 She highlighted such difficulties as making the lugs for the pin fittings, which are present on two of the models. A few other models have come to light, including one of an Anglo-Saxon square-headed brooch found, interestingly, at Geneva,30 while another, possibly a mount, of a later date and made of pewter, comes from Huntingdon.31 It is known that jewellery made of lead or pewter was worn in Anglo-Saxon England,32 so it is not always certain whether an object was a model or a finished piece. From outside Anglo-Saxon England, however, comes part of a lead penannular brooch from the fifth to sixth centuries at Dinas Powys.33 This is very unlikely to have been worn as a brooch. Lead is impractical for such brooches, because of the way they were worn: it would simply have bent under pressure from the fold of cloth which is trapped against the pin, so the object must have

32 See A. J. Mainman and N. S. H. Rogers, Craft, Industry and Everyday Life, Archaeology of York 17/14 (London, 2000), pp. 2571–4, for lead-alloy disc-brooches from Coppergate, York. These were clearly not casting models. In one case, for example, the catch-plate had been bent over for use, and the hinge had been drilled to take the pin, neither of which would have been done for a model.
33 L. Alcock, Dinas Powys: an Iron Age, Dark Age and Early Medieval Settlement in Glamorgan (Cardiff, 1963), fig. 23 and pl. VIIB, 1.
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Plate 9. Detail of an experimental lead model by Angus McFadyen.

had some other use, and that it was a model for mould-making is the most likely. This argument is reinforced by the fact that the recesses in the terminal are roughened, as if to take enamel: it is normal practice to enamel on copper, silver or gold (chapter 5), but the melting point of lead is below that of enamel, which would give rather disappointing results if enamelling were attempted.

Although the evidence is rather slender, it does at least strongly suggest that lead models were sometimes made as a stage in the casting of copper alloy, silver and gold objects. In this context, McFadyen’s experiments in the replication of plated disc-brooches of the sixth to seventh centuries are of particular interest.\(^3^4\) The back-plate of these brooches is a circular casting in silver, on to which is riveted a gold plate which holds the cloisonné and central boss (see pls. 15 and IVc).\(^3^5\) The silver back-plate is cast with the lugs for the pin fitting on the reverse, as well as the decorative details on the front. These include the recesses for both the niello panels and the single garnets which border the gold front-plate, plus the sections of beading which decorate the rim. In the course of McFadyen’s tests, beeswax proved very difficult to work accurately, being rather too fragile. It proved to be easy for a skilled carver/engraver to produce the various recesses in lead, pewter and boxwood to a high degree of accuracy. Only lead, however,

\(^{3^4}\) McFadyen, Aspects of the Production of Early Anglo-Saxon Cloisonné Garnet Jewellery, pp. 37–42.

allowed the rows of beads on the rim to be made easily, as a result of the metal’s extreme malleability. They were made by rolling the corner of a square iron bar around the rim of the model while applying pressure, and by this simple means neat and even beads were produced which were indistinguishable from those on the Anglo-Saxon originals (see pl. 9). A lead model is thus clearly indicated in the manufacture of at least this particular form of brooch.

It is possible that the lead models were used in the same way as wax in lost-wax casting; they could have been melted out of the mould before the molten gold or silver was poured in. It is hard to see how this could ever be proved, since any evidence would be destroyed during the process but the idea remains worthy of consideration, particularly in the light of some of the problems with model making discussed above. Lead is far more robust than wax, and this is particularly important, given the most likely method used to make moulds discussed above. In order to make a mould, the model had to be pressed into the clay, and in the case of some of the more attenuated forms such as the square-headed brooches, beeswax (the only wax likely to be available) would probably not have the strength required to maintain its integrity under the pressure needed.

No models of any kind were found at the major production site at Helgö, Sweden, however, which produced hundreds of mould fragments, and for this reason Lamm posited the use of wax models in connection with the two-piece moulds found there.\(^\text{36}\) The ninth-century production site at Ribe in Denmark provides evidence for production of wax models in the making of Berdal-type brooches.\(^\text{37}\) Brinch-Madsen’s hypothesis is that these were built up of layers of wax on a ‘loam’ matrix. A layer of cloth was incorporated in the last layer or two, which would have strengthened the model, but would allow it to flex enough to be removed from the clay mould at the next stage. This appears to be evidence of a recognition of the fragility of wax models.

We have no concrete Anglo-Saxon evidence for wax models until the Late Saxon lost-wax objects such as the censers mentioned above (but see discussion of the Sutton Hoo (74) buckle below). Both Leigh and Mortimer, basing their conclusions on practical experiments by Taylor, favoured the use of wax models for early cast brooches.\(^\text{38}\) Mortimer supported this view with her observation of ‘smoothing marks’ on the backs of some cruciform brooches, which indicated the possible removal of excess wax in order to reduce the weight of the cast brooch.\(^\text{39}\)

\(^\text{37}\) Brinch-Madsen, Metal Casting Techniques, pp. 15–189.
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Dickinson also favoured the use of wax models for the production of fifth- to early eighth-century saucer brooch moulds, rather than the alternatives of bronze, bone and wood.\(^{40}\) She was concerned, in part, to use technical differences as a discriminant in her classification of this abundant brooch form, and postulated the use of a lathe to produce the circular basis of the form. Lathes are known to have been in use by the date these brooches were in production.\(^{41}\) It should be noted, however, that a good craftsman would be perfectly capable of producing a circular model by hand.

While the decoration is clearly cast into such brooches, the nature and quality of the modelling indicates that a wax impression was taken from an original model which was carved, probably on the flat surface of a turned section of material. While the surfaces of these brooches do not always have the sharpness one would expect from a directly carved pattern, the decoration is very clearly defined, without the rather soft qualities one would expect from wax. The nature of the models which were used to make the moulds therefore remains a matter for debate. A remarkable aspect of cast Anglo-Saxon jewellery is that, even on items which were worn and buried as pairs, such as the saucer brooches, slight differences can invariably be detected. This is one of the reasons why wax models have been favoured by a number of scholars, since they offer an explanation for this slight variation: it would be necessary to have a separate model for each mould, because it would be virtually impossible to remove the fragile wax from the damp clay without damage. There are always likely to be slight detectable differences between these wax models, however skilfully they are made. Several explanations of the casting processes in which models of various materials have been used have been put forward to account for all or some of the available evidence, including these variations.

The existence of the few models made of lead, for example, offers the possibility of a process like that proposed by Vierck, which was in part offered as an explanation of these differences (fig. 14a). Vierck, working with mainly continental material, proposed a very complicated system to explain the use of lead models, whereby an original model (the *Urmödel*) was made of wood, bone or wax, from which a positive model was made of copper-alloy. This would correspond in form to the final piece of work, but would lack the finer details. From this a two part clay mould was made to produce another model, this time of lead (the *Zwischenmodel*). This was


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Fig. 14a (left). Casting process after Vierck. Down in cross-section: (1) basic model; 2) two-piece mould made to cast lead model; (3) lead model, refined and with detail added; (4) investment mould made from lead model; (5) final casting.

Fig. 14b (right). Thin casting after Mortimer and Pinder: (1) positive model pressed into pad of clay; (2) model removed, and recess coated with wax; (3) second pad of clay pressed over, with in-gate former in place, to form completed mould; (4) final thin casting.

then refined and decorated, and used to produce the final object in a ‘lost-lead’ investment casting process.\(^{42}\)

As Axboe observed, however, the original carvings for many of these brooches must have been the negative.\(^{43}\) The nature of this carving is

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achievable in bone, antler and the harder woods such as boxwood, and we have good examples to show the high level of accomplishment regularly achieved by carvers in these media.\textsuperscript{44} Indeed, a strong clue as to how some, at least, of these lead models may have been made comes from four moulds of antler; three from Ipswich\textsuperscript{46} and one from Southampton.\textsuperscript{46} These are most likely to have been made for casting lead, tin or pewter. They are very simple concentric designs, cut in negative into the base of the antler, near the burr. Low melting-point metals can be very successfully cast into antler without any damage to the mould: if a plain backing was used, probably of wood, this would create a very simple two-part mould.\textsuperscript{47} While it has been assumed that these antler moulds (which are also, in effect, models) were used to produce simple finished items, their existence indicates another method whereby casting models might have been made, at least in the ninth and tenth centuries, but probably from much earlier. Because the mould is made in negative, it means that simple raised motifs are very easy to produce by carving and drilling, as these examples show. To make such designs in the positive would be far more laborious, since this would involve carving away large areas of the background, to leave the dots and lines standing up above the surface.

Axboe, therefore, proposed that many cast items began with models carved in the negative – the three-dimensionally opposite form to the finished piece (fig. 15).\textsuperscript{48} Based on his visual examination of some Scandinavian brooches, he suggested that they were carved first in the negative, either whole or in sections, and that from this model/mould a positive wax model was made which could then be used to make the final mould. He observed that the sharply pointed ridges on some of the interlace patterns are relatively easy to carve in the negative, where they directly reflect the shape and action of the chisel or graver. It would be extremely difficult to carve the same forms in the positive, although he was able to identify areas of positive carving on the model. For some of the brooches with a central arch or bow, he suggested that this was carved in the negative as a flat strip, and that the resulting wax positive was gently bent to the required curve.

Using Axboe’s criteria, it seems reasonable to suggest that the two seventh-century interlace moulds from Hartlepool are the result of this


\textsuperscript{48} Axboe, ‘Positive and Negative Versions in the Making of Chip-carving Ornament’.

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Fig. 15. Casting sequence. Upper figure (shown partly in section): design carved in negative on hard material, and coated with wax. This produces a positive wax model arriving at the same stage as the finished lead model in step 3 of fig. 14a. Lower figure: section of final mould – wax has been removed from the negative model, and a two-piece mould made around it. From this the final casting is made.

process (pl. 3), while the three eighth-century decorated roundels from Whitby represent the end product.  

Another method of mould-making was first suggested by Mortimer in her work on cruciform brooches. The front of the mould could have been made starting with a positive model in the manner described earlier (fig. 14b). The wax would probably have been poured in, and then quickly poured out, once a layer had been deposited on the surface of the mould, but molten wax would then have been brushed over the surface of the impression in thin layers, until a suitable thickness had been achieved. The second half of the mould would be made by pressing clay into the first half so as to cover it but also provide an ingate. The wax coated on the first half provides the space for the metal. It is possible that the lugs for the pin-fittings were added before this was done in the form of sheet wax, but these would be especially vulnerable, and it seems more likely that, as Dickinson suggested, these were made directly in the lower half of the mould, which could be removed for this purpose.

49 Cramp and Daniels, ‘New Finds from the Anglo-Saxon Monastery at Hartlepool, Cleveland’, fig. 7A, C.
50 Wilson, D. M., Anglo-Saxon Ornamental Metalwork 700-1100 in the British Museum, pp. 192–3, pls. XXXVIII and XXXIX.
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Plate 10. Sutton Hoo, Suffolk, buckle (74), interior.

Our experiments in connection with the great gold buckle from Sutton Hoo (below), however, have shown that it can be difficult to achieve an even coating of wax in the mould, and therefore an even thickness of metal in the casting. It could be, therefore, that sometimes no wax was used at all, if the second half of the mould was made directly from the first. The new half could then be pared away to create the necessary void to be filled with metal. This would be quite practicable on the saucer brooches, in view of their simple, tapered section, although there would be many difficulties with more complex forms. The notion of using no wax, and making the pin lugs after the mould has been opened also offers an explanation for the apparent preference for two-part moulds among those surviving: it seems certain that it was normal practice to make small, low-risk alterations after the mould was completed (see chapter 4).

One of the advantages of the last two mould-making methods described above is their economic use of metal, since they enable thin sections to be produced. Cast gold is very rare at any time in Anglo-Saxon England, with
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Plate 11. Reconstruction of the thin-casting process, showing (left) interior and (right) exterior of the casting as removed from the mould and before cleaning. (L. 20mm)

the richest examples coming from the early seventh century, including the large buckles from Sutton Hoo (74) and Taplow (79), both already mentioned, where the loops and tongue plates are castings. It is very much to the point that the loop for the buckle from Sutton Hoo (74) is a hollow casting, probably made in two halves and soldered together. The main body of this buckle is also a thin, open-backed casting. Bruce-Mitford’s account of its making is rather sparse, but the mould for this piece is likely to have been made with an impression from a carved bone or wooden model, in a similar way to that described above.52 The inside of the casting exhibits a very convincingly uneven, wax-like surface, with hints of the relief of the front of the buckle being discernible (pl. 10).53 Added to this, the thickness of the walls increases towards the hinge, where the maximum strength is needed.54 The latter feature would be much more difficult to achieve by fabrication, and this casting therefore exhibits the inventive use of the properties of wax to achieve a result in metal. On plate 11 we illustrate our experiment of stages in this process, which we call ‘thin-casting’, showing similar effects on the finished piece to the interior of the Sutton Hoo buckle.

53 Ibid., fig. 401a.
54 Ibid., p. 539.
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As Bruce-Mitford pointed out, quite a lot of refining and detailed work was done once the piece was cast. There are also signs that some cleaning up took place on the backs of saucer brooches after casting, as well as on the Coppergate Helmet (chapter 4) which indicate that any inadequacies which arose from casting were removed with hand tools. On the evidence of their forms, some of the ninth-century gold and nielloed rings, including a massive example from near Bologna, Italy, and another from Selkirk, were cast before being decorated.

There is a larger number of examples of cast silver, including brooches of various types from at least the sixth century through to the end of the Anglo-Saxon period. These include some of the sixth-century square-headed brooches, the back plates of some seventh-century platted disc-brooches, and such items as the late-eighth-century sword pommel from Beckley, Oxfordshire (9). Some of the more ornate strap-ends, from the latter part of the period, were also cast. They are usually of copper alloy, but are frequently decorated with silver wire inlaid into niello. Buckles have already been mentioned in connection with casting, and many if not all of the silver and copper-alloy examples have at least the loop cast, and usually the tongue plate as well.

Although we have no buckle moulds from Anglo-Saxon sites, the Dalriadic site at Dunadd, Argyllshire has produced parts of the moulds for the loop and tongue plate of a buckle of strongly Germanic character. The mould for the loop clearly shows that the hinge elements were cast integrally, while the tongue plate mould is of especial interest; it shows that this part was cast with a straight tag on the back, ready to be bent around to fix it in the centre of the hinge, between the main plate and the loop. This is not only paralleled in the Taplow buckle (79 and pl. Ia), but also in a number of lesser seventh-century examples. This lends credibility to the suggestion that the catch plates on brooch backs were also cast straight, and bent after the piece was broken out of the mould. More than one author has suggested that these catch plates were hammered over, but there would be no need for such force, and pliers would be a much better tool to use. It may be, however, that the heavier sections of metal in the tags on the back of the tongue plates of the buckles needed the greater force of the hammer, but those we have examined show no obvious signs of hammer marks. Perhaps a mallet was used for this job, to ensure as little damage as possible.

The brass nasal and eyebrow decoration on the Coppergate helmet (88

57 Ibid., no. 203, p. 237.
59 Lane and Campbell, Dunadd, pp. 127–9, figs. 4.32–3, 4.35, 4.36.
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Plate 12. Coppergate helmet (88), detail of nasal and brow ridges.

and pl. 12) is a fine example of the casting skills of the Anglian craftsmen, and one which has been very closely studied. There is no evidence to show whether or not the eyebrows were cast in one with the nasal but, on the assumption that this was indeed the case, Tweddle suggested that the model to make the mould was carved, possibly from wax. The whole object would either have been cast flat and then bent to fit the helmet, or else the model was made three-dimensional so that it matched the curves of the helmet. 60 Both these alternatives have their practical difficulties. Beeswax as we have already said is a fragile material to work with and difficult to carve crisply, whereas bone and antler and hardwoods such as

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boxwood are ideally suited to this kind of carved decoration. It is possible, therefore, that a positive model made from one of the latter was used to impress into the clay of the mould, although the large scale would rule out the use of antler, as it is available only in small sections. To make the whole unit in one, however, it would have been necessary to join together at least three sections of bone which, given the contemporary expertise in comb construction, is not beyond the bounds of possibility. This seems the best of the alternatives, for if the whole had been cast flat, some fairly drastic bending and shaping would have been needed to fit the unit to the helmet. With any unworked cast metal, and particularly with brass, this is a risky operation. Any imperfections in the casting are likely to fail under the stress, and the piece could, at least, crack. Added to this, the eyebrows are of quite a heavy section – a maximum of 1.62cm wide by 0.64cm thick, and it is probable that more than hand strength would be necessary to control the bending. The use of a hammer is very unlikely, because this would leave hammer marks or facets in the finely detailed casting. On the other hand, a wooden mallet would produce enough force without damaging the surface. No mallet has been found, but wooden objects need very special conditions to survive. On the whole, it would have been more practical to have cast the assembly in the right shape.

The late tenth- to early eleventh-century head of a figure from Winchester (85, pl. VIb), only 2.25cm high, raises interesting questions. It is described as made from sheet, and if this is the case it would have been made by a development of the repoussé process (chapter 4). However it could have been cast using a lost-wax process and an investment mould. To achieve this the head would have been roughly modelled in clay and then coated in wax into which the final detail would have been worked. Further clay would have been applied to form an outer shell. Once the clay was hardened and had been pre-heated to between 500 and 600°C (at which point all water would have been removed from the clay and the wax would have melted), it would have been possible to replace the wax with molten silver. Once it had cooled the mould could be broken open, and the still-soft core dug out. This method requires a reasonable sized opening in the figure at some point. Either method (repoussé or casting) would be difficult at such a small scale.

Discussion

Casting is, as we have seen, a rather complex subject, embodying as it does a number of different skills and techniques. The few mould fragments which survive in Anglo-Saxon England only give an indication of what went on;

61 Ibid., p. 972.
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they must represent but a minute fraction of the original total. They bear witness to the making of piece-moulds. The evidence for investment moulds comes only from late Anglo-Saxon objects (pp. 72–3, above). If the secondary lead models discussed above were part of a multi-stage casting process, as Vierck proposed (fig. 14a), then the only justification for this would be that they were to be used to make investment moulds. He suggested, however, that they were made in piece-moulds, which makes it perplexing that the same technology was not used all the way through the process. The complexities of his system seem unnecessary other than as an explanation of the variation between apparently similar objects, but it must be remembered that his theory was based on a statistically tiny sample of evidence: lead models could still have been used more than once to make piece-moulds.

We have seen that the Anglo-Saxon goldsmiths, along with their contemporaries on the Continent and in Scandinavia, had at their disposal all that is needed to make identical castings, principally the piece moulds for which the evidence is very strong, and yet there is hardly any evidence that they did so. We believe that explanations for this will have to be sought outside the workshop, possibly in the social and cultural milieu in which the smiths worked. Indeed there have been some attempts at this (chapter 9).

The decision as to which technique to use to make a piece must have been an equation between the amount of time it took (since casting can be much quicker than fabrication) and the economic constraint imposed by the immense cost of gold and silver. Although still a very expensive material, after the seventh century silver was more abundant than gold, and this sometimes made casting a more viable option. There are also designs and motifs which are really only achievable by casting. There was clearly no single method of casting, but a range of different approaches: it is quite possible that the individual goldsmith, working at the most sophisticated end of the scale chose the most suitable technique for the piece in hand, from a range of possibilities.

GOLD AND SILVER WORKING (FABRICATION)

Sheet
The process of making sheet metal is exactly the same for gold, silver and copper alloys, and must have changed very little since the beginnings of metalworking. Once a lump of the metal is available, it can be hammered into sheet. The Anglo-Saxon goldsmith used it only in small amounts. The hammering-out of metal was therefore a small-scale operation, not requiring an assistant. In more recent times, where larger sheets of metal were needed, it was usual to have one man (the apprentice or journeyman) holding the hot
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metal (silver) in tongs while he and the master-craftsman did the hammering. A flat stake and a slightly full-faced hammer are all that is required, the metal being first hammered flat from the initial billet (or ingot, if strip is being made). It is gradually spread by working around the growing disc in concentric rings of hammering. The advantage of a slightly full-faced hammer is that it spreads the metal much more effectively, and is much less likely to leave any deep, sharp marks in the metal surface. Regular annealing is required during any prolonged hammering, a process with which the goldsmiths were clearly familiar, since the thinner sheet-metal would have been unobtainable without it. One of the side-effects of the use of the full-faced hammer is that the metal will tend to dish as it is being worked. This is simply remedied by reversing the work piece on the stake periodically. As the metal gets thinner, the process becomes more delicate, and a flatter hammer is used. Most of the hammered sheet gold used by the Anglo-Saxon goldsmiths is very thin, and it was probably always given some kind of backing which provided the structural integrity needed for the jewellery. The scarcity of the metal meant that the craftsmen tried to gain maximum visual impact from the tiny amounts of gold they were working with. Although it is probable that Anglo-Saxon goldsmiths knew the process of making gold leaf, since some of the great gospel books of the eighth century and later used gilding, none of the sheet gold used in their jewellery is thin enough to warrant the use of such a specialised technique. Even the foils used to back the garnets in the seventh century Sutton Hoo cloisonné inlays are, at between 0.01 and 0.028mm, achievable by skilled hammering.

As we saw in chapter 2, there are examples of shears or snips from a couple of sites, and these would be used to cut the sheet. Even large shears, if well set up, can be used to cut thin sheet, and although all the shears known to us are straight, these can be used to cut loose curves or even discs without much difficulty. We have no evidence of sawn metal, and nor do we have (from England) any saws, although something remarkably similar to a modern hacksaw was found in Gotland (p. 58). Although this has fine teeth, there is no definite evidence to show that it was used on metal. It could equally have been used on hard wood, bone or antler.

An interesting side issue is the cutting of blanks for coins. There are clear references to the relationships between goldsmithing and minting (see for example p. 237) and examples of coin dies have been found, for example at Coppergate, York. The question arises as to how the blanks for the coins

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62 For the heat treatment of metal to restore working properties, see Untracht, Metal Techniques for Craftsmen, pp. 246–7.
63 For example it was used in the early eighth century in the Codex Amiatinus, Florence, Biblioteca Medicea Laurenziana, MS Amiatinus 1.
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were actually made, since it would be laborious and wasteful to clip and file each one. A piece of scrap copper alloy from Fishergate, York, gives a clue, since this appears to have been cut with a circular punch. This is a small piece of sheet, 4.8 by 2.8 cm, with three part-circular bites out of one side. The diameter of the discs which have been cut away would be approximately 1.8 cm. The edges of these bites are deformed downwards in the manner typical of punched metal, and this is obviously how the metal was cut. We have no examples of such circular cutting dies from England, but the late tenth-early eleventh-century tool chest from Mästernyr in Gotland contained a punch suitable for this purpose. This is a round bar, 36.9 cm long, with a diameter of 1.4 cm. One end is hollow for about 4 cm, with a hole at the side, near the top, to allow any trapped metal to be pushed back out. Only a very slightly larger version of this tool would have been needed to produce the effect seen in York.

Beyond simple bending, very little hand-forming is evident in Anglo-Saxon gold and silverwork until towards the end of the period. Nearly all the more three-dimensional pieces were achieved by casting either the whole thing, or a matrix onto which silver and/or gold elements were mounted. The very delicate seventh-century cloisonné cell-work was all done with extremely thin sheet, usually much less than 1 mm thick. The very fine bends and steps were probably all achieved with no more than tweezers – even modern jewellers’ pliers are far too large and clumsy for this work. Hollow vessels such as the Trehiddle chalice (80) and the Ormside Bowl (60, pl. II a and b) would have started off as sheet.

The late ninth- to tenth-century strap-end blank found at Cheddar is of some relevance here. Although of copper alloy, it gives a hint that some items at least were forged (i.e. hammered) to achieve the basic form, and then worked on subsequently to produce decorative details. Five similar strap-end blanks, three of silver and two of copper alloy, form part of the early ninth-century hoard from Sevington, Wiltshire. The silver blanks and at least one of the copper-alloy examples show clear signs of having been produced by hammering. The roughly shaped and faceted animal heads at the ends of nos. 73 and 74 are very cleanly formed, and their surfaces show no signs of having been filed or carved. Their simple form suggests that they could have been hammered into a shaped swage cut into a hard material such as iron, perhaps part of a stake, like that from Coppergate, York discussed in chapter 2 and below (fig. 6).

66 Rogers, Anglian and Other Finds from 46–54 Fishergate, p. 1237, fig. 610, no. 5297.
67 Arwidsson and Berg, The Mästernyr Find, no. 52, pp. 15 and 31, where it is called a cold drill, and pl. 23.
69 Wilson, Anglo-Saxon Ornamental Metalwork 700–1100 in the British Museum, nos. 71–8, pp. 169–71 and pl. XXX.
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Rod

Rods of metal were made in a straightforward way. The metal was cast into an ingot mould of a suitable size and shape (fig. 4), which could then be drawn out with the hammer into quite thin rods. The process produces a taper on the metal, either at one end or both, a feature which is easily recognised, and which presents many aesthetic opportunities to the goldsmith. The surviving examples of Anglo-Saxon ironworking show consummate skill in the use of the hammer, and some Anglo-Scandinavian finds such as the silver bracelets from the early tenth-century Cuerdale hoard also exhibit this process very clearly.\textsuperscript{70} It is remarkable, then, that the Anglo-Saxon goldsmiths seem to have been blind to the possibilities offered by the process, particularly when their Scandinavian contemporaries were making wide use of it. It is possible to hammer rod into a groove (also called a swage) in a stake or anvil in order to change its section, and/or reduce it. This method can also be used to even out a piece of hammered rod or wire. A more sophisticated version of this technique is to use two opposed swages, the upper one being hammered onto the lower one with the rod or wire in between. As hammering continues, the rod or wire is rotated in the grooves until it is well rounded, and then moved along to allow work on the next section. It is possible to recognise such wire by the very slightly creased or faceted surface, as Whitfield has shown,\textsuperscript{71} although with really well swaged wires, this may not always be possible. Whitfield was not able to identify any such swages from Anglo-Saxon contexts, but an ‘anvil’ (really a stake) from mid tenth-century Anglo-Scandinavian Coppergate, York is a strong candidate (fig. 6).\textsuperscript{72} This has three very narrow parallel grooves running across the upper surface, which Ottaway interpreted as being used either for needle-making, or for wire-making in conjunction with a matching swage. Although very small, it is possible that this stake could have been used with a hammer as suggested. It is also possible that it could have been used to make lengths of reeded strip, but these could only have been very short (see chapter 4).

Although we are not concerned here with ironworking, many of the hand methods are virtually the same as for non-ferrous metals and therefore the making of the wire for chain-mail is of some relevance. We have two examples of mail from the seventh and eighth centuries; the mailcoat from Sutton Hoo\textsuperscript{73} and the mail curtain from the Coppergate helmet (88).\textsuperscript{74} Sonia O’Connor suggested that the iron wire from which the

\textsuperscript{70} Philpott, \textit{A Silver Saga}, pl. pp. 36–7.

\textsuperscript{71} N. Whitfield, ‘Round Wire in the Early Middle Ages’, p. 13.

\textsuperscript{72} Ottaway, \textit{Anglo-Scandinavian Ironwork from Coppergate}, pp. 512–14, fig. 194, pl. XXXVII.


\textsuperscript{74} D. Tweddle, \textit{The Anglian Helmet}, pp. 999–1011 and 1057–81.
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Fig. 16. Wire making. Left: strip-twisting; centre: block-twisting with rectangular section; right: block twisting with square section.

chain-mail on the eighth-century Coppergate helmet is made, is very likely to have been drawn.\textsuperscript{75} The wire is of a very even section, but because of corrosion the tell-tale parallel striations, which are always present on the surface of drawn wire, are now lost. Sadly, the scientific examination of samples from this piece was not conclusive as to the method of manufacture,\textsuperscript{76} but Janet Lang has expressed the view that the wire is more likely to have been hammered, as we have suggested for rod.\textsuperscript{77} Burgess, on the other hand, believed that the very existence of chain-mail implies knowledge of wire-drawing, in view of the large amounts of wire of consistent section which are required.\textsuperscript{78} Working from the measurements given for the individual links of the Coppergate mail, even a conservative calculation gives us a length of approximately 49 metres of wire. To produce such a length of even-sectioned wire by hammering seems, on the face of it to be a truly astonishing feat of skill, and if we extend the theory to the amount of wire involved in the Sutton Hoo mailcoat, then we seem to need the mythical skills and powers of Weland to accomplish the task! Discussion with Patrick Hoverstadt, a fully trained blacksmith has, however, thrown considerable light on this area of speculation. His

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reaction to the problem was that wire making is the sort of job an apprentice would be given. A skilled hammerman would be able to produce enough wire, of the right quality, for the Coppergate helmet in ‘days, rather than weeks’.  

Wire

Wire-making technology has a very long history, with many aspects to it. The evidence of the jewellery itself shows that the majority of wire was being made by one of two processes, strip-twisting or block-twisting (see fig. 16), both of which have been ably demonstrated by Oddy\(^{80}\) and Whitfield.\(^{81}\) In strip-twisting, a narrow strip of metal is cut from the edge of a thin sheet. The strip is then either twisted until it forms a tiny tube with a slightly raised spiral seam, or is coiled into as tight a helix as possible. This is then rolled between two hard surfaces of stone or metal to even it up. It is possible to continue the rolling until the tube reduces to become solid. Block-twisting is similar, in that a square- or rectangular-section piece of strip or wire is cut from the edge of a sheet of metal. It could be cut from a straight side, but if a longer length is needed, it can be cut spirally from the edge of a disc and then straightened out.\(^{82}\) It is then twisted hard, and thereafter rolled between two flat pieces of metal or stone. In this case, the metal twists on its own axis, and remains solid. Frequent annealing is necessary, but the spiral ridges in the twisted strip are gradually flattened off and a round wire is achieved. Close examination, given sufficient magnification, will reveal the tell-tale ‘seams’ spiralling round the wire, even after the wire has been beaded. Strip-twisted wire will reveal only one seam running around its length, while block-twisted should show two or four, depending upon whether the original strip was square or rectangular in section. Whitfield, in her study, found that rectangular-section block-twisting was more common than any other method of wire-making. McFadyen found that the most successful wire, the least liable to flake, was made by starting with a square section. As he pointed out, however, any variation in the width of such a tiny strip is probably of little significance in real terms, and it probably has more to do with such factors as the eyesight of the goldsmith, the time available to make the wire, and the accuracy of the shears used to cut the strip.

As is often the case with Anglo-Saxon goldsmithing, the basic theory and practice of this process is very supportable, until one takes account of the tiny scale; the wire may have a final thickness of, say, 0.2mm. The process is not capable of reducing the thickness of the wire once the ridges have been

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\(^{79}\) We are very grateful to Mr Hoverstadt for this discussion.


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Plate 13. Kingston Down brooch (44), drawing from Faussett’s notebook.

rolled flat – too much pressure would be needed. This means that the original strip or block was not much bigger than the final size required. The explanation possibly lies in the fact that no individual wire is especially long, and one has more chance of making a short length of such fine wire successfully. We suggest a maximum of c. 17cm for the longest single wires we are aware of – on the gold buckle from Taplow (79, pl. Ia). For the very
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finest wires, a long piece would be that which surrounds the central boss on the Kingston Down brooch (44, pls. 1b and 13) at about 5.6cm. Anglo-Saxon metal-cutting shears are likely to have been extremely effective, but even the most exceptionally skilled jeweller would find it difficult to cut the initial strip evenly. It is far more likely that a sharp iron or steel knife and a straight edge were used, since the original metal could have been no thicker than the final diameter of the wire and gold is, of course, a relatively soft metal. We are accustomed these days to wire being easily obtainable in continuous lengths, whereas the Anglo-Saxon goldsmith probably made his wire as and when he needed it. He almost certainly could not afford to keep a stock of useful pieces of gold or silver, since this would tie up material which was extremely precious, and probably did not belong to him in any case. He would make the components he needed, and any excess would literally go straight back into the melting pot.

The gold thread used in Anglo-Saxon embroidery provides an interesting parallel to this method of making wire. Tenth-century gold threads from St Cuthbert’s stole and maniple were made in the following way.83 A strip between 0.35 and 0.59mm in width was cut from sheet gold 0.0036mm thick. This was then wrapped around a fine silk core without overlap, while adjusting for the unevenness of the strip, so that very few gaps appeared. The resulting thread measures 0.78mm in diameter. The gold strip could only have been wrapped manually, as the varying width of the strip is compensated for. Jacqueline Mina, who has experimented with replicating this thread as used by the Romans, found that it was relatively simple to produce short lengths.84 She found that by clamping both ends of the gold strip and the silk thread to each other, and twisting, the gold naturally wrapped itself around the silk, until there were no gaps. The method was suggested by her knowledge of strip-twisted wire. She was, however, unable to make gold strip fine enough to achieve the minute size of the original. Once again, one understands the theory, but is impressed by the practice.

As we have shown in our discussion of rod, wire could be produced by hammering. Most wire today is produced by drawing through hard metal dies (draw-plates, see chapter 2). Whitfield has shown that very fine drawn wire, however, was produced in Anglo-Saxon England by the late eighth to ninth century.85 It should be borne in mind that wire-drawing is not a stand-alone process; the wire does not have to start as a large round bar and then be drawn down as a round section until the desired fineness is reached. It is much easier to start with a fine strip of square or rectangular section, cut

84 Pers. comm.
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from the edge of a sheet. This would be cut to a size close to the final diameter of the wire, and then run through the draw plate to round it off. This approach also removes most of the heavy deformation, since it is mainly getting rid of the unwanted corners, which provide relatively little resistance until one is close to the final section. It is probable that the wire-drawing technique replaced block- and strip-twisting only gradually. It would take time to spread from one goldsmith to the next, and the making of accurate draw-plates remains to this day a highly specialised skill.

Theophilus, in his chapter on ‘chain’ making recommends the use of a simple wooden draw-plate to even out the section of what is probably a kind of trichinopoly work (see below). This simple and effective way of evening out the section must have been known since the first colonné (loop-in-loop) chains were made, several centuries BC. This method could well have been the origin of wire drawing. While there are a number of iron chains known from Anglo-Saxon contexts, there are surprisingly few surviving in goldsmith’s work. The two gold shoulder clasps from Sutton Hoo (73) both have a short length of chain attached to the hinge-pin, presumably to prevent loss. This chain is the very simplest form of colonné. The double gold pins from Cowlow, Buxton, Derbyshire (20), which are also probably seventh century, are joined by a very similar chain. The great advantage of this type of chain is that the joins in the links are soldered before the chain is assembled, therefore avoiding any risk of inadvertently soldering any of the links to each other. This also makes the chain strong and reliable. A copper-alloy pin from Flixborough (33), Lincolnshire, is of the early eighth century. It has a somewhat different chain attached to it. It is a much cruder affair than in either of the two previously described, with unsoldered links. These are not in the colonné style, but instead have a loop made by butting one end of the wire against the centre of its length, while the other end is bent around to meet the outer end of the first loop. Given a tough alloy, this chain could be quite serviceable, but not as strong as one with soldered links. The trichinopoly technique (fig. 17 and pp. xv–xvi) is a method of knitting (sometimes called French knitting) resulting in a yarn or wire tube. The scourg from the Trehiddle hoard was made by this technique. The chain on the Tara Brooch and panels of wire on the Ardagh chalice were made by the same technique, in the latter case with the tube cut open and the wire opened out and pressed flat.

86 Hawthorne and Smith, Theophilus, pp. 138–9.
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Fig. 17. Trichinopoly work. Trichinopoly made using a bobbin (or circular wood block pierced with a circular hole) and four pegs made from nails. See glossary.

Soldering

The use of solders on precious metals dates back almost to the beginnings of metalworking in Europe. Gold and silver in their natural state are normally alloyed with other related metals, and as a consequence, metal from different sources will have different melting points; this fact may well have given rise to the first solders to be used. In any case, once the alloying of metals became known and understood, the differences in melting points would offer obvious possibilities to the craftsman. Soldering with different alloys of the same metal, which is the common method in use today, works in the following way.\(^9\) The two pieces of gold or silver to be joined are made to fit as closely as possible. Depending on their configuration, it may be necessary to hold them together in some way, so that they do not move during the soldering. Both parts are heated simultaneously to reach the high temperature required, which is often in excess of 800\(^\circ\)C. The solder is then

\(^9\) This kind of high temperature soldering is known as brazing, but the tradition within the silver and jewellery trades is to call it soldering.
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touched to the joint, whereupon it melts, and is drawn into and along the joint by capillary action. Because the solder alloys used are very compatible with those being joined, the molten solder diffuses into the surfaces in the joint, and makes a very strong bond. Where the joins are very small or awkwardly placed, the solder may be cut up into small pieces, and laid along the joint.

To assist the soldering process, a flux is needed, the purpose of which is to keep the metal surface clean and free of oxides which would otherwise inhibit the flow of the solder. Silver/copper alloys, especially those high in copper, oxidise freely when heated in a normal atmosphere. Even gold alloys, of the purity which the Anglo-Saxons seem generally to have used for their jewellery, will oxidise to some extent, since they normally contain a certain amount of copper. The nature of the flux they used is not known; borax (sodium tetraborate) is the traditional flux in northern Europe, but it is not clear how long it has been in use. Theophilus used burnt lees of wine (potassium tartrate) for soldering silver,91 while Pliny describes the use of natron, a naturally occurring mixture of sodium and potassium carbonates,92 and common salt, especially sea salt, will also perform this function.93

It has been shown that silver was soldered with ‘soft’ solders, containing a high proportion of lead or tin, in late Roman Britain.94 The continuation of late Roman techniques into Anglo-Saxon England is not impossible and, although eutectic soldering (see below) is feasible for silver as well as gold, solder alloys were probably the norm for silver work. Some examples may be cited where this is the most likely technique; for example the late eighth-century sword pommel from Beckley (9) is made from two castings, which are most likely to have been soldered together. Another piece, a gilt copper-alloy cloisonné mount from Bifrons, Kent (10), has clearly been soldered with a silver-coloured alloy. This remains silver-coloured in the otherwise corroded mount, and retains its original form, including the meniscus formed by the molten solder when the joints were made. All the signs are that this soldering is original, since many of the cloisons retain their inlays and foils. The scale of the cloisonné work in this piece is larger than is usual in Anglo-Saxon work. This is a piece which clearly needs analysis, since the combination of silver solder and gilt bronze seems an odd one. What is very clear, however, is that silver soldering was either not a universally known technique, or was not always applicable. There are numerous examples of silver-backed sixth- to seventh-century keystone and plated disc-brooches where the brooch fittings have been cast integrally, rather than being soldered on, which might have been easier. Even on much later examples, such as the Strickland (71) and

91 Hawthorne and Smith, Theophilus, p. 107.
92 Rackham, Pliny, IX, Book 33, 29, pp. 70–3.
93 Ogden, Jewellery of the Ancient World, p. 64.
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Plate 14. Fuller brooch, (35).

Fuller (35, pl. 14) brooches, the fittings and all other additions are riveted on (see p. 100). There is a possible explanation for this. Almost all these pieces are decorated with niello, and some are also gilt. If the silver solders in use were of high tin or lead content, their melting points are likely to have been very low, and so the risk of undoing previous work while applying the niello and gilding may have been unacceptably high. We do not know the sequence in which they were done, but all three processes require relatively low temperatures; either the niello and/or gilding would have been spoiled as a result of the soldering, or the soldered components would have been at risk of being remelted during gilding and/or nielloing.

Such solders may well have been used by the Anglo-Saxon goldsmiths for longer joints on the larger objects, but these in themselves are a rarity among the surviving precious metal objects. For work on the tiny scale that is the norm for the surviving objects, the physical application of the solder becomes much more problematic. The solder needs to be cut into tiny pieces
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which are then applied to the work with tweezers or a brush. This has to be done after the flux has been applied, and most craftsmen do it once the flux has been fused, and is still hot. Even in the most skilled hands and with the advantages of modern metallurgical knowledge, the use of a separate solder alloy tends to leave small scars and blemishes on the surface of the metal, and the potential for error is very high. Some later filigree methods involve the use of a powdered solder, which is spread all over the work in order to ensure that all the joints are filled at one soldering. This leaves a very obvious fine texture on any plain areas of metal, a phenomenon which does not seem to occur on even the tiniest of Anglo-Saxon gold or silver work.95

Few of these problems arise with an alternative method of soldering which was certainly known to Theophilus in the twelfth century,96 and is believed by Ogden to have been in use around the eastern Mediterranean by about 2000 BC.97 This method has been given a number of different names – eutectic soldering, reaction soldering, granulation soldering, colloidal hard soldering, autogenous welding, diffusion bonding – but all refer to the same basic principle, which is as follows. A copper-rich salt is mixed with an organic substance, often in the form of a mild adhesive. These may be further mixed with a flux of some kind. The resulting liquid or paste is applied to the area of the joint to be soldered, and heated. As the metal heats up, the organic material carbonizes, and in turn reduces the copper salt to copper, which mixes with the gold to form an alloy with a lower melting-point. The capillary effect at the area of contact within the joint pulls this alloy into the joint, and so solders the two parts together. The reaction takes place at a temperature not far below the melting point of gold and, especially where the gold is alloyed to some extent, great skill and care are needed to avoid any overheating. The risks of the process are emphasised by Theophilus’ description of the solder ‘running around everywhere as if water was being poured over it’, and his warning to quench the work with water as soon as it has been seen to solder. Many recipes for gold ‘solder’ appear in the early texts, including Pliny,98 Theophrastus99 and Mappae Clavicula.100 Theophilus provides the earliest description of the process itself,101 and Cellini gives us a vivid description of the soldering of gold minuterie.102 Because of its use in the making of some of the remarkable jewellery of the Etruscans and ancient

95 For a sixteenth-century method, see Ashbee, The Treatises of Benvenuto Cellini on Goldsmithing and Sculpture, pp. 10–12. This mainly refers to silver filigree, but the principle is well explained.

96 Hawthorne and Smith, Theophilus, pp. 121–5.

97 Ogden, Jewellery of the Ancient World, p. 65.

98 Rackham, Pliny, IX, Book 33, 29, pp. 70–3.


100 Smith, and Hawthorne, ‘Mappae Clavicula’, esp. chaps. 117–18, p. 44. See also chapter 1, above.

101 Hawthorne and Smith, Theophilus, pp. 121–5.

102 Ashbee, The Treatises of Benvenuto Cellini on Goldsmithing and Sculpture, p. 46.
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Greeks, which is noted for its very tiny granulation, this soldering process has been the subject of much study and experimentation.103

Once it has been mastered, this method has a number of advantages over the method using a separate alloy described above. The joints created are extremely neat, since no lumps of solder are involved which need to be cleaned off: this is an especial advantage in relation to the filigree work beloved of seventh-century Anglo-Saxon goldsmiths. The process can be done on a very tiny scale, which was an essential requirement for making the jewellery which forms the subject of much of this book. If a joint turns out to be ‘dry’, as must often have been the case with some of the more complex pieces of cloisonné for example, then the process can be repeated once or twice to correct the fault. One problem with this method of soldering is that the alloy is produced at a temperature very close to the melting point of the gold alloy from which the jewellery is made, so great skill and close observation of the metal are required. As this technique is almost always used on small masses of gold, with few exceptions such as the soldering of the cloisonné cell-work to the heavy loop of the Taplow buckle (79, pl. Ia), a large hearth is not necessary, and the soldering was probably done on a small charcoal hearth with some kind of air supply to raise the temperature. Bellows would probably be too big and insensitive for the fine control of temperature necessary, and the air may well have been supplied by the goldsmith’s lungs, probably via some kind of blow-pipe, but possibly simply by blowing. Theophilus used both bellows and mouth when soldering decorative features to a chalice handle – a relatively massive piece of metal.104

There is hardly any metallurgical difference between joints made by either method, since both contain small amounts of copper, although recent work in Germany suggests that solder alloy joints have a higher silver content than eutectic joints.105 In any case, this can only be discovered by taking sections of the joints in the jewellery, which is rarely possible, for obvious reasons. As a result, it is hard to be categorical as to the soldering method used, and we must rely on visual examination to tell us what it can. As already mentioned, where gold solder alloys are used, one may expect to see the occasional blemish near the joint, however slight. Visual examination of some sixty-five pieces of Anglo-Saxon jewellery which incorporate gold soldering has failed to reveal any such traces. This means that they were


104 Hawthorne and Smith, Theophilus, p. 123.

105 We are grateful to Dr Birgit Buhler for this information.
made by the eutectic soldering technique. There is considerable variation in
the quality of the work, from the superbly crisp cell-work on an empty
composite disc-brooch from Faversham (28, pl. 7), to the rather flooded
and apparently over-heated filigree on a plated disc-brooch, from the same
site, Faversham (26), and yet there still none of the blemishes implying the
use of solder alloys.

Fig. 18. Rivet (shown in section). Left: rod fitted through closely fitting
holes in two pieces of sheet, and extending slightly above and below; right:
ends of rod hammered to spread them over and grip the two pieces of
sheet.

Rivets

These feature commonly in the construction of Anglo-Saxon jewellery, at
least from the late sixth century onwards. They are often hidden, but can
serve also as an aesthetic feature. Rivets are used to join two or more pieces
of metal together, and this is achieved by drilling through the pieces to be
joined and passing a short bar through the holes. The ends of this bar are
spread with a hammer or punch until the components are pulled tightly
together (see fig. 18). Rivets were used to join major components together,
for example on the various Kentish plated disc-brooches, where the gold
front plate is joined to the silver back plate by means of rivets placed under
the three or four outer circular garnets (see pl. 15). They were also used on
some of the copper-alloy composite disc-brooches. Minor components
were also fitted unto larger ones, such as the fittings on the composite disc-
brooch, Faversham (29), where each rivet has a decorative, domed head
surrounded by a ring of beaded gold wire. The Fuller brooch (35, pl. 14) is
another example, where the domed tops of the rivets form part of the overall
design on the front of the brooch.

Rivets are quite frequently found on repaired Anglo-Saxon metalwork
(see pp. 242–4), including fine metalwork, and here they perform the useful
function of rejoining components which have become separated, while
avoiding any further damage that might follow from high-temperature
soldering. A good example is the pectoral cross from the tomb of St

106 M. Pinder, ‘Anglo-Saxon Garnet Cloisonné Composite Disc Brooches: Some Aspects of their
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Plate 15. Gilton plated disc-brooch (37), detail showing rivet construction revealed by missing garnet setting.

Cuthbert, Durham. One of its arms, which had been broken off, was reunited with the cross by the use of a small gold plate held with rivets (pl. IIIa). Rivets can be purely decorative without any structural function, as are most of those on many of the later silver disc-brooches, for example that from Sutton, Isle of Ely (72). However, the decorative and functional were frequently combined, as for example on the Fuller brooch (35, pl. 14), already mentioned, where the rivets that attach the brooch fittings on the back are incorporated into the design in an aesthetically satisfying way.

Decorative Techniques 1: Changes of Surface or Form

As was said at the beginning of the last chapter, the dividing line between manufacturing and decorative techniques is not always clear-cut. Some of the decorative techniques, such as engraving, inlay and Pressblech, are largely concerned with changes to the surface or form of the metal. Enamel and garnet cloisonné, on the other hand, are non-metallic additions to the jewel, comprising a complex of distinct skills. In this chapter and the next, we have attempted to divide the techniques into these two broad categories.

Carving

Carving may be defined as the removal of material by the use of sharp implements. The term normally refers to the removal of relatively large amounts of material, and can be used to produce fully three-dimensional forms, although we have found no such examples in Anglo-Saxon fine metalwork. In a less overtly three-dimensional way, however, we believe it to have been a crucial aspect of Anglo-Saxon decorative ideas in many media. Its use in stone, ivory, bone, antler and wood is well attested, but while there is some evidence for direct carving into metal, this was probably only done as a means of redefining designs which had been cast. This will either have been done with small hammer-driven chisels of iron, or for some of the finer work engraving tools will have been used (see below and chapter 2).

Much use has been made of the term ‘chip-carving’ to characterise a particular decorative technique, typified by such eighth-century objects as the nasal on the Coppergate Helmet, York (88, pl. 12), and a mount from Whitby (82) in the British Museum. The essence of the technique is that a basically flat design is left visible against a faceted background, formed by the removal of small angular ‘chips’. The term implies an origin in wood-carving, but it is found widespread in stone, bone and ivory as well as in metalwork.

Our experiments have shown that this type of carving is relatively easy to reproduce in non-metallic substances, especially in antler, and rather
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difficult to achieve in metal. This reinforces the evidence from those metal objects which have been examined critically, which are clearly cast from models that already had the decoration in place. The skill of the metalworker in carving, therefore, was exercised at the stage of making the three-dimensional model, rather than directly on the metal object (see pp. 64–86, above).

Once such an object had been cast, the decoration would need at least slight reworking. This would probably be done with the same tools which did the initial carving of the model, since the metals used by the craftsmen were relatively soft. Punches would also have been used both to redefine lines and to establish additional decorative features, and seem to have been used in the case of the recesses for the niello on the gold buckle from Sutton Hoo (74), for example. There are visible signs of the use of a chisel or graver on some pieces where it has slipped in the cleaning process, for example on the left-hand upper point of the interface panel on the nasal of the Coppergate helmet, York (88, pl. 12). We have not been able to find any example of Anglo-Saxon metalwork which contains any three-dimensional carving, as opposed to the cast, then finished, examples such as those discussed above.

Engraving

This is a close relative of carving, and indeed there is no clear dividing line between the two, but the term is most commonly used with reference to much finer, mainly linear designs which remain very much on the surface of the metal. Engraving is done with finer versions of the tools used for carving. These have tangs to which wooden handles are fixed, and they are pushed into the metal by hand, without the use of a hammer (see pl. 5).

Engraving is found at least as early as the seventh century, for example on the buckle from Eccles, Kent (23), but there are difficulties in separating this technique from chasing. Both techniques were highly favoured by the late Saxon goldsmith. Such works as the late ninth-century Fuller brooch (35, pl. 14) and the early eleventh-century Sutton, Isle of Ely brooch (72) are decorated with sinuous linear designs, emphasised by the use of niello, which could have been produced by either technique. The ninth-century gold rings discussed under the topic of casting (p. 83), and others of that date such as the Æthelswith ring from Aberford, West Yorkshire (1), and the Æthelwulf ring from Laverstock, Wiltshire (48), were probably engraved, once the basic form had been produced. On these examples, the engraving verges on carving, and the technique was used to produce the recesses for the niello.

Chasing

To the modern jeweller and silversmith, chasing means the decoration of a
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Fig. 19. Chased and engraved lines. Left: a chasing punch produces a line by pushing metal to either side as it travels along, thus producing a slightly raised edge on each side of the line; right: a graver cuts metal away to create the line, and so leaves no trace at the sides of the line.

metal surface by the use of small punches, to make designs using line and texture. It is distinguished from repoussé by the fact that it only affects the surface of the metal, and hardly deforms it in any other way. Unlike engraving, metal is not cut away but is displaced by the action of the punch, which is a short, slim bar of iron or steel with one narrow, shaped end (see chapter 2). The other, broader end is struck repeatedly with a hammer while the craftsman guides the punch along. If the metal being decorated is solid, such as a casting or a thick plate, then lines can be chased which will appear only on the front of the piece. If, on the other hand, the metal is thin, then a negative of the design worked on the front will appear on the back. Even if the back of the object is accessible for examination, linear chasing can be extremely hard to distinguish from engraving. When freshly done, however, a close examination of the lines will reveal that they have slightly raised borders, where the metal has been displaced to either side of the punch as it travels along the line. Engraving removes a sliver of metal from the surface, and so does not create this feature (fig. 19).

The metal to be decorated needs to be held firmly while the chasing is being done, and this is now usually done by sticking it into hard pitch. This melts easily, sticks to the metal, and yet is resilient enough to maintain its grip while the metal is worked on. Although ‘pic’ (pitch) is an Anglo-Saxon word, and the substance was used in medical preparations, there is no direct evidence that the Anglo-Saxon jeweller had access to pitch. Theophilus certainly mentions pitch in connection with chasing, but makes no mention of where or how it is obtained.¹ A more commonplace use for pitch was in caulking between the planks of wooden-hulled boats. The most notable example of Anglo-Saxon ship construction is the Sutton Hoo ship, but the few clues discovered during its excavation point to it having been caulked

¹ Hawthorne and Smith, Theophilus, pp. 129–30.
² R. L. S. Bruce–Mitford, The Sutton Hoo Ship-Burial, I. Excavation, Background, the Ship and Inventory (London, 1975), pp. 373, 486.
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with animal-derived materials. Within the burial chamber itself, however, a number of fragments of ‘Stockholm tar’ were discovered. This is a mixture of pine resin and sawdust. A common constituent of modern chaser’s pitch is ‘Swedish pitch’, which is a pine resin. It is hard to believe that the Anglo-Saxon goldsmith was not alive to the use of this material as a support for chasing. It is interesting, however, that Theophilus in the twelfth century used wax to fill a vessel in order to apply grooves or flutes, where a modern silversmith would use pitch.3

Baldwin Brown first mentioned the use of chasing or ‘tracing’ as he called it, in connection with linear motifs on a silver quoit brooch from Alfriston (7). He suggested that chasing could be distinguished by an evenness of width and depth to the line, whereas engraving would show more variation. This seems a hard position to defend: both techniques are subject to the skill of the craftsman, and therefore both could be prone to variation in line width and depth, either intentionally, as part of the design, or accidentally, as a result of faulty technique. The same author also drew attention to the use of this technique as a way of redefining details on cast items.4

The decoration on some of the great series of ninth- to tenth-century silver disc-brooches could conceivably have been partly chased, but it would be very difficult to prove this from the finished and well-worn brooches.

Punching

The use of repeated punch-marks to form decorative friezes and other patterns is a technique common to many parts of Europe over a long period, and the Anglo-Saxons were certainly very aware of its possibilities. If the end of an iron punch is shaped into a square, triangle, circle, ring, chevron or other simple motif, it can be hammered into the surface of soft metals such as gold, silver and copper-alloy and used to enhance the decorative effect. This was done on thick metal as, for example, on a number of fifth- and sixth-century square-headed brooches, and on similarly dated saucer brooches, such as a pair from Abingdon (5, pl. 16), which show the use of a single triangular punch to make alternately opposed impressions which form a zig-zag pattern around the edge of the central design. The same motif can be seen on some late sixth- or seventh-century plated disc-brooches, such as one from Faversham, (27) although in this case, the possibility of this feature being carved or punched into the model, from which the mould was made, cannot be ruled out. The back plate of the mid seventh-century Crundale buckle (21, pls. 17, 18) is decorated by the use of at least two triangular punches which form a dog-tooth border around the edge of the plate. These punches are

3 Hawthorne and Smith, Theophilus, pp. 101–4.
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Plate 16. Abingdon, Oxfordshire, pair of saucer brooches (5).

Plate 17. Crundale, Kent, buckle (21).
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Plate 18. Crundale, Kent, buckle (21), close-up of punchwork on the backplate.

particularly interesting, not only because their working ends formed long, narrow triangles, but also because their surfaces were cross-hatched in a regular diagonal pattern, which relates them to the stamps which impressed the gold foil behind garnet inlay (pp. 141–3). It therefore raises in acute form the problem of how such regular fine detail was achieved on such a minuscule area. A narrow punch was probably used to create the recesses for niello for the complex interlace design on the early seventh-century gold buckle from Sutton Hoo (74). Punch-work decoration continued in use after this, but by the ninth century it seems to have degenerated to the stippling effects seen on the Strickland brooch (71). The technique was used very extensively on work from the Viking period, and is well represented in the early tenth-century Cuerdale hoard.5 A very late example is the punch-work on the tiny, partly gilt silver head found at Winchester (85, pl. VIb), which is dated to the late tenth or early eleventh century. This piece is of interest on two counts in relation to punching: it represents a very late use of lines of closely placed punch marks, and the punch or punches used must have had extraordinarily tiny working ends.

To do the punch-work, the metal needs to be supported on something solid and firm. If the back of the piece to be decorated is flat, a heavy, flat-topped piece of iron or copper alloy would be ideal, but hard wood could also be used. Mortimer suggested that some kind of clamp would be needed to hold saucer brooches while they were being worked on,6 but we believe

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	his would have been unnecessary: skilled and accurate punch-work is still being done in India and other Asian countries without such aids. Where the punch-work is to be done on a three-dimensional surface, support can be more difficult to provide. On some of the deeply modelled square-headed brooches, for example, the back of the head and foot is reasonably flat, and punching can still be done without practical difficulty. The silver head from Winchester, however, presents problems because it is hollow, and would have collapsed under the hammering required to leave punch-marks. It is probable that it was filled with resin or pitch (see below under repoussé), but a more likely material would be lead, which would be firm enough to prevent distortion of the head, but still capable of being melted out at the end of the process; or it is possible, if it was cast work, that the clay core from the casting process was left in place (p. 85).

The production of coins is, of course, a vastly more accomplished version of punching, and this activity was carried on from the sixth century onwards. There is also, clearly, a link between this technique and the stamping used in ceramic decoration, and here also it started very early and survived until the end of the Anglo-Saxon period.

There have been attempts to find identical punch-marks on different pieces, in order to identify individual workshops.7 Although such studies are of value, it should be born in mind that the punches were made of iron, which, while harder than the non-ferrous metals used by the goldsmith, is subject to wear and distortion after prolonged use. It is very likely that some of the punches were re-shaped periodically, and would thereafter leave slightly different 'footprints'.

Repoussé

True repoussé is the production of highly three-dimensional decorative features from sheet metal. It is done with a range of small punches, mainly by pushing the metal up from behind, and then refining details from the front. It seems to be extremely rare in Anglo-Saxon metalwork of any kind. There are a number of early Anglo-Saxon objects such as wrist-clasps which have applied decorated plates, and these have been described as repoussé.8 While these pieces could have been produced by the free-hand use of punches, the visual evidence is by no means conclusive. On the other hand, while most bracteates seem to have been made with dies of some kind (below, p. 110), there are some examples, such as those from Driffield and Sarre, where the characteristics of line quality and form tie in well with

9 *Ibid.*, pls. 5.2 and 5.3.
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the use of punches.⁹ To this may be added the Anglian helmet from Coppergate, York (88), which has an inscription running around and across it. These are in raised letters on thin copper-alloy strips.¹⁰ While it is possible that the Pressblech technique was used here (see below), the character of the work strongly suggests that each letter was worked up individually using small punches. The curve on the outer skin of the late eighth-century Ormside bowl (60, pl. Iia) rules out the possibility that this was Pressblech rather than repoussé, even without the fact that there are no repeats. A late ninth-century portable reliquary from Winchester (84) has repoussé copper-alloy panels mounted on a wooden base. These panels appear to be quite thin, but although it is not impossible that this is a relatively large-scale example of Pressblech, as one element appears to be repeated at least once, it is most likely that it is repoussé.

The tiny late tenth- or early eleventh-century silver head from Winchester (85, pl. VIIb) was mentioned in chapter 3, as a possible hollow casting. It was described by Lasko as being embossed, and if he was right, then we are dealing with another Anglo-Saxon miracle in miniature.¹¹ Cellini gives a description of how a colleague made hollow gold figures for crucifixes, starting with a bronze model over which the sheet metal was beaten, and subsequently using hammers, punches and pitch to complete the final three-dimensional form.¹² A similar method could have been used by the craftsman who made the Winchester head, but as is so often the case, the impressively tiny scale of the work makes it very hard to imagine how it was done.

Pressblech

Deeply modelled thin sheets of gold, silver and copper-alloy are a recurring theme in north-west European metalwork during the early medieval period. In Anglo-Saxon work, these panels are used to enhance larger objects, for example the decorative tinned copper-alloy plaques on the Sutton Hoo helmet. Such panels have sometimes been described as repoussé (see above), but this is a little misleading: these plates were produced in a single operation, using some kind of die. The method by which this was done has been the subject of a good deal of research and discussion, especially in Germany and Scandinavia, where there are, perhaps, more examples available for study. The German word Pressblech has been applied increasingly to this technique. The essence of the process is simple enough: a die is made of some suitably hard material, and on to this is pressed a thin sheet of metal, which takes up the design. Because Pressblech is done with thin sheets of metals which are both malleable and

ductile, the force required to produce a clear impression is not excessive. Theophilus describes exactly this process, using lead to force the foil into the die.\(^{13}\)

The evidence for this technique has been studied by Capelle and Vierck, who looked at a number of copper-alloy dies from various sites in northern Europe, including four of Anglo-Saxon origin.\(^{14}\) To these should perhaps be added the Hammersmith plaque, of the eleventh century,\(^{15}\) and another eighth-century example from Swanley, Kent.\(^{16}\) The former is a rather perplexing cast bronze object, but one suggestion for its use has been as a Pressblech die. The piece from Swanley, a small circular object with a simple geometric design, measuring only 2.2cm in diameter, is normally described as a stamp for decorating book bindings, but it could quite possibly have been used for Pressblech. There is also a small, seventh-century cast bronze plaque from Rochester, Kent, found after Capelle and Vierck’s survey.\(^{17}\) As this measured only 4.4 × 1cm, and only 2mm thick, it is suggested that it is most likely a die for making the decorative foil mounts for drinking vessels, such as the two from the find at Sutton Hoo. All these dies are either circular or roughly rectangular in plan. The circular dies from Barton-on-Humber and Lullingstone were most likely used to make bracteate pendants.\(^{18}\) Bracteates were imported into England from Scandinavia in the sixth century, and were produced in England thereafter. They are very thin plates of gold with stamped decoration, and are usually strengthened around the edge with a beaded wire. In England they are completed by a suspension loop which is normally of reeded strip (see below). Scandinavian bracteates formed the subject of an important study by Axboe, which included a thorough discussion of manufacturing methods.\(^{19}\)

The die from Rochester is cast in a heavy copper-alloy, and still retains flanges around its edges which tell us that it was made in a two-part mould. The very fact that these dies are cast, and in copper-alloy, is indicative of repeated use. Making a die involved a considerable investment in time, and copper-alloys were widely used to make the jewellery itself, which implies that they were not the cheapest of metals. We may perhaps assume from this that the use of such alloys would only be justified if the job in hand was a very rich one such as the Sutton Hoo helmet, or if the die was going to be

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\(^{16}\) J. Campbell, *The Anglo-Saxons*, pl. 81.


\(^{18}\) Ibid., p. 387.

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used repeatedly. As we have seen in the discussion of casting (pp. 64–86), the kind of design represented on these dies is easily carved in bone or antler, and dies carved from such materials may have been used by Anglo-Saxon metalworkers in the production of chip-carved ornament. A carved model, probably of bone or antler would be the first stage in the casting of a copper-alloy die. An antler die will, however, stand up to quite a lot of direct use, certainly twenty or thirty times, depending on the size and depth of the design. While this level of durability might be expected from bone and perhaps horn, Axboe found these materials ‘too fibrous’ for the purpose.\(^{20}\) He also found that ivory and boxwood were good for seven or eight stampings. This seems a low figure, but the depth of fine modelling on some of the bracteates militates against the frequency of use of the die. The making of a copper-alloy die must, therefore, have been to ensure long-term and consistent production.

The backing foils on the filigree panels which decorate some of the richer seventh-century buckle plates and brooches (see below), such as that on the handsome Taplow buckle (79, pl. 1a), and the Kingston Down brooch (44, pl. 1b) are often modelled to emphasise the interface designs, and these were produced by a similar process. This modelling is very simple; the interface pattern remains as a flat surface, to which the filigree wires are soldered, while the areas between are sunk down in soft curves. This can be seen on a number of pieces where the wires have become detached, such as two of the panels on the Kingston Down brooch. These panels are tailored to fit the piece, and each is repeated four times around the circular design. It is clear from a close visual inspection that each set of repeats was made from the same die.

It is rarely possible to examine the backs of these panels, since they tend to be permanently fixed into the more complex pieces of jewellery, but where they are accessible, they reveal very instructive features. A buckle from grave 68 at Sarre, Kent (68, pl. 19), allows such an examination. This reveals clear impressions of the original marking-out lines, scribed into the surface of the die, and there are even suggestions of what might be the grain of the material from which the die was made, although it is not clear whether this was bone or wood. It has already been suggested by Speake that some of the so-called bone or stone ‘trial pieces’ found at Irish sites from comparable dates could have had a similar function to the bronze dies.\(^{21}\) We may add to these the tenth century bone ‘trial pieces’ from York.\(^{22}\) Many of the Irish examples are exquisitely carved, and far more finished than seems reasonable for a ‘trial’, but if they were used for


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Plate 19. Sarre, Kent, buckle (68), showing the back of the filigree plate.

Pressblech, the high degree of finish would be justified. O’Meadhra made a similar suggestion, and tested it with reference to Viking-period examples from Ireland.\footnote{U. O’Meadhra, ‘Preliminary Observations on Relief Back-plates in Hiberno-Saxon Filigree Work’, \emph{Laborativ Arkeologi Rapport fran Stockholm Universitats Arkeologiska Forsknings Laboratorium} 1 (1986), pp. 142–3.} She used 0.1mm thick aluminium foil (probably comparable with most of the original gold foils – see below, p. 125) and finger pressure, and obtained encouraging but not conclusive results.

Speake proposed two ways in which the copper-alloy dies may have been used: either the die was pressed or hammered into thin metal foil, supported on a yielding material (he suggested pitch or lead), or the foil would have been worked down onto the die using a wooden burnisher.\footnote{S. C. Hawkes, Speake and Northover, ‘A Seventh-century Bronze Metalworker’s Die from Rochester, Kent’, p. 389.} Both these
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Plate 20. Reconstruction of Pressblech die, carved in deer antler.

Plate 21. Back of foil stamped into the reconstructed die.

methods for making the foils are valid, although both also have their drawbacks in practice. Hammering into pitch will produce a good result, but small thin pieces of metal then have to be retrieved from the pitch (if this was indeed the material used) and the adhering pitch cleaned off. Capelle and Vierck remarked that the slight arching found on some of the long rectangular plaques similar to that from Rochester was probably the result of hammering. Although a soft metal, lead requires considerable force to push a shallowly modelled die into it, and there is a high risk of damaging the foil.

Northover experimented with silver foil on the Rochester die.\textsuperscript{25} Because

\textsuperscript{25} Ibid., p. 392.
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Surface markings indicative of burnishing were observed on a Pressblech foil from Finglesham, the foil used in his experiment, which was only 50 microns thick, was burnished down onto the die using pointed wooden tools. The results were rather mixed, due in part to the working qualities of silver. We have experimented with a small antler die, to assess the practicalities of making a filigree backing plate. For this purpose, the die was based on a panel from the Kingston Down brooch mentioned above (see pl. 1b). It was carved from deer antler using engraving tools (pl. 20). Fine gold foil 0.1mm thick was then laid on top of this, and a thick piece of leather was placed over the top. The leather was then hammered smartly down onto the foil, which easily took the impression of the die (see pl. 21). This impression bears a strong resemblance to the Anglo-Saxon original. It proved difficult to produce a good impression by placing the die on top of the foil, with the leather between that and a firm support, and burnishing also proved troublesome, although perhaps because the foil was a little thicker than that used by Northover. Burnishing clearly produced a fair result, but there would always be problems of registration with the die. The use of a leather pad as described above avoids these difficulties, and produces good results although it has not been possible to test it on a copper-alloy die such as the Rochester example. Axboe suggests that leather pads were used in this way at Lódöse, Sweden in the ‘Middle Ages’. Leather would have been commonplace to the Anglo-Saxon craftsman, and its use as a tool is perhaps overlooked.

The nature of these dies probably varied, depending on the job to be done, and the number of times the die was to be used. All the rectangular copper-alloy dies share a rounded quality to the tops of the interlace threads, and this suggests that they were not used for making filigree backing foils, but for foils which were decorative in their own right. Some of these copper-alloy dies may have had more than one function; the small example from Swanley in Kent described earlier has previously only been assumed to be a stamp for leather bookbindings. It seems reasonable to suppose, however, that in such a context, two uses for this type of tool were united: on the ornate binding of Codex Bonifatianus at Fulda, silver mounts made with such dies adorn the leather binding, which is itself decorated with stamped motifs.

Inlay

The inlaying of one contrasting metal into another for decorative purposes

28 J. Campbell, The Anglo-Saxons, p. 84.
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is found among the output of the Anglo-Saxon goldsmiths. Evison in 1955 was the first to show that there is a considerable body of early Anglo-Saxon examples of the use of this technique.\(^{30}\) She listed some thirty-eight objects in iron, with another ten in bronze. She added a few more to the list in both metals, in a further paper in 1958.\(^{31}\) The dates of the objects ranged from the fifth to the seventh centuries, after which there appears to be an hiatus until the technique re-emerges in the ninth century.

One of the more frequent uses of metal inlay in later times is on the seaxes and other blades of the ninth and tenth centuries. Some of the finer examples have inlays of copper, bronze or silver, often in combination. The inlays can form inscriptions, such as on the very elegant example from Battersea, London (50). On others, the designs are purely decorative, and can include the use of differently coloured wires twisted together. For example, the seax from Hurlock, Co. Durham (42) is inlaid with wires of copper and bronze twisted together. In a further refinement, the blade from the Thames at London (53) has a herringbone pattern made up of two opposed sets of twisted bronze and brass wires.\(^{32}\) The seax from Sittingbourne (79, pl. IIIc) is one of the most complex, since it is inlaid with copper, bronze, silver and niello. Here, the inlays are applied in rectangular or triangular panels, separated by short lengths of silver and copper wire twisted together. The panels are themselves inlaid with niello, which would have been applied after they had been hammered into their recesses, since hammering would destroy the brittle niello inlay. A knife blade from Southwark, London (54) is one of the most technically accomplished of any of these examples. The complex spirals and other motifs are very well carved and inlaid into the iron. In the context of these examples, it is of interest that there is some evidence which suggests that inlaying into iron blades was being done in the workshops at Farcumbe, Netherton.\(^{33}\)

Unfortunately, Evison did not devote much space to the techniques used by the Anglo-Saxon craftsmen, and this is one of the areas which awaits proper investigation, but the basic principles of inlaying can be given here (see fig. 20). Because metals vary in their malleability, it is possible to inlay a soft metal into a harder one by hammering it into a prepared recess. The hammer spreads the softer metal, which pushes against the sides of the recess. The process works particularly well where the recess is undercut, so that the inlaid metal locks itself in position. There are other methods of inlay, or onlay, but all rely upon a differential in the malleability of the two metals. Because of this, iron is an ideal metal into which softer metals such as silver, gold, copper and brass can be set. The majority of these inlays are of copper-alloys or silver, and are mainly into iron. Theophilus describes a


\(^{32}\) See also the example from Honey Lane, London (51).

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Fig. 20. Inlay. Left: round wire placed in square-section recess; centre: round wire placed in undercut recess; right: sheet metal inlay place in fitted and undercut recess. Note that all are shown before hammering, and thus are standing proud of the surface.

method of overlaying iron with silver or gold, but we know of no Anglo-Saxon examples of this technique.34

The inlaying of single lines, especially where these are short and straight, and especially where they cross a curved surface, is one of the easiest techniques to perform. Engraving or carving skills are not necessary, as a slot to receive wire can be cut with a narrow file. The wire can be hammered into the slot directly, and if the slot is neatly cut, there is no need for any undercutting. An intriguing question arises from these inlays into iron: what was the nature of the metal from which the cutting tools were made? To be of any use, they had to be harder than the metal they were cutting, and the implication is that the Anglo-Saxon goldsmith and the weapon-smith in many cases were one and the same and used their understanding of the hardening of iron for blades in the development of this technique.

Most of the examples of silver inlays are into copper-alloy, but the Strickland brooch (71), which dates from the mid ninth century, is a rare example of gold being inlaid into silver. It is also one of the few examples of non-linear designs being inlaid into non-ferrous metal. Small gold panels are inlaid into the silver to form an integral part of the overall design, which also includes niello inlays. There is a linear inlay around the circumference of the brooch. All the gold inlays are stippled with a small pointed punch and, although this was probably not part of the original inlaying process, it would tighten the fixing, as well as serving a decorative function. The recesses to take the inlay were carved from the thickness of the brooch. The inlaying of small areas of contrasting metals, as opposed to wires, is rare, with the majority of designs being of a linear nature.

Niello

Niello was used to emphasise an engraved or chased design, by filling the recesses with black. One of the more constant features of Anglo-Saxon goldsmiths’ work, niello is found as a decorative inlay on jewellery and

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other items throughout the Anglo-Saxon period. It occurs, for example, on almost all the seventh-century plated disc-brooches, on the great gold buckle from Sutton Hoo (74), on some of the ninth-century silver disc-brooches such as the Fuller brooch (35, pl. 14), on some silver sword hilts from the late ninth and early tenth centuries like that from Abingdon (2), as well as on some ninth- or tenth-century seaxes discussed above.

Niello is a mixture of silver and sulphur, copper and sulphur, or silver, copper and sulphur, which gives a rich silvery black when polished, contrasting strongly with silver, silver-gilt or gold. Some of the ancient texts give recipes for niello, but Mappae Clavicula gives detailed instructions for both making and applying a silver/copper/sulphur niello.35 Theophilus’ recipe for niello was composed of four parts silver, two parts copper, one part lead and an indeterminate amount of sulphur.36 Cellini devotes the first chapter of his Treatises to niello and his recipe uses the same constituents as Theophilus’, but in rather different proportions. He gives one ounce of fine silver, two ounces of copper, three ounces of lead, plus enough sulphur to fill a vessel ‘about as big as your fist, the neck of which should, however, not be wider than might hold one of your fingers’.37 A lead content is common in these and later recipes, but La Niece found none in the Anglo-Saxon examples she analysed. Silver/copper/sulphur niello has a melting point of c. 680°C, which means that the process can be carried out in a charcoal hearth. The precise composition of ancient niello has been the subject of recent investigations, which have revealed some interesting and fairly consistent results.38 Roman niello is normally either silver sulphide, or copper sulphide: silver, copper and sulphur were not combined until the late fifth century in northern Europe, after which this mix became the norm. La Niece analysed thirty-six Anglo-Saxon objects, dating from the sixth to the tenth centuries. She found that silver/copper/sulphur niello was the most common (twenty-two objects), while silver/sulphur was less so (fourteen objects). Silver/sulphur niello was used on silver, silver-gilt and brass, while silver/copper/sulphur niello was found on gilt bronze, bronze, brass, silver-gilt, and silver. Silver/sulphur niello was the only type used for the gold objects.

Niello, once it has been mixed up, can be applied to the work in one of two ways. It may be ground up and applied to the recesses made to receive it: Theophilus recommends that this is done with the niello wet.39 The piece is then heated until the niello is molten, at which point, if it has not filled all

36 Hawthorne and Smith, Theophilus, p. 104.
37 Ashbee, The Treatises of Benvenuto Cellini on Goldsmithing and Sculpture, p. 7.
39 Hawthorne and Smith, Theophilus, p. 105.
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the recesses, some modern craftsmen work it into the recess with a spatula. More niello could be added, if necessary, after the first heating. Theophilus' alternative method is to make the niello into a stick which is rubbed over the hot metal, where it melts and fills the recesses. Once cool, the excess niello is filed back to the original metal surface, leaving it only in the recesses. The surface can then be refined and polished along with the metal (see below, p. 130).

Reeded strips

These are a characteristic feature of many pieces of sixth- and seventh-century Anglo-Saxon gold and silver jewellery. For example, the Kennard brooch, Faversham (29, pl. IVa), one of the largest and most impressive of the composite disc-brooches, has a reeded rim-strip, four reeded gold strips in a cruciform arrangement on its central boss, and two small pieces of reeded strip used as extra ‘washers’ beneath two of the rivet heads holding the catch-plate onto the back. Well over seventy pendants of various types are known to us which have suspension loops made from reeded strips. On many of these, the ridges vary in width, with a larger one in the centre flanked by two narrower ones, for example the pendant from Faversham (25). Sometimes these suspension loops are overlaid with beaded wires running along the grooves, for example on the Holderness cross (41). A buckle from Alton, grave 16 (8, pl. 27), has been repaired with long reeded strips riveted across it, and, interestingly, a mount from the same grave has attachment strips made in the same way. They were also used to make the mount holding the rock crystal sphere from the sixth-century grave 4 at Sarre, Kent. There are many other examples from this period, but the use of these strips appears to be rare during earlier and later Anglo-Saxon periods. It is, however, quite widespread over a much longer period on the continent of Europe.

A useful example to take is the reeding on the rims of the composite disc-brooches which have closely spaced parallel ridges running along their length. The more luxurious examples vary from 4–5mm to 11mm wide, on which there may be as many as ten ridges. Most of them can be seen to be flat on the back, for example on Sarre (68), but a few, such as that on the brooch from Boss Hall, Suffolk (13), are made of thinner metal and are in effect corrugated, the back of the strip being the negative of the front.

There are a number of possible methods by which these reeded strips

40 Hawthorne and Smith, Theophilus, p. 108.
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Fig. 21. Typical silversmith’s scraper.

Fig. 22. Scraper, modified and with negative profile cut into the edge, shown with reeded strip in progress.

might have been produced, given what we know of the tools and materials available to the Anglo-Saxon craftsman. Four possible alternatives have been considered, namely chasing (above), swaging (chapter 3), carving and draw-swaging. On balance, as discussed elsewhere,\(^43\) we feel that only the last two are supported by the evidence, and draw-swaging is the most likely to have been used in most cases.

The strips may have been carved by using an adaptation of the silversmith’s scraper. This tool is normally made from a heavy steel strip, with one end bent

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at right angles and sharpened (fig. 21). It is used to clean up uneven areas of metal, such as those marred by poor soldering. Although little used nowadays, the principle of scraping has a long history. Theophilus describes a small-scale scraper, related to an engraving tool.\(^{44}\) The description is open to interpretation, but he seems to suggest that it is the side of the tool which does the work, rather than the tip. Cellini describes a much larger tool for cleaning the surfaces of cast silver plates.\(^{45}\) A scraper could be simply adapted by cutting the negative of the desired profile into its working edge. By repeatedly dragging this along a suitable width of metal strip, the reeding could be carved into the surface (figs. 21 and 22). This is a laborious process, requiring a sharp cutting tool. Tests carried out with a tool made of modern mild steel showed the need for frequent sharpening. This method leaves parallel scratches along the length of the grooves, similar to those found on some Anglo-Saxon pieces. The marks on these were, however, much finer than on the test-piece, and the latter also showed some fine ‘chatter’ marks. Both of these phenomena could be ascribed to a lack of expertise on the part of the experimenter, but the laborious nature of the technique is probably the more significant point to note. The corrugated strips could not have been produced by this means.

Draw-swaging is the most effective currently known method for producing fine, even reeding by hand. Although well-known in silversmithing for at least three hundred years, neither Cellini in the sixteenth century, nor Theophilus in the twelfth century make mention of it. The process involves pulling a flat strip of metal through the gap between a shaped iron or steel die and a flat, hard surface. It is necessary to be able to make very fine adjustments to this gap, so that the strip can be pulled through successively smaller openings. The negative profile on the die is thus gradually transferred to the flat strip. If the surface opposite the profile is of an equally hard material, the completed strip will have the desired ridges on one side, the reverse remaining flat. If, on the other hand, this part is of a softer material, and the metal strip is thin, a corrugated strip will be obtained (see pl. 22). The metal is normally pulled through the draw-swage assembly by hand, which is perfectly feasible for the small strips of silver and gold alloys we are concerned with here, but the apparatus needs to be firmly anchored to allow the metal to be drawn through it. The modern draw-swage is made of steel, with a screw thread to enable adjustments to be made as work progresses (pl. 23).\(^{46}\) Screw cutting in wood was known from the first century BC in Alexandria,\(^{47}\) but we have no evidence for it in England at this date, so some other means of clamping and adjustment must be considered. Possibly there was some kind of adaptation

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\(^{44}\) Hawthorne and Smith, Theophilus, p. 91.

\(^{45}\) Ashbee, The Treatises of Benvenuto Cellini on Goldsmithing and Sculpture, p. 83.


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Plate 22. Modern draw-swage in operation, producing corrugated strip.

Plate 23. Modern draw-swage.

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of the small clamps such as those found at Coppergate. These are usually of antler, which is probably not strong enough to withstand the kind of stresses involved in draw-swaging, but an iron one was found at Hedeby, and this would probably be strong enough. These clamps are very similar to a modern type of jewellers’ clamp, normally made of two hardwood jaws held together by a steel ring (plate 24). The work is placed between them at one end, and a wedge driven in from the other end to provide the gripping pressure. The Viking-age clamps are of such similar form that it is very likely they were used in the same way. Wooden wedges would have been perfectly adequate, although we know of none being found in direct association with these clamps. If one jaw of such an iron clamp was cut with a suitable profile, then the wedge would provide very fine adjustability. How such a clamp could be held firmly enough to allow the wire to be drawn through it, is not so easy to visualise, but the clamp does not need to be gripped, only prevented from moving in the direction in which the metal strip is being pulled. This could be achieved by a device as simple as a short wooden plank with a hole in it, through which the strip could be pulled.

The modern draw-swage produces rigidly parallel scratches, best seen at the bottom of the grooves in the reeding (pl. 25). Similar lines are clearly visible in the same position on several seventh-century examples, such as the rim on the brooch from Faversham (28) and the strip from the Sutton Hoo ‘wand’ (76, pl. 26). The same examination revealed, however, that these pieces had been worked on subsequent to the formation of the reeding, probably with a fine file, with the result that the parallel scratches only run for short distances before being obscured by probable file marks. This filing may have been necessary to remove any blemishes in the reeding such as

48 MacGregor, Mainman and Rogers, Bone, Antler, Ivory and Horn, fig. 953.
49 Graham Campbell, Viking Artefacts, p. 135.
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Plate 25. Detail of reeding produced by modern draw-swage.

Plate 26. Sutton Hoo ‘wand’ (76), detail of reeding.
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Plate 27. Alton, Hampshire (8), repairs to buckle made with reeded strip.

accidental scratches made during assembly of the piece. It may also be the case that some ‘chatter’ occurred during the making of the strip, as happened with some of our early experiments. This occurs when the strip vibrates rapidly as it is drawn through the swage, and causes it to show very closely spaced undulations running at right-angles to the reeding. This would need to be removed, and filing is the most likely method by which this was done.

The widespread use of reeded strips, even for seemingly mundane purposes, would suggest that they were not terribly difficult to produce (see pl. 27). Had it been necessary to spend hours of concentrated effort to produce them, the craftsman is hardly likely to have used them as washers on the back of a piece of jewellery, as on Faversham (29). Examination of many examples of reeding has made it obvious that there is much variation in the width, proportion and number of lines, from one piece to another. This may indicate either that each goldsmith had his own individual tools, or that the tools were relatively easily made. The latter seems by far the most likely interpretation of the evidence. It may also be that the tools wore out quickly, which is quite probable if they were made of iron. The likelihood that knowledge and skill varied amongst jewellers must also be taken into account. The difference in skills is most obvious in a comparison between the rim on the Boss Hall brooch (13) already mentioned and that on, for example, Faversham (29). The former is very thin, corrugated, and with relatively coarse reeding, while the latter has a flat back and extremely fine reeding.
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The absence of any contemporary tools which can definitely be assigned to the making of these strips means that the use of any particular reeding technique in Anglo-Saxon England must be conjectural. There is, however, enough evidence to indicate that they were produced either by carving or by draw-swaging, and for the reasons given above, the latter method would seem to be the most likely. There is clearly a strong relationship between draw-swaging and wire drawing, but we still await firm proof of suitable tools for either technique in the sixth and seventh centuries.

Applied elements

A feature of the work of the Anglo-Saxon goldsmith is the enrichment of a design by applying elements to an already constructed object. Simple examples of this are the large fish which decorates the front of the main body of the Crundale buckle (21, p. 17), and there are similar features on the front and back of the smaller Eccles buckle (23). Such elements can be either castings or formed from sheet. These can be fixed in various ways, although soldering does not appear to have been one of them. The filigree panels discussed below were another commonly applied feature.

Filigree

From the late sixth century, filigree work was widely used on the richer pieces of jewellery. It seems usually to have been made with gold, and often takes the form of separate decorative panels incorporated into larger, more complex structures such as belt buckles or disc-brooches. A base-plate, which is usually flat, but may be three-dimensionally modelled to emphasise the interlace pattern forms the foundation, as for example on the large panel on the Taplow buckle (79, pl. Ia), and the smaller panels on the composite disc-brooch from Abingdon (3). Whitfield showed that a common arrangement in filigree from the Celtic tradition is to have a flat base, on to which a pierced and embossed plate is mounted, but she has identified only one certain Anglo-Saxon example of this in a buckle from Faversham, Kent. No Anglo-Saxon backing-plates have been measured for thickness, but a long series from the Viking period at Birka, Sweden, measured between 0.5mm and less than 0.1mm, the majority measuring 0.2mm in thickness. The Anglo-Saxon examples give the appearance of being equally thin. These plates seem never to have been used structurally, and were invariably set into gold, silver, or base metal and frequently backed with paste, although on the Crundale buckle (21, pl. 17), for

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eexample, they are riveted directly to the main body of the buckle with gold rivets.

The main elements in filigree are short lengths of beaded and/or twisted wires which are bent into simple repeated motifs, formed into interlace patterns, or used to build up decorative frames around discrete fields. On the richer work, the interlace patterns are formed by a single beaded wire flanked by finer ones (see pl. Ib). In most cases, this interlace is illusory in that the wires do not actually run over and under each other. In some examples however, such as the late eighth-/early-ninth century sword pommel from Windsor, Berkshire (86), the pattern is made up of plain and beaded wires which form true interlace. Beaded wires have a long history, as well as a wide distribution throughout Europe and the East, but in Anglo-Saxon goldsmithing the most frequent use is found in the late sixth and seventh centuries. Before this period, beaded wires are either absent or very rare, and they become rather scarce afterwards. It was not, at least in the later centuries, an exclusively goldworking technique. While the filigree panel on the sword pommel from Windsor is of gold, that on the late eighth-century Ormside bowl (60) is made of silver-gilt. Paradoxically perhaps, neither the Minster Lovell (58) nor the Alfred jewels (6, late ninth century, pl. VIIIa) contain many beaded wires, even though both are of gold, and both employ granules. In other later examples, in both gold and silver, the beaded wires are replaced by pairs of round wires twisted together. An exception to this is a silver disc- brooch, now in the Ashmolean Museum, and reputedly found at Canterbury (16), which has been dated to the third quarter of the tenth century. This is made up of concentric rings of wire soldered edge to edge around a stamped disc. The wires alternate between strongly beaded and spirally ridged. From the uneven nature of the latter, they were probably made by ‘misusing’ a single- or double-edged wire beading tool (see below, p. 127).52

The earliest text on how to make beaded wires is, once again, Theophilus. He described a two-part iron jig, or organarium, which was effectively a pair of opposed swage-blocks, with the negative of the bead or beads cut into each opposing face. This used a swaging action to produce beads on a length of round wire.53 He also referred to another tool ‘as thin as a straw, a finger long, and nearly square, but wider on one side. [The] tangs, on which handles are put, curve upwards. On the underside a longitudinal strip is dug out and filed like a furrow, and the faces on both sides of this are filed sharp.’ This was rolled across the wire whilst being pressed down, and thus produced single beads.


53 Hawthorne and Smith, Theophilus, pp. 88–90, and esp. fig. 10 for a reconstruction of this implement.
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The most recent and comprehensive work on Early Medieval filigree is by Niamh Whitfield. In addition, Duczko has published valuable work on the Viking Age filigree from Birka. Both of these writers replicated the processes they proposed for making beaded wire, which are mainly those described by Theophilus. Whitfield also tested single-edged and multiple-edged tools. From their work, especially that of Whitfield, it is reasonably clear that Theophilus’ *organarium* is best suited to larger wires, where heavy pressure will be needed to displace the metal. The extreme mechanical accuracy demanded to make an effective *organarium* for wires down to 0.2mm diameter was probably not within the grasp of the early medieval goldsmith. Whitfield described how Baines has been able to make a double-edged tool, based on Theophilus’ second description, which is capable of beading wires as thin as 0.2mm diameter. With modern resources, he was able to make an *organarium* which would bead wires down to 0.3mm diameter, but found that the double-edged tool was superior. While great skill is needed to make both the tool and the beaded wires, these skills are clearly well within those available to the Anglo-Saxon goldsmith. A single-edged tool was also tested, and this proved practical, but did not produce even or well-rounded beads. Whitfield showed that it is possible to identify the tools that were used by careful examination of the wire, and gives some examples of Anglo-Saxon beaded wires made with these two tools.

All the experimentation discussed above seems to have been carried out with modern drawn wires but, as discussed in chapter 3, Anglo-Saxon gold wires were almost exclusively produced by block or strip-twisting. In the course of his own experiments, McFadyen discovered that wire made from a twisted square section gave the best results, with a rectangular twist being almost as good. Strip-twisted wire proved very difficult to bead satisfactorily, showing a strong tendency to break under pressure. When it had been completely compressed internally, however, somewhat better results for beads were achieved.

Another commonly used element in Anglo-Saxon filigree is a pair of round wires twisted together, often as borders around decorative fields. These twists are sometimes grouped together in pairs with opposite twists, in order to form ‘pseudo-plaits’, or, as it is also called, herringbone pattern. Twisting two wires together is as straightforward as it sounds: if a long enough length of wire is available, it is easiest to double it over, and then twist between two clamps of some kind. Given the fact that these twisted wires are usually less than 1mm thick, the clamps need not be particularly

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tough, and the antler clamps already discussed (chapter 2 and above) would easily suffice. The fact that the individual wires were themselves made by twisting could possibly cause problems, however, which would worry a modern practitioner: if the two wires were twisted in the opposite direction to that in which they were originally made, they might, in effect, unwind themselves. Strip-twisted wires would be especially prone to this problem, but they are extremely rare in Anglo-Saxon jewellery.\(^{58}\) This may also be a consideration with block-twisted wires, although there appears to be less structural danger here. If the goldsmiths saw it as a problem, one would expect to see that they had always twisted in the same direction, which would mean that the original twists in a set of pseudo-plait wires would have been in opposed directions. Close examination of a pendant from Faversham (25) Kent, shows that on this piece at least, the phenomenon was not taken into account.\(^{59}\) The inner of the two twists can be seen to run counter to the twist in the wire, thus loosening the structure, making these twists run at a very shallow angle across the wire, and creating more open seams, which are clearly visible. The outer twist, on the other hand, runs in the same direction as the twist in the wire, and because of this the seams have been tightened up and are much harder to see. The seams also run at a much steeper angle across the wire. The problem therefore occurred as we would expect, but did not deter the Anglo-Saxon goldsmith.

A further refinement, often used on the finer work, is the twisting together of beaded wires, usually in pairs, but occasionally in threes. They are mainly used as borders to important elements in a design, such as major stone settings. Examples of both types can be seen on the composite disc-brooch from Kingston Down (44, pl. 1b). which has double twists around both the circumference of the brooch and the circle of white shell, and a triple twist, bordered by single beaded wires, around the central boss. The wires from which the triple twist is made are extremely fine.

There are a few examples in Anglo-Saxon gold work where granules were used. They were mostly used singly in the centre of a beaded wire ring, as part of a larger filigree design, and an example of this can be seen on the pendant from Womersley, Yorkshire (87). Granules were sometimes used in small groups, the filigree panels at the ends of the shoulder clasps from Sutton Hoo (73) being perhaps the best known examples. A later instance is on the filigree panel from the Windsor pommel (86). This has small clusters of five or six granules placed amongst the interlacing wires. Granules could also be used to carpet areas in a design, as in the ‘Alfred Jewel’ (6, pl. VIIIa), and the Minster Lovell jewel (58). The gold granules found on these pieces are usually perfectly spherical. To achieve this, a tiny piece of gold is melted and, because of its small size, the surface tension of the molten metal pulls it

\(^{58}\) Niamh Whitfield, pers. comm.

\(^{59}\) Illustrated in Whitfield, ‘Round Wire in the Early Middle Ages’, fig. 4.
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into a sphere without gravity having any noticeable flattening effect on it. A method of making such granules, used by modern goldsmiths in Italy, is to cut up fine pieces of gold, and place them in layers, interspersed with powdered charcoal, in a ceramic container. This is then heated in a kiln until the melting point of gold is exceeded, after which the temperature is held for some time. The charcoal provides a reducing atmosphere which prevents any oxide forming on the surface of the granules, allowing them to become perfect spheres. When the whole has cooled down, the charcoal is washed off, and the granules remain. Theophilus does not mention the making of granules, but Cellini gives a typically cursory account of the process, telling us to pour the molten gold into a pot of powdered charcoal. He has obviously left out some essential details.

Gilding

Many examples of Anglo-Saxon jewellery in both silver and copper-alloys, from the earliest period onwards, were gilt. Sometimes they were wholly covered in gold, while others were only partly (or parcel-) gilt. The plated disc-brooch from Gilton, Kent (37, pl. 15), was found to have been partly mercury-amalgam gilt, and it seems certain that mercury amalgam gilding was the method generally used. Because of the dangers associated with the heating of mercury, this is not an area which we have been able to pursue. Other writers have been able to carry out practical experiments, however. This method exploits the compatibility of mercury with gold, silver and copper and its alloys. Gold is ground up in mercury to form an amalgam, which is then painted on to the surface of the jewellery to be gilt. Heating the piece after it has been coated drives off the mercury as vapour, and leaves the gold well-bonded with the silver or copper-alloy. The mercury is driven off at between 250° and 350°C, which is well below the temperature at which niello becomes workable (see above, p. 117). Gilding and niello were frequently used together, and the differences in working temperature mean that the niello would have been applied first, before the gilding.

Amalgam gilding gives a good coating of gold, and a very good colour, and it was used until the late nineteenth or early twentieth century in

60 Ashbee, The Treatises of Benvenuto Cellini on Goldsmithing and Sculpture, p. 10.
61 A. Middleton, F. Shearman, C. Stapleton and S. Youngs, ‘The Gilton Brooch: the Earliest Medieval Cloisonné Enamel in Western Europe?’, Jewellery Stud 8 (1998), pp. 27–36, esp. p. 35. We have accepted the modern spelling of this place-name, formerly Gilton, as corrected by the authors of this paper.
63 Northover and Anheuser, ‘Gilding in Britain’, p. 118.
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western Europe, after which it was superseded by electroplating. *Mappae Clavicula* describes the making of mercury amalgam for gilding in chapters 55 and 219.64 Theophilus also devotes three chapters to various ways of making amalgam and another to a method of applying the gilding.65 Both sources describe the grinding of very thin sheets of gold in mercury. We have evidence of this process being used in Anglo-Saxon England from the mainly eighth-century site at *Hamwic*. Here a small stone mortar was found which proved to have been used for this purpose.66 The small container of mercury from Hérouvillet in Normandy has already been mentioned in chapter 2, pp. 41–2. Supplies of mercury, which could have come from the Iberian peninsula or Italy, were clearly available throughout the period.

**Polishing and finishing**

We have very little evidence for how this was done either in the literature or in the objects themselves. Theophilus briefly describes the polishing of silver, prior to hammering it into a die.67 He used a soft cloth with ground charcoal to clean it, then says ‘scrape chalk on to it and polish it’. In a later chapter, he uses chalk again, which he scrapes finely and rubs over the surface with a linen cloth.68 This is done dry. Chalk is calcium carbonate and this, in the form of whiting, is still used today by some craftsmen as a very fine abrasive. Theophilus also described ways of polishing gilding and niello.69 He does the former by making a brush with fine brass wire bristles, which burnishes and brightens the surface of the gilding without removing any of the gold. This method continues in use today. For polishing the niello, he uses a ‘soft black stone’. The exact stone is not known, but the way it is used – by rubbing it over the surface of the inlay, lubricated with saliva, exactly parallels the use of the modern ‘Water of Ayr’ or ‘Tam O’Shanter’ stones. These are a naturally occurring, soft, fine-grained shale, which work as a very fine abrasive. The next stage uses the collected slurry from the first stage, rubbed over the work with a piece of lime wood and more saliva. The final finish is achieved with ear-wax (frequently used by Theophilus and Cellini) and soft leather. The first two stages would certainly improve the surface of a piece of metal, but would leave it matt.

Jewellers’ rouge, which is basically red iron oxide, also called haematite, is also used for this purpose. An intriguing find of a tiny piece of jewellers’ rouge attached to a fifth-century coin at the Marlowe Theatre site in Canterbury has already been mentioned in chapter 2 and it may be that

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64 Smith and Hawthorne, ‘*Mappae Clavicula*’, pp. 36 and 60.
68 Ibid., p. 158.
69 Ibid., pp. 114–15.
Decorative techniques I: changes of surface or form

this was used as a polish for metal. It may even be a hint that there was a goldsmith’s workshop at or near the site. Haematite was also found at Dunadd in Argyllshire, where it could have been used as a polish or as a dye: the apparent Anglo-Saxon connections with this site make this find of relevance here.

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71 Lane and E. Campbell, *Dunadd*, p. 196.
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Decorative Techniques 2: Non-metallic Additions

The Anglo-Saxon goldsmith shared the love of colour which was such a feature of the other art forms of the period (see chapter 6), and there are many examples where various non-metallic materials have been introduced to add colour to the designs. These materials included garnets, glass, enamel and white materials such as shell, ivory and bone. Each of these required specialised skills, and deliberate adaptations in the form and structure of the work in order to accommodate them.

GARNET AND GARNET CLOISONNÉ

Garnet is a common stone which is found abundantly all over Europe, although gem-quality deposits are rarer. They were used extensively by the Anglo-Saxon goldsmiths during the sixth and seventh centuries, but the source or sources of the stones they used is unknown as yet. Arrhenius and Mellis believed that those used in Merovingian cloisonné may have come from Bohemia (see below, p. 144). Recent analytical work by Farges, using proton-particle X-ray emission analyses of fifth-/sixth-century Merovingian material from Louvres (north Paris), France identified three types of garnet, none of which was almandine, the commonest form.1 Of the three types identified, type I probably came from the area of Podsedice, Bohemia, while types II and III, which came from the richest of the finds, were stones with a very localised geological distribution in areas of central Europe, Scandinavia or India-Sri Lanka. The implication is that the rarest stones were deliberately chosen for the richest work. Von Freeden et al. have argued that there was a dearth of larger garnets in the second half of the sixth century, which they attribute to the severing of trade routes through the Arabian Peninsula due to the activities of the Sassanids.2 They based their conclusions mainly on Merovingian period jewellery from Germany, and


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argued that after this date, there was a decline in the use of fine-celled cloisonné, especially in copper alloy. If they are right, this contrasts with the great flowering of this type of work in England in the late sixth, seventh and early eighth centuries. We are fortunate in the number of pieces of this work which survive to us, many of them being among the finest expressions of the goldsmith’s art from any period in our history. Because of their obvious attractions, such examples as the collection from Sutton Hoo and the Kingston Down brooch (44, pl. Ib) have become well-known outside the field of Anglo-Saxon scholarship.

The term cloisonné simply refers to a design made up of metal cell-work, and is nowadays associated mainly with enamelling (below, p. 153). Small cells of gold, filled with garnets cut to regular shapes, were put together to form areas of decoration. These were made either as applied panels, or as an integral part of the construction of a piece. The technique and many of the visual ideas associated with it seem to have spread north-westwards from the Black Sea area during the Migration Period, and the jewellery found in Anglo-Saxon England is among the latest in a very long line of development.

This form of decoration has always attracted the attention of scholars, but most of their work has been concerned with stylistic questions. With some notable exceptions, little has been published on the methods used in the manufacture of garnet cloisonné. Arrhenius has written extensively on Merovingian work, but does include some Anglo-Saxon examples. Adams’ recent work on the earlier east European jewellery is of great value. Two groups of Anglo-Saxon cloisonné jewellery have been studied closely in terms of construction: the Sutton Hoo regalia, and the great composite disc-brooches. The following account of cloisonné construction is largely based on these groups.

Where it has survived, the cell-work is usually made from thin gold sheet, but it is not infrequently made from copper alloy or silver, which in some cases is gilt. There are a number of differences in construction between gold cloisonné and that made from copper alloy or silver, and it is useful to treat them separately here. Before examining each element in cloisonné construction, it will be helpful to summarise the main steps. The Kingston Down Brooch (44, pl. Ib) is a good example of gold cloisonné. Cloisonné which is entirely constructed of gold is in fact fairly straightforward: the design was laid out on a thin gold base-plate, and the main walls were very carefully soldered to this along their entire lengths. The subsidiary walls were only tack-soldered; and were often only a casual fit, except at the top edges. The cells were then part-filled with a kind of paste before the stones, each with

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6 Pinder, ‘Anglo-Saxon Garnet Cloisonné Composite Disc Brooches’. 133
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Plate 28. Abingdon (Milton North Field), Oxfordshire, composite disc-brooch (3).

its backing of patterned foil, were set in. It was probably not strictly necessary for this paste to have any adhesive properties in gold cloisonné. There are two reasons for suggesting this: the corners of the backing foils almost invariably became trapped between the stones and the cell walls, enhancing the fit, and the cell walls usually show some spreading of the top edge. The combined effect would be quite enough to hold the stones (which have complex shapes, and fit the cells quite well) very effectively. The cell tops were probably burnished after the stones were set, but the spreading may also have been caused by wear and tear. The whole surface may then have been ground and polished, to achieve the extraordinarily even contour seen on some of the best-preserved examples.

Where copper alloy or silver is used for the cell-work, somewhat different techniques were used in its construction. The type is exemplified by a brooch from Abingdon, Milton North Fields, Kent (3, pl. 28). In the case of the composite brooches, the following method is reasonably constant. The design was laid out on a copper-alloy base-plate, and the cell-work was then made in two stages. The major dividing walls were soldered to the base-plate but, unlike the gold cloisonné, the subsidiary walls of the cell-work were not, nor were they soldered to the main cell walls, or to each other – on the better preserved examples, clean dry gaps can be seen at the points where the
Decorative techniques 2: non-metallic additions

Fig. 23. Faversham strap-end (30), showing method of forming cloisonné cells. Part of the central cloisonné strip is shown. The rear cell wall has been raised to reveal the recesses cut into the side of the trough.

subsidary cell walls meet the main walls. On the fragmentary composite disc-brooch from grave 11 at Chamberlains Barn, Leighton Buzzard (49), a damaged section of one of the remaining subsidiary bosses shows the clear impression of a radial cell wall in the paste. Its bottom edge patently did not reach the base-plate, so it is most likely that the areas contained within the main divisions were filled with a backing paste which had some kind of adhesive component. Into this were set the minor cell walls. The stones and foils were also set into this paste, perhaps at the same time. The work may well have been done in sections, for ease of control. Where the state of preservation permits a judgement, there is no visible spreading of the tops of the cell walls, which lends support to the idea that the stones were held in by the paste. It also suggests that the top surface of the cloisonné was not ground and polished, so the slight unevenness visible in even the best-preserved examples may be an original feature. A variation on this type of construction occurs on a sixth-century silver-gilt strap-end from Faversham (30). The main body of this is probably cast, with a central recess to take the cloisonné, which is made up of simple rectangular and sub-rectangular stones. The cell divisions can be seen to have been constructed in the following way: recesses were cut into the wall of the channel in which the stones sit, and small rectangles of sheet metal were let into these. There is no sign of solder, so they may have been given slightly tapered sides and then tapped down with a hammer to jam them into place (see fig. 23). Although there is clearly paste behind the stones, there is no sign

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of any foil on this strap end. These simple descriptions barely do justice to a very large amount of knowledge and skill on the part of the goldsmith.

Backing pastes

The backing pastes are clearly an important element in both types of construction, and those used in the closely related Merovingian garnet cloisonné have been the subject of a much work by Birgit Arrhenius, who proposed the following classifications of technique:

1. Clasped cloisonné: all the cell work was soldered together, and to a base-plate. The paste was placed in the cell-bottoms to provide a ‘yielding foundation’ for stones when they were being set.

2. Cement cloisonné: all the cells were pierced out from thick sheet metal, which was not soldered to a base-plate. The paste was applied from behind the stones, before the base-plate was attached.

3. Sand putty technique: in this method, the main cell walls were soldered to the base-plate, while the subsidiary ones were soldered to each other but not to the base-plate. The putty (paste) has sand as one of its constituents, and perhaps egg-white and, according to Arrhenius, was baked in an oven to set it after all inlays had been put in place. She cites some Anglo-Saxon pieces as examples of this technique, such as the pendant from Milton, Kent (57, pl. IVb).

4. Fused paste technique: only the main (outer) cell walls were soldered to the base plate, the subsidiary walls being set into the paste, along with the stones and their foils. The paste contains a substance which will cause it to shrink a little as it dries, the theory being that this will draw all the elements tightly together. Arrhenius suggested wax for this purpose and, although she does not offer any particular kind, beeswax would have been the most readily available. Arrhenius assigns a pair of rectangular belt mounts from Sutton Hoo (77) to this technique. She would presumably include the two other very similar mounts in the same suite.

While the last of these four proposals appears to make a good deal of sense in theory, a little practical analysis brings many questions. Even where the paste had adhesive properties, if the cell-work was not soldered to the base-plate it could easily have cracked off as the paste contracted. The adhesive would need to be very strong to avoid this, and the whole assembly would end up concave. In either case, if all the cell-work is soldered to a base-plate, the end result of the shrinkage would almost certainly be a concave panel. Where visible, in all the examples of Anglo-Saxon gold

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8 Arrhenius, Merovingian Garnet Jewellery, pp. 79–83, 175–76.
Decorative techniques 2: non-metallic additions

cloisonné we have examined, the cell walls are soldered both to each other and to the base-plate. A good example of this is an empty composite disc-brooch from Faversham (28, pl. 7). It is possible that the base plate was made convex, and the shrinkage was used to flatten the brooch out, but this seems an unnecessary complication to an already complex piece of construction. The high quality of workmanship, especially in the Sutton Hoo pieces mentioned above, where each stone is a very good fit in its cell, means that there was little necessity for any additional mechanism to retain the stones. With this accuracy of fit, it is only necessary to slightly burr over the tops of the cells in order to stop the stones coming out. In any case, the more complicated the shape of the stone, the less likely it is to fall out of its setting, as the chances of some friction between the two are increased. It is far more likely that a type of paste was used that did not shrink, but provided bulk to the jewel and enabled the goldsmith to level up the top surfaces of all the stones. Adhesive properties would not be necessary, since the cell-work is strongly constructed, and the stones can be well set without it. Where the cloisonné is of copper-alloy or silver, however, then something very much closer to Arrhenius’ fused paste seems to have been used.

The method outlined at the beginning of this section for the construction of copper-alloy and silver cloisonné, closely matches Arrhenius’ sand putty technique. It is clear, from a close examination of such pieces as Faversham (29) and the two similar brooches from Milton North Field, Oxfordshire (Abingdon, 3, pl. 28 and 4) that the subsidiary cell walls are ‘floating’ in the paste. In the surviving jewellery, the paste is rarely exposed in areas of any size, but on Abingdon (3) one of the filigree panels is missing, and this exposes a relatively large area of paste. This appears to be a very dense, cohesive mass, on which can still be seen the faint impression of the back of the filigree panel.9 Arrhenius’ citing of the Milton, Kent, pendant (57) is perplexing, however, since the cloisonné on this piece is of gold and, where the millefiori and some other stones are missing, the whole structure can be seen to be well soldered.

Adams, in her study of fourth- and fifth-century garnet cloisonné in Europe, has been able to refine Arrhenius’ categories somewhat.10 She substitutes ‘framework cloisonné’ for Arrhenius’ ‘cement cloisonné’, and her description of this equates most closely to the Anglo-Saxon gold and garnet work, particularly her third subdivision of this type, where the cell walls are ‘spot soldered’ to the base plate.

Backing pastes, as we have seen, are a crucial element in cloisonné work: they serve more than one function, and as indicated above, there seem to have been at least two types. The most common use of paste was as a filler

10 Adams, Late Antique, Migration Period and Early Byzantine Garnet Cloisonné Ornaments, esp. p. 220.
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behind individual stones and other inlays such as glass. In this application, the paste may also have served to enable the goldsmith to achieve a smooth overall surface to the cloisonné. The paste would allow him to make small adjustments to compensate for any slight variations in the thickness of the garnet slabs, so that all their top surfaces were at the same level. This may have been done very easily: if all the cells were well filled with paste, with the garnets and their foils on top, it may well have been possible to press the whole assembly down onto a flat surface, and allow the paste to extrude through the slight gaps in the settings until the stones were all level. A rather smooth and soft paste would have been needed to achieve this. McFadyen found that a backing paste of ground roasted seashells (calcium carbonate) and water – slaked lime – made just such a paste and, in time, it reverts to a solid state.11

Another purpose served by the backing pastes was simply to add bulk to a piece of jewellery. This is most obviously the case with the group of composite disc-brooches. These are constructed from a front plate, which holds all the cloisonné work, and a simple back plate, which holds the brooch fittings. These are held together, but with a space between them, by a collar of reeded strip (see chapter 4). This space is filled with paste, and serves no other purpose than to give body to the piece. There are many parallels to this mode of construction to be found among Merovingian, Frankish and Lombardic brooches.12 By contrast, there are examples where the cell-work and its base-plate form the whole structure, which is consequently very shallow. This is especially true of some of the pendants, such as the Ixworth (43) and Wilton (83) crosses (fig. 25).

While the ancient literature makes no direct reference to anything resembling backing pastes, there are some recipes which indicate a similar technology. Mappae Clavicula chapter 137 describes ‘Wax marble’, a mixture of ox glue and gagatis stone.13 Smith and Hawthorne point out that gagatis as used originally may have meant jet, but later became confused with achatīs – agate. Neither material seems suitable to the purpose, which was to make a mouldable artificial stone, which clearly would have had adhesive properties. Chapter 122-B of the same work, however, gives ‘a recipe for glue for stone’.14 This is very similar, except that it adds fish glue to the ox glue, and substitutes powdered marble for the gagatis. Theophilus does not give any such mixture, but does explain how to make fish glue, and glue made from hide and stag horn.15 Adhesives were

12 See, for example, B. Thieme, ‘Filibronscheibenfibeln der Merowingerzeit aus Deutschland’, Bericht der Römisch-Germanischen Kommission 59 (Mainz, 1978), pp. 381–562; F. Rademacher, Fränkische Goldscheibenfibeln aus dem Rheinischen Landesmuseum in Bonn (Munich, 1940); J. Werner, Die Langobardischen Fibeln aus Italien (Berlin, 1950).
13 Smith and Hawthorne, ‘Mappae Clavicula’, p. 47.
14 Ibid., p. 45.
15 Hawthorne and Smith, Theophilus, pp. 26–7, 36.
Decorative techniques 2: non-metallic additions

therefore almost certainly available to the Anglo-Saxon goldsmiths, and a mixture of animal glue and ground chalk or marble (forms of calcite) would be a possibility for use in this application.

Arrhenius analysed the filler pastes from eight Anglo-Saxon pieces and found four were largely calcite (in three cases mixed with either quartz or wax), two were of quartz mixed with either silicates or clay minerals, and the remaining two were mainly wax.\(^{16}\) The different purposes for which filler pastes were made are very likely to have affected their constituents. Unfortunately, however, Arrhenius gives no indication as to which parts of the objects were sampled. The high wax content in the Kingston Down brooch (44, pl. Ib), for example, would have even more significance if the exact position of the sample were known: if it came from one of the four peripheral roundels, the wax may have formed an adhesive element which held the small central cabochon settings in place, since these had no other means of attachment. The analysis from the composite brooch from Gildon (38, pl. VIa) causes equal frustration, since with this object, it would be possible to take the sample from the inner filling. On the other hand, the composite brooch from Faversham (28) has lost its back plate, and samples of the vestigial remains of the pastes could have come from either front or back.

The pastes which remain behind the garnets in the copper-alloy cloisonné panels on the Sutton Hoo shield have also been analysed.\(^{17}\) These are parts of the dragon and bird which formed part of the decoration of the shield (78). Analyses of these were carried out at the British Museum’s Department of Scientific Research.\(^{18}\) Samples were taken from three of the cloisonné elements, and although the results are rather varied, it may be significant that one definitely contained wax, one possibly did so, while the remaining one did not. In her discussion of these analyses, East said that this variation in content is not easily explained by apparent differences in technique. A more recent analysis of the pastes from the plated disc-brooch from Gildon, Kent (37, pl. 15), showed that the substance behind the stones in the cloisonné was composed of calcite, aragonite, a little quartz and beeswax. That from the central setting was of calcite, with an unidentified organic binder, which was not beeswax.\(^{19}\) The presence of the organic binder in this location is of some significance: the central roundel of these plated disc-brooches probably contained a dome of white material (see below, p. 149), surmounted by a circular garnet. Where this feature survives, there is no apparent mechanical means, such


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as a rivet or a bezel, by which the dome is held in position. Thus it may well be that the paste, which is invariably found behind these domes, had an adhesive element: the central feature of the brooches was, in effect, glued into place.

A feature of the superb gold and garnet cloisonné jewellery discovered at Sutton Hoo is that there is no trace of any backing pastes. All the garnets and their foils are suspended over empty space, held only at their edges where they are gripped by the cell-work. Bruce-Mitford believed that this was their original state, and that there had never been any paste present. In support of this, he pointed out that on some of the harness mounts, Sutton Hoo (77), a number of cells have holes drilled into the backs, which he believed must have been made ‘in connection with a programme of repair or reconditioning of the seven mounts: their purpose can only have been to push back into place, or extrude for resetting, garnets that had sunk in their cells and could not otherwise be extracted’. If Bruce-Mitford’s thesis is correct, the question which occurs to a practitioner is simply to ask why the goldsmith would go to such lengths for no apparent gain? The stones would be exceptionally difficult to set, especially when one considers the extraordinary conformity of each stone with the overall surface of the cloisonné, and the finished piece would be very easily damaged. The acid soil conditions at Sutton Hoo, which are responsible also for the complete elimination of human bones, would have leached any alkaline paste away during burial, and it is our belief that there was originally a conventional backing paste, which is now lost. The mysterious holes in the backs of the mounts could well have been used to push the stones out, as Bruce-Mitford says, but during the original manufacture of the jewellery, rather than at a later date. This might have been necessary if those particular cells had not been packed with a sufficient quantity of paste, resulting in those stones lying below the general surface of the cloisonné. Drilling in from the back would probably be the only way to remove such stones without damaging the cell-work, in order to add more paste. This may sound like a criticism of the Sutton Hoo goldsmith, but this is not the case. The quality achieved in the finished pieces is superior to that on any other extant examples, and one of the most noticeable features is the overall smoothness of the surface of the cloisonné. Even if the whole surface was ground down after the stones were set (see below, p. 148), the goldsmith had to work to an extremely demanding standard, only attainable by being very uncompromising. It is consistent with this approach for us to assume that adjustments would have been necessary during manufacture, even if those were only tiny. It should also be born in mind that the backs of these panels were hidden on the

20 See Avent, Anglo-Saxon Garnet Inlaid Disc and Composite Brooches, nos. 147, 148, 152, 156, 157, 163, 164 and 166.

21 Bruce-Mitford, The Sutton Hoo Ship-Burial, II. Arms, Armour and Regalia, p. 600.

22 Pers. comm., Professor David Jenkins, University of Wales at Bangor.
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completed items, so the goldsmith’s ‘footprints’ would never have been seen by the owner.

As has been mentioned above, some cloisonné items from the Sutton Hoo find do retain some backing pastes. East also refers to the acidic conditions of the soil at Sutton Hoo, and says that while these would favour the differential disappearance of calcite (the main constituent of most cloisonné pastes), wax is well preserved. Presumably the mixture of wax and calcite will ensure the preservation of at least some of the latter. A major difference between the cloisonné on the shield and that on the regalia is that while the latter is in gold, the former is made of copper alloy; the differences between these two construction methods has already been discussed, pointing out the necessity for some kind of adhesive quality in the paste used for copper-alloy cloisonné. The fact that this paste has survived, while that in the gold cloisonné has been lost, is not unexpected in the conditions at Sutton Hoo. The pastes which remain visible in gold cloisonné work often have a drier, whiter appearance than those in copper-alloy or silver cloisonné, which may be a result of the lack of any binder.

Cloisonné panels are often a separate component in the jewellery, a common example being on the tongue plates of the more ornate buckles. These are castings, often of silver, which may have been gilt, with a recess incorporated to receive a tray of cloisonné. In the case of a silver-gilt buckle from Faversham (31) it can be seen that this tray was riveted to the tongue plate before the stones were set in the cell-work, because some stones are missing. Even on the all-gold buckle from Taplow (79, pl. Ia), the same method of construction would appear to have been used. A similar practice was employed on the harness mounts found at Sutton Hoo (77). Instead of being riveted into place, however, the cloisonné trays were here held in place in what would nowadays be called ‘rub-over’ settings. Each tray was let into a closely fitting bezel, the top edges of which were ‘rubbed’ over to trap it in place.

Gold foil backing

Behind each garnet in a typical piece of cloisonné, there is a tiny piece of gold foil, usually with a cross-hatched ‘waffle’ pattern embossed on it. The purpose of these foils is to enhance the appearance of the stones by reflecting golden light back through them. The light shimmers as the jewellery is moved around, in a manner reminiscent of the rear reflectors on a car bumper. The foils, being gold, will also have helped to deepen the colour of the stones, since these very thin plates of garnet give little room for

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any inherent depth of colour. The foils are also very thin: the only measuring programme has been carried out on the Sutton Hoo jewellery, where they varied from 10 to 20 microns.25 The scale of the patterning is often astonishing, with as many as 5.5 lines per millimetre.26 Cross-hatched foils have been the subject of a number of studies, with that of Meeks and Holmes being the most comprehensive review of possible manufacturing techniques. The precise patterns on the foils vary considerably, even within a single piece of jewellery, and Avent and Leigh were able to distinguish fourteen different foils within a group of Kentish square-headed brooches.27 They may have a plain grid or a ‘boxed’ grid where the lines are deepened at regular intervals to form a kind of ‘tartan’ effect. Diagonal grids, and even an open grid with rings in each square are also known. The best of the foils, and there are many such, are of astonishing accuracy and evenness. The orientation of the foils also varies, and Avent and Leigh believed that the goldsmith deliberately varied this to emphasise certain features of the design.

The assumption is that the pattern was impressed into the foil with some kind of die or punch. Gold foil of this thickness will need very little pressure to produce a very crisp impression. Avent and Leigh identified examples of foil where there was evidence of the repeated use of the die, suggesting that foil may have been prepared in sheets, rather than single pieces. The nature of the tool was explored most comprehensively by Meeks and Holmes, who rightly concentrated on the problems of making the tool small enough. They concluded that the only way such a tool could be made was with the aid of a simple reducing engine, an ingenious version of which they devised, using only the technologies available to the Anglo-Saxons.28 Some dies apparently for making backing foils have been found, including one from a small burial mound at Tijtsma, Wijndalum, Friesland (The Netherlands). This measured 1.74 x 1.61cm, and the subdivisions appear to compare in fineness with those from Sutton Hoo. The pattern on it is irregular, however, unlike those posited by Meeks and Holmes, and so this object only goes part of the way to explaining the mystery of how the Anglo-Saxon foils were made.29 It is interesting, however, that this die was found in Wijndalum, because this was where one of the finest Friesian garnet cloisonné brooches was found.30 It is one of the few pieces of continental

30 L. Webster and M. Brown, eds., The Transformation of the Roman World AD 400-900 (London, 1997), pl. 52; R. L. S. Bruce-Mitford, Aspects of Anglo-Saxon Archaeology: Sutton Hoo and other Discoveries (London, 1974), pp. 270-3, pl. 88a-b, where it is described as a buckle.
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work we have noted which exhibits of the same quality of workmanship as
the shoulder-clasps and the plaques from the purse lid at Sutton Hoo (73
and 75).

Garnet cutting

Cabochoon stones were regularly used, the best example being the magnifi-
cent garnet in the pendant from Milton, Kent (57, pl. IVb). This a
beautifully evenly-ground and symmetrical oval stone, with a very high
 crown. A number of other, smaller cabochoons were used, for example as
subsidiary elements in the composite disc-brooches. The vast majority,
however, were used in the form of thin flat slabs, sometimes used singly, but
most frequently in the many pieces of cloisonné decoration. Few measure-
ments of the thickness of these garnet slabs have been published, but eight
stones from St Cuthbert’s cross (Durham, 22, pl IIIb) measured between
0.5mm and 0.73mm, while one from the Forsbrook pendant (34) measured
approximately 1mm thick.31

Although this work is largely concerned with the metalworking skills of
the goldsmiths, it is impossible to avoid the issue of how these slabs were
made, since they form such an integral element in the design and structure
of this impressive body of material. A great deal of speculation and some
experimentation has been devoted to this subject, especially over recent
decades. Good quality garnet can never have been cheap, and for this
reason alone it seems odd to us to reduce substantial lumps of good quality
garnet into tiny slices. The use of some kind of saw would be necessary to
achieve this – presumably a metal wheel fed with an abrasive – which
inevitably results in a loss of material. Any such saw is hardly likely to have
been less than 1mm thick, so the wastage would probably be of a greater
mass than the slices which were produced, and this is before wastage caused
by grinding and polishing. Although it might be argued that this spreads the
available garnet over a wider area, it offends against the practical common
sense and good husbandry of the lapidary, which certainly in more recent
times has been to cut the largest possible stone from the rough lump, partly
to preserve the maximum depth of colour. All this provokes the simple
question, why was the garnet used in thin slices? The making of tiny slabs
would not have suggested itself when the craftsman was faced with a lump
of good quality garnet, and as we know, they made and used cabochoons.
Therefore perhaps garnet cloisonné began because a form of garnet was
available which suggested the idea. Arrhenius has stated that the garnets
used in Merovingian and other cloisonné must have been cleaved.32 She
bases this on work by Mellis, who showed that the inclusions in the garnets

32 Arrhenius, Merovingian Garnet Jewellery, pp. 30–1.
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Fig. 24. (a) Fully formed rhombodecahedral garnet crystal, with a compressed crystal superimposed. (b) A compressed garnet crystal.

usually run parallel to the cut face of the stone, and it is a feature of garnets that these inclusions run parallel to the crystal face.\textsuperscript{33} He therefore proposed that the cut stones came from well-developed rhombodecahedral crystals (fig. 24a). He further proposed that, if metamorphosed after the crystals were formed, the compression would result in a schistose structure which would be cleavable into thin sheets. Arrhenius was able to cite a source of such stones from southern Bohemia, which she says were of ‘good even colour, and easily cleavable.’\textsuperscript{34} Where such stones were found, it is reasonable to think that broken and accidentally cleaved stones would also be found; it would be a short step from these to the first cloisonné. Dr Gordon Cressey of the Natural History Museum, London, has suggested a different geological cause for what may be the same phenomenon.\textsuperscript{35} Where garnet forms in a hard matrix, which is subject to shear (lateral stress) over time, it can become susceptible to brittle fracture. This is different from cleaving, which means that the stone can be split along the line of the crystal structure: diamond is the best-known example of this property. Diamond is the best-known example of this property. Garnet, however, which is susceptible to brittle fracture, tends to form slivers with a low conchoidal fracture if hit with a hammer. These are normally small and thin, but if the stone had been subjected to the conditions described above, thicker slivers are more possible. This is presumably what Arrhenius actually meant by ‘cleaving’. The garnet may even be found already broken into slivers, which could have provoked the idea of its use in jewellery. Because of their low conchoidal faces, these slivers would need to be ground and polished flat.


\textsuperscript{34} Arrhenius, \textit{Merovingian Garnet Jewellery}, p. 31.

\textsuperscript{35} Pers. comm.
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Another possibility came to light during discussions between McFadyen and Dr Cressey. Given the right conditions during crystal formation, naturally flat slabs are formed in sheets of mica. The slabs are, in fact, fully formed dodecahedral crystals, but with two opposite faces very large, and all the other faces compressed around the rim (fig. 24b). The specimens which led him to this conclusion were labelled pyrope, although almandine is more likely, since this variety of garnet is more commonly found in mica. These stones were discovered in North Carolina, but since garnets occur so widely, this does not rule them out of the argument: they could turn up anywhere that garnet is found in mica, and where they do occur, they could be abundant. If such stones could be shown to have occurred in Europe, this too could hold the key to the origins of garnet cloisonné. Since both these and the previously discussed forms of garnet present themselves in suitably thin slices, and their surfaces require little grinding and polishing, some kind of mosaic would be an obvious way to use them to good visual effect, whereas the cutting and grinding of larger lumps, with the attendant high level of wastage, seems a much less logical line of development. To test the possibility of the stones having been cut from flat crystals, a T-shaped stone from a lost disc-brooch found at Guilton, Kent, was tested in an X-ray spectrometer, to try to establish whether the polished face was parallel with the original crystal face. No such correlation was found, however, so the idea of fractured stones is the most plausible. To fully test this, however, many more garnets would need to be examined.

A number of rather misleading assertions have been made in connection with garnet cloisonné. In his discussion of the garnet work from Sutton Hoo, Bruce-Mitford quoted a delegation of London lapidaries, who estimated that many of the four thousand garnets used in the Sutton Hoo treasure would have taken at least a day each to cut and polish, while some would have taken two or even three days to achieve. As Bimson pointed out, they gave their estimates on the basis of modern methods of cutting, and in ignorance of early medieval techniques. She showed that the time required was, in any case, less than might be expected, and could be further reduced by working on a number of stones simultaneously.

The ancient literature does give us some clues as to early methods of gem cutting. Abrasives are the key element in this process, and both Pliny and

36 See McFadyen, Aspects of the Production of Early Anglo-Saxon Cloisonné Garnet Jewellery, pp. 130–1.
37 We are extremely grateful to Dr Cressey, The Natural History Museum, and to the Visitors of the Ashmolean Museum (who lent the garnet), and to the good offices of Dr Arthur MacGregor, who made this test possible.
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Mappae Clavicula⁴¹ speak of emery, a naturally occurring mix of corundum with magnetite, haematite or spinel. By the twelfth century, however, Theophilus was using sandstone to cut and polish rock crystal and other stones including beryl and jasper.⁴² Only for cutting hyacinth did he recommend emery. If hyacinth is taken to mean sapphire, then this may imply that only emery was abrasive enough to deal with the harder stone, since emery and sapphire are both forms of corundum.⁴³ Another possibility is that emery was not easily obtainable by the time Theophilus was writing. As Bimson has suggested,⁴⁴ and McFadyen has shown,⁴⁵ a rotating grinding surface is not necessary for the efficient production of garnet slabs suitable for cloisonné work.

Although many garnets examined by various researchers have shown wheel-cut edges, the exact procedure for cutting the slabs to shape remains a mystery. This mainly rests on the difficulty of making an abrasive wheel which will retain a crisply defined shape for long enough to produce that shape on the edge of the garnet. The wheel-engraving of gems was practised by the Romans but we have no indication as to how or of what material their wheels were made.⁴⁶

An esoteric feature of a few pieces of Anglo-Saxon garnet jewellery is the inlaying of gold into garnets. This is usually in the form of a circle of gold set into the flat top surface of a stone. A pair of silver square-headed brooches from grave 44 at Lyminge, Kent (⁵⁶, pl. Vc) have, set in the heads, rectangular garnets approximately 12 x 4mm. In the centre of these, a tiny circle of gold, no more than 2.5mm in diameter has been set. In the foot of each of these brooches a similarly sized tear-drop-shaped garnet shows the same feature. A mount from Faversham (³²) has almost exactly the same form as the heads of these brooches, and contains a similar, but slightly larger garnet, with exactly the same inlay. The method by which the recess was cut, known to jewellers as trepanning, is almost certainly very ancient, but we have found no reference to it in the early literature. A tube, preferably of a relatively soft metal such as copper or one of its alloys, is rotated against the surface of the stone, while being supplied with an abrasive and water. This will gradually cut a circular recess. The tube would probably have been mounted on a kind of bow-drill; the reciprocating action would probably make more efficient use of the abrasive than a modern drill. Because garnet is a relatively tough stone, it would be possible

⁴² Hawthorne and Smith, Theophilus, pp. 189–91.
⁴³ In the Mohs scale (of hardness), sapphire measures 9, beryl 7.75, and rock crystal and jasper (both quartz) 7.
⁴⁴ Bimson, ‘Dark Age Garnet Cutting’, p. 128.
⁴⁵ McFadyen, Aspects of the Production of Early Anglo-Saxon Cloisonné Garnet Jewellery, pp. 135–8.
to set the ring of gold wire into the recess by tapping gently with a hammer or a punch. The slightly roughened side walls of the recess would help the gold to grip. It is very likely that this method would be used to cut some of the larger holes which are found in a number of garnets, for example one in a composite disc-brooch from Guilton (38, pl. VIa).

Much discussion has been devoted to the sources of the cut garnets. Arrhenius has written extensively on the subject, and has proposed a small number of centres, mostly on the mainland of Europe, from which various types of jewellery emanated (but see above, pp. 132, 144).47 Bruce-Mitford referred to ‘the early organisation of the garnet trade, where the pre-cut stones might be mass-produced in such centres as Alabanda in Asia Minor . . . using templates for predetermined sizes and shapes’.48 Bimson observed that, however well or badly the edges of the garnets were cut in cloisonné work, the top and bottom surfaces were extremely well finished. From this she deduced the possibility that the garnets were traded as polished but uncut slabs.49 Because Anglo-Saxon garnet cloisonné jewellery shows a few regular groupings of stones, forming pattern elements which are often repeated, it is also tempting to think that they might have been traded as made-up groups. In fact, close examination of the jewellery shows that, although these repeated elements are apparently identical, there is much variation between them. Added to this, there are examples where a repeated element has had to be adapted in order to fit in with the constraints of the overall design. The well-known cross pendant from Ixworth, Suffolk (43), is symmetrical in both axes, which is compromised by the bulky suspension loop. To accommodate this, the cell pattern had to be modified. Similarly, on the pendant from Old Westgate Farm, Canterbury (15), the repeating pattern on the rim had to be compressed at the top where the suspension loop is joined on. There are other less obvious cases of the same phenomenon to be found, and this would suggest that either the goldsmiths worked extremely closely with their gem-cutters, or that they were able to make at least minor modifications to the shapes of the garnets themselves.

The grave at Tattersall Thorpe contained six pieces of garnet (five slabs and one sliver). Two of the slabs still retain their whole profile, while the remaining three are to some extent broken. All appear to have been finely cut.50 As was probably the case with many Anglo-Saxon goldsmiths, part of his work would have been the repair of jewellery, and these stones could have come from such repairs and have been kept for future use. The only other loose garnets of Anglo-Saxon dates we know of have been found in the cemetery at Butler’s Field, Lechlade, Gloucestershire, where a seventh-century woman’s grave contained a purse holding two hundred very small

50 Hinton, A Smith in Lindsey, pp. 83–6 and fig. 56.
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polished but uncut garnets which would have been unsuitable for use in cloisonné work.\(^{51}\)

One of the remarkable features of some of the surviving pieces of the cloisonné work is the overall smoothness of the surface. This is especially noticeable on those pieces on which the cloisonné surface is curved or domed, but it is also present on many jewels where the surface is flat. A possible method of achieving the smooth flat surface has already been discussed above, but the curved surfaces would present the goldsmith with far more of a problem. Where the general surface is well preserved, the evenness of contour is astonishing, in view of the fact that it may be made up of dozens of individual elements.\(^{52}\) The stone-cutters were undoubtedly extremely accomplished, but it beggars belief that they could cut so many tiny stones to precisely the right curve before assembly. This would be especially true of the many examples of domed inlays.\(^{53}\) Even if the stones were cut individually to the appropriate curve, it seems certain that some slight variation would occur which would be visible on close inspection, but this is not apparent. It is possible, therefore, that at least some grinding and finishing was done once the stones were in place in the cell work. This would enable a smooth uniform contour to be achieved without too much trouble. There is evidence that something along these lines did take place. On the Canterbury pendant (15), at the junctions of the four cloisonné ‘arms’ with the outer cloisonné ring, it is possible to see where the edge of a grindstone or something similar has bitten into the raised edge of the cell-work in the ‘arms’. On the Burton Pidsea (Holderness, 41) cross a similar effect can be seen at the point where the suspension loop meets the top surface. One of the results of grinding and polishing the whole surface of the cloisonné would be areas of very fine scratches which would run across from one stone to the next. They should be distinguishable from marks made by wear and tear by a more consistent parallel alignment. They will probably only be found through microscopic investigation, but if found they would offer conclusive proof. One would also expect to find traces of the abrasive trapped between the stones and the cell walls, or lodged in the backing pastes. Certainly, no emery has been found in such circumstances. Some pastes have, however, been found to contain quartz (see above, p. 139), which Theophilus recommends as a polishing agent when rock crystal has been ground down finely, so this raises the possibility that this abrasive was used.\(^{54}\)


\(^{52}\) See, for example, the shoulder clasps from Sutton Hoo (73).

\(^{53}\) For example the central stud on the Kingston Down Brooch (44).

\(^{54}\) Hawthorne and Smith, Theophilus, p. 191.
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OTHER MATERIALS

The Anglo-Saxons certainly possessed finely cut and polished items of rock crystal, although these are rare. Crystal spheres, mounted with suspension loops, have been found, for example, at Sarre, Kent, in an early to mid sixth-century grave,\textsuperscript{55} and at Bifrons, also in Kent.\textsuperscript{56} A late example of its use in jewellery is the slab of crystal which forms the front of the Alfred Jewel (pl. VIIIa). This has recently been shown to be a reuse of a Roman survival.\textsuperscript{57} The scarcity of this material implies that all the rock crystal objects were imports or re-uses, and that the cutting and polishing was not done by Anglo-Saxon craftsmen. The case of the spheres is of particular interest, however, as it raises the question of optical aids (see chapter 2).

A common feature of the Kentish silver and gold jewellery of the late sixth and seventh centuries is the use of a matt white material. This was used in small flat areas, but is most often seen as domed shapes, often surmounted by a gold setting containing a round garnet. La Niece has analysed samples from thirty-eight pieces of Anglo-Saxon jewellery, the results of which showed three main groupings – shell, magnesite and/or cristoballite, and bone or ivory.\textsuperscript{58} As she pointed out, it is possible to observe differences in the character of this material. For example, the brooch from Faversham (29) has a central boss which is made up of four sections, each of which shows quite a strong directional grain. The Kingston Down brooch (44, pl. I b) has a similar central boss, but rather than showing any grain, this appears to have had some kind of coating on it, which has worn through in the most exposed areas. Shell was the predominant material, and was identified as coming from marine gastropods. The size of the pieces used ruled out a local origin, and the material must have been traded. Two items, both from Yorkshire, contained mother-of-pearl. The magnesite/cristoballite group were probably the result of the exploitation of a local natural resource in Kent.

Although amber as a material was certainly known, only one piece of Anglo-Saxon goldsmiths’ work containing amber has so far been found. This is the Ripon Jewel (64) which contains four main squares of amber, forming the arms of a cross within a circular mount, linked by bands of garnet cloisonné. Amber would present no difficulties in cutting and polishing: being resin, it is very easily cut with abrasives, and equally

\textsuperscript{55} J. Campbell, \textit{The Anglo-Saxons}, pp. 28–9.
\textsuperscript{56} G. B. Brown, \textit{The Arts in Early England}, VI, ii, pl. XCIII, 2.
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easily polished. It is rather brittle, however, and care needs to be taken to preserve sharp corners.

Glass

While glass-making is not within the scope of this book, it must be noted that glass was a common component of jewellery, from the fifth to the early eighth century, in the form of beads. It was also used in many pieces of seventh-century cloisonné work to add colour contrast to the red garnet. A deep opaque blue is frequently found in, for example, seventh-century plated disc-brooches, where it occurs regularly at the apex of peripheral triangular features, for example the brooch from Faversham (27). It is also found on some of the large composite disc-brooches from the seventh century, especially the Kingston Down brooch (44, pl. Ib), which originally had at least fifty-seven cells filled with this material. The ‘Amherst’ brooch from Sarre, Kent (66), is unusual in that it has, within its inner ring of cloisonné, a series of triangular cells which are alternately filled with opaque malachite green and a semi-transparent yellowish-olive glass. It is not always clear if these were the original colours of the glass, or if they have been altered by soil conditions during burial. Another example of glass in cloisonné, which has received little attention, comes from grave 27.3 at Lyminge (55) in Kent. This is a zoomorphic purse mount, of copper-alloy, entirely inlaid with clear glass in two shades of green. None of the glass inlays have any patterned foils behind them. There is some evidence that glass was sometimes used to simulate garnet: on the pectoral cross found in St Cuthbert’s coffin, Durham (22, pl. IIIb), which is dated to the second half of the seventh century, one or possibly two of the inlays are of red glass, closely matching the colour of the garnets which fill the remaining cells.

Glass is, of course, a much softer material than garnet and, therefore, cutting and shaping it, using exactly the same techniques as for garnets, would present few problems to the goldsmith.

Decorative glass studs imitating cabochon jewels were also made from the seventh century for both secular and ecclesiastical purposes: there are seventh- to eighth-century examples of the latter from York (the Minster site) and Whitby. Some of these were inlaid with different colours of glass, but the recesses along with the studs themselves were made in moulds rather than cut: an example of a mould with its glass stud still in position was found at the eighth-century Irish site at Lagore Crannog. A small glass

61 Webster and Backhouse, The Making of England, nos. 107, k, li and ii, m, n, pp. 144–5; and 108e, p. 147.
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plaque found at Whitby has a pierced design in gold sheet inlaid into it,\(^{63}\) which parallels a number of glass studs with similar inlays found in Ireland: there is an example from Deer Park Farm, Co. Antrim,\(^{64}\) and the Derrynaflan paten has blue studs inlaid with metal.\(^{65}\) The later history of glass in jewellery is difficult to trace, but a recently discovered tenth-century enamel which we were privileged to examine has small glass inserts around its circumference (see chapter 6). These glass studs appear to be spherical and are a deep translucent blue. This parallels six very similar brooches which have mainly exactly similar spheres, sometimes with the addition of pale blue and yellow.\(^{66}\)

Millefiore glass is a rare addition to Anglo-Saxon goldsmithing. The term refers to minute areas of finely detailed pattern, mostly chequerboard, made up of different colours of glass. These may be of alternating red and white, blue and white, or red and blue. The shoulder clasps from Sutton Hoo (73) also contain chequerboard elements of red, white and blue combined. Millefiore was made by fusing small rods of coloured glass together, and then stretching them out to reduce the size. This works in much the same way that ‘seaside rock’ is made, in that the internal pattern reduces in proportion to the circumference of its outside. The amount of reduction is limited only by the skill and control of the glass-worker. Millefiore occurs more frequently in Anglo-Saxon glass beads, although the patterns are usually rather freer than the tightly controlled grids found in the jewellery.\(^{67}\)

There is only one other Anglo-Saxon example of millefiore being incorporated into garnet cloisonné, and that is the pendant from Milton, Kent (57, pl. IVb), which was dated by Hawkes to the mid seventh century. This contains a large oval cabochon garnet, approximately 2.6cm × 1.7cm, which is surrounded by a simple garnet and blue glass cloisonné border. At the four ‘compass points’ there are square cells, two of which are empty, but the left-hand and lower cells contain chequerboard millefiore (red and blue, and red and white respectively). There are a few other pieces of millefiore in Anglo-Saxon goldsmith’s work of a similar date. One of the largest is a disc of complex millefiore, approximately 2.5cm in diameter, which forms one of the pendant units which make up the early seventh century necklace from Sarre, Kent (67).

An interesting parallel is offered by the Kingston Down brooch (44, see pl. Ib) which, as Kendrick first observed, contains what could be seen as an imitation of millefiore.\(^{68}\) The brooch contains four lozenge-shaped cells,

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three of which retain their garnets and behind each of these are five small squares of waffle-patterned gold foil, arranged in a chequerboard pattern. It is not absolutely clear what material is showing between these squares, but it is most likely to be the usual white backing paste. The overall effect is very muted, and although the brooch was known to antiquarians and scholars from its first discovery in August 1771, it was almost one hundred and seventy years before this feature was noticed. Even Fairholt’s otherwise acutely observed illustration fails to show it, and this must leave some doubt as to the goldsmith’s intentions, since true millefiori is far from muted in its visual impact.

Where the glass for the inlay and imitation jewels or millefiori was made is an interesting question. There is Anglo-Saxon glass of the fifth to seventh centuries in a variety of vessel forms, and the local distribution of many of these types suggest that they were made in England. We have no evidence of fine glass-working workshops in the fifth or sixth century, and it would seem likely that a significant proportion of the glassware of this period was imported, perhaps from the Rhineland. At the time Bruce-Mitford published his account of the Sutton Hoo millefiori, it was his opinion that most other examples of the use of this feature in Anglo-Saxon jewellery were accounted for by the recycling of Roman survivals. It would seem odd, however, that tiny fragments of Roman millefiori should survive for perhaps two hundred years before being put to use. There is evidence of glass working at Anglo-Saxon monastic sites, however, from the seventh and eighth centuries, for example from Monkwearmouth/Jarrow, where millefiori was made, as well as window glass. Fragments of glass vessels are found widely on monastic sites and other estates of the seventh to eighth centuries, such as Whitby in Yorkshire and Brandon in Suffolk, and Barking in Essex has also produced evidence for glassworking on the site. There is still no evidence for the manufacture of glass from its constituent materials in the period for which we have most evidence that glass was used in jewellery, whether for secular use or for ecclesiastical metalwork. It is probably safe to conclude, however, that the goldsmiths did not manufacture the glass they used, although the implication of the imitation jewels is that they worked

69 Faussett, Inventario Sepulchrale, pl. 1.

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it. It must for them have been a trade item (as newly manufactured pieces) or else an opportunistic use of sherds of Roman or contemporary locally made or imported glass.

Enamel

Enamel is a vitreous silica-based substance – essentially glass – which is fused by heat to a prepared metal surface, with metal oxides giving the colours. Gold, silver, copper and iron can all be enamelled, with the first three metals being particularly suited to the technique. The whole subject of early medieval enamelling is badly in need of some comprehensive practical research and analysis. In general, it may be treated as a craft in itself, which it certainly was during the later Middle Ages. It could not be said to be among main skills of the modern goldsmith, and this seems to apply equally to the Anglo-Saxon goldsmith. It is relatively rare among the techniques practised in the early Anglo-Saxon centuries. Buckton identified an hiatus in enamel production on the continent, however, between the 860–870s and the 960–970s, and this was reflected in Anglo-Saxon England: it may be that enamelling expertise and materials became more widely available to goldsmiths after this.\textsuperscript{75} The high profile which enamelling enjoyed to the west of the Irish Sea should not be forgotten. Youngs believes that there is a difference in the composition of the enamels found in Ireland, and those used in Anglo-Saxon England,\textsuperscript{76} which implies that enamels were manufactured locally. Analysis of the different compositions of enamel and their distribution seems to be one of the most fruitful methods of unravelling the early history of the technique (see below, p. 155).

In the early centuries, the technique seems to have been mostly associated with gilt copper-alloy jewellery, where it was only used in small quantities. Hines noted enamel within four of his groupings of sixth-century great square-headed brooches.\textsuperscript{77} Later examples, though still small in number, include some of the most opulent pieces of Saxon goldsmiths’ work, such as the ‘Alfred’ and Minster Lovell jewels (below, p. 154), which are dated to the late ninth century, and an early eleventh-century reliquary cross of unknown provenance, now in the Victoria and Albert Museum, London (\textsuperscript{89}).

Two types of enamelling are known from Anglo-Saxon works – champlévé and cloisonné. In the first of these methods, found in Anglo-Saxon work from the fifth century, the enamel is applied to recessed areas within the thickness of the metal: the recesses may be produced by casting them as part of the piece, or by chasing or engraving. Examples include the sixth-century

\textsuperscript{75} Buckton, ‘Late Tenth- and Eleventh-century Cloisonné Enamel Brooches’, esp. p. 15. For a survey of enamels placing Anglo-Saxon examples in a European context, see Haseloff, Email im frühen Mittelalter.

\textsuperscript{76} S. Youngs, pers. comm.

\textsuperscript{77} Hines, A New Corpus of Anglo-Saxon Great Square-headed Brooches, groups X, XI, XIII, XIX.
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great square-headed brooches mentioned above, but the technique continues to the end of the period with the disc from Brasenose College, Oxford (61), and the disc from Carfax, Oxford (62), both of which are probably of eleventh-century date. In cloisonné work, the enamel fills a pattern of cell-work made up of flattened wires which are placed edge-on to the backing. In all cases, the different colours are in discrete areas, separated by the metal walls. The few examples of cloisonné enamel are from the Middle and Late Saxon periods, the ‘Alfred’ (6, pl. VIIIa) and Minster Lovell (58) jewels, enamelled on gold, being the most notable examples. The origin of the enamel plates in these jewels has been the subject of some discussion (chapter 6), but that in the Minster Lovell jewel fits well with other examples, such as the disc from Great Saxham, Suffolk (36).78 As far as we know, all the other examples of enamelling are on copper alloy.

Anglo-Saxon enamels are mainly opaque, a bright red being the commonest colour, with yellow and blue used less frequently. It has been shown that red enamels can corrode to become yellow or white; Brown and Hughes demonstrated that, in the small sample they analysed, only where red and yellow occurred together was it safe to accept that yellow enamel had indeed been used.79 The modern method of application is to grind the enamel, in water, and to apply the resulting granular paste to the metal. When dry it is heated, usually in a small kiln (although a kiln is not strictly necessary: a hearth would do), until the enamel fuses to give a glazed surface. This is the method described by Theophilus,80 which was the same as that used in the Roman period.81 However, it is not certain that these early enamels flowed as easily as their modern equivalents, and it is possible that, like Iron Age red enamel inlays, they were roughly shaped to fit, heated (presumably in situ) under reducing conditions to a temperature sufficient to soften the glass, and then pressed into place.82 Because this is a rather heavy treatment, this method of enamelling is only applicable to champlvé on fairly robust one-piece castings. Cloisonné enamelling must have been done with a method similar to the modern one outlined above: the integrity of the cloisonné framework’s delicate structure would be threatened by the pressure needed in the older method.

The location of any enamelling workshops in Anglo-Saxon England remains unknown. Scull believed, on balance, that the presence of a group of enamelled gilt copper-alloy dress accessories in sixth-century East Anglia

79 Pers. comm. from P. D. C. Brown, quoting from an unpublished joint paper with M. J. Hughes.
80 Hawthorne and Smith, Theophilus, pp. 126–8.
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was indicative of a continuing Romano-British population and its traditions.\textsuperscript{83} These would have included such skills as enamel working. The fact that enamel has such a low profile within later goldsmithing may be a reflection of this situation. The Sutton Hoo treasure, otherwise the apogee of the Anglo-Saxon goldsmiths’ skills, contains no enamel other than that on the hanging bowls, which, like other contemporary examples of the same form, are probably of Celtic origin. This could be as good an indication as any that enamelling was not widely practised in England in the sixth and seventh centuries. Youngs believes, however, that enamelling was a relatively easy technique to develop, and Stapleton et al. have suggested that the raw material was a by-product of refining silver. Silver-rich litharge slag and cupel debris may have been heated together with base metal, sand and lime. This produces a silver-rich alloy, together with a substance very similar in composition to many early medieval enamels.\textsuperscript{84} Thus, red enamel may be an imaginative reuse of a fortuitous by-product. They also demonstrated that there was a discontinuity in the composition of Roman and early medieval enamels, although the ‘new’ recipe may have been introduced at the end of the Roman period, and that the composition of Anglo-Saxon enamels differs from that used during the Roman occupation and before,\textsuperscript{85} which suggests that enamelling was practised in early Anglo-Saxon England, albeit on a smaller scale than in Celtic Britain at the same period.

Everson proposed the existence of an enamelling workshop in the Oxford area in the tenth century.\textsuperscript{86} The concentration of cloisonné enamelled disc-brooches in the south-east of England may hint at the existence of another source but, as Buckton astutely pointed out, this may simply reflect the modern distribution of metal detectors. Enamel was also found in some crucibles excavated in tenth-/eleventh-century contexts at Cheddar, in Somerset\textsuperscript{87} and this is of interest here, since it implies not only that enamelling was being applied to jewellery, but that the craftsmen were indeed making their own enamels rather than importing them. Much further work needs to be done in relation to this fascinating subject. A newly discovered enamelled disc-brooch (90) is discussed briefly in relation to construction and design in the next chapter (see pl. V a and b).

A further refinement perhaps related to enamelling is the direct inlaying of glass into garnets. This is a very unusual feature, and occurs only on very rich pieces of goldsmiths’ work. On the purse lid from Sutton Hoo (75), there are two cloisonné plaques each depicting a hawk catching what is


\textsuperscript{85} Ibid., pp. 915–19.


\textsuperscript{87} Rahtz, The Saxon and Medieval Palaces at Cheddar, pp. 252–3.
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probably a duck. The eyes of the hawks are tiny circular garnets, with blue glass rings inlaid into them. A seventh-century plated disc-brooch from Kingston Down, Kent (45, pl. IVc) has a similar feature in its central setting, although it is not certain whether the surrounding stone here is glass or garnet, and the recently published pectoral cross from Holderness, Humberside (41), has a central stone with a circular groove cut into it, probably to receive either glass or gold. The circular recesses on these stones would have been made by trepanning, as described for the inlaying of gold into garnets above, p. 146. It is probable that the glass, or enamel, was packed into the resulting depression in powder or granular form, and then fused in the heat of the hearth. Unlike many other stones, good quality garnet such as that used in these examples, is very tolerant of high temperatures, well in excess of that needed to melt glass (around 1000°C) without any loss of colour, provided care is taken to heat and cool the stone gently to avoid thermal shock. As with so many of the questions related to Anglo-Saxon craftsmanship, experimental work is needed to test these ideas. The technique described here, however, should be compared not only to the inlaying of gold into garnet discussed in the section on cloisonné earlier in this chapter, but also to the inlaying of glass ‘jewels’ with glass of a different colour or with metal, in the section on glass.

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Construction and Design

There are clear changes in the style and design of Anglo-Saxon goldsmith's work, between periods, and also between regions. Many of these changes of style relate to broad factors of cultural development and interaction, such as the influence of late Roman traditions of metalworking; the relationship between Celtic, Anglo-Saxon and Mediterranean art in the first Christian centuries; and the influence of Scandinavian art styles as a result of the Viking invasions and settlements from the late ninth century onwards. These very broad issues of dating and stylistic attribution are not in themselves the topic of this book. However, there are some factors in the design of metalwork which can only be explained in terms either of the constraints of the available technology, or in the status of fine metalwork in relation to other arts. There may also be some features of metalwork which particularly well illustrate the aesthetic sensibilities of the Anglo-Saxons. It is such considerations which are developed here.

Apart from a few glimpses, the main evidence for what the Anglo-Saxon goldsmiths were capable of, and what their means of production were, is the jewellery itself. As we have seen, we have very little evidence of workshops, and no truly specialised fine metalworking sites, with the probable exception of Coppergate, York. Even though the huge concentration of fine work in precious metals from late sixth- and seventh-century Kent, and especially the Faversham area, strongly implies the existence of a local production site, as does the place-name itself (see chapter 8), this has not as yet been located. We may still be unclear about how the goldsmiths traded, especially in the earlier centuries, and about how specialised they were. We do not know how many of them there were at any one time, nor for most of the period whether they worked alone or in ateliers (see chapter 9). What we do know, however, is that they possessed great skill in both designing and making.

Design Ideas

It is a truism to say that design does not exist in a vacuum. All design has an historical and cultural context linking it to sources in the past and in contemporary works in other media. Iconography can relate to both
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current ideology, and to the regard in which particular media are held in a particular society. It can also relate to what is usually termed ‘taste’, although for early societies this often has to be deduced from visual characteristics of the surviving designed works themselves. Design, however, also has to be worked out in practice in relation to the materials and technology available, and to the skills of the craftsmen. There is a vast literature on the art of the Anglo-Saxons, and here we attempt to contribute to this from our specialist perspective, rather than to provide a general survey. The design ideas discussed below are an attempt to look at the impact on the design of pre-Conquest metalwork of the materials and techniques available to the goldsmiths, of the prevailing ‘taste’, perhaps of the society but more clearly of the patrons of the finest work, and of the immediate environment in which goldsmiths worked. We have not attempted to cover every possible example and part of the period, the following are case studies only.

Colour and contrast

From observation of the metalwork, it is clear that there was a love of densely packed areas of ornament, but this is usually contrasted with plainer areas, even in such heavily ornamented examples as the gold buckle and garnet work from Sutton Hoo (73–8), or on the later silver disc-brooches (35, 71, 72). Colour, as we have seen in the chapters on decoration, seems to have played a large part in the design thinking of the goldsmiths throughout the period, although the effects achieved altered with the materials available. We have already mentioned the Anglo-Saxons’ love of resplendence in chapter one, and this is exemplified by a particular fondness, in the early part of the period, for a combination of gold with red. The availability of imported garnets had much to do with this, and also the relative prevalence of gold as a material. That this also relates to ‘taste’, or perhaps to the desire to express status, is surely shown by the skill expended in making a little gold look like much more, and the willingness to supplement garnets with red glass. The rich finds of garnet and gold jewellery, whether gold throughout or built up on a base of copper alloy, clearly illustrate this, but even in the early period these were by no means the only colours available to the goldsmith. Contrasts between gold and silver were achieved by inlaying as on the later Strickland brooch (71) and by part-gilding as on the head from Winchester (85, pl. VIb). We know that, in the tenth century at least, they had at least two alloys of copper, including brass, and these were sometimes used to provide a contrast as on the seaxes discussed under inlay in chapter 4. Glass was used in several different colours. Blue glass was frequently incorporated into garnet cloisonné pieces, as well as green. Millefiore glass was used in a few instances to add a combination of colour and fine detail to an ornament, and enamel in
red, blue, yellow and occasionally green and white, although not all these colours were used in all periods. The use of white, in the form of shell or other materials, provided a contrast to the riches of garnet and gold in the early work. Niello added silvery black detail, contrasted with gold, gilding or silver, and in the case of some of the plated disc-brooches, tiny gold rings were inlaid into the niello itself (see, for example, Faversham 26). We also noted, at the end of the last chapter, that at least up to the eighth century, contrast was added by inlaying glass with metal or contrasting glass, and garnet with metal. Difficult techniques did not deter the smiths from the expression of colour and detail. We have also noticed that once an idea was used and was successful, it was repeated many times and in many materials.

In the Cuthbert cross (22, pl. IIIb), however, other influences on the choice of colour and the layout can be deduced. As it is set with garnets it is inevitably red, but as we know, at least one, possibly two, of the stones are not garnet but red glass.1 The centre also features five stones, and each arm is carefully sub-divided into twelve cells. Twelve stands not only for the twelve apostles, but also for the twelve foundations of the heavenly Jerusalem, in the exegesis of which, redness was associated with martyrdom and particularly with the Crucifixion. This association was commented on by Bede, who wrote at length on the meaning of the stones of the Holy City.2 He was drawing on earlier sources but his emphasis seems to have been a new development at this period.3 Blood, gold and jewels are also associated in the opening of *The Dream of the Rood.*4 Although we know this only in the form in which it was written down in the tenth century, some lines from this poem also appear on the shaft of the probably mainly eighth-century Northumbrian cross at Ruthwell, Dumfriesshire.5 Early in the poem, in lines 20–23, the cross is sometimes red with blood, sometimes adorned with treasure, changing even as the observer looks at it, which could be the description of the Cuthbert cross, or a carpet page in the Lindisfarne Gospels. In the poem, the cross in its treasure-laden aspect is overlaid with gold and set with jewels, in particular with five jewels on its ‘eaxlgespanne’, which has been translated as both cross-beam and crossing.6 The implication of this play of forms and its associated ideas, is that while some aspects of design were dictated by

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2 For Bede’s exegesis of Revelation 21:19–20, see *PL* 93, cols. 197–204.
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materials and by adaptation of earlier forms (see below and p. 170), others were a response to the Christian and specifically monastic milieu in which they were actually created.

Borrowing between art forms

The fine arts of painting and sculpture have for so long been dominant in western art that it is rather hard to think back to a period in which they were influenced by other arts which were at the time held in higher regard. The two most commented on arts in Anglo-Saxon England were metalwork and the textile arts, especially embroidery, and it is interesting that even these influenced each other.

Some metalwork borders and interlace panels, for example, were skeuomorphs of patterns which could also be carried out in wire or thread. For example, the beaded filigree on the early seventh-century buckle from Taplow (79, pl. Ia) only appears to be interlaced, there is no real under- and over-plaiting. Where the wires appear to go under, the ends in fact just butt up against the apparently overlying strand, and the three-dimensional effect is enhanced by placing the wire on top of a foil formed with the same pattern (as discussed in chapter 4). Examples of the direct technique of knitted and interlace work in wire include the scourage from the ninth-century Trewhiddle hoard (81) or in Irish art the panels from the underside of the Ardagh chalice, c. 700, which are also of a knitted structure. In Anglo-Saxon metalwork there are panels of filigree ornament which are true interlace, as on the eighth- to ninth-century Windsor sword pommel (86).

The close connection between textile and wire techniques can be demonstrated by a comparison between an interesting use of knots, plaits and embroidery using wire, found particularly in ninth- to tenth-century contexts in Birka in Sweden.7 These are in the Borre style and are reproduced almost exactly on Viking Age sculpture such as the sides of the Gosforth cross.8

Another type of textile skeuomorph has previously been identified in metalwork. This is the reliquary in the form of a bag or purse. These survive in textile form: for example the York silk pouch dated c. 975 to early mid eleventh-century by its archaeological context: it has a crudely embroidered cross.9 Skeuomorphs of these reliquaries in metalwork include the Winchester reliquary (84) of the late ninth century, but there are numerous

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continental examples of the type, including examples of small reliquaries imitating textile purses from Tongres in Belgium and the ninth-century Enger reliquary in Berlin.

An odd skuomorph is an example of a metalwork technique imitated in metalwork. We have already discussed the use of rivets in chapter 3. The Fuller brooch (35, pl. 14) is cited as an example of their use in an aesthetic as well as practical rôle. It may be that the large domes on the great gold buckle from Sutton Hoo (74) are imitations of this kind of rivet, but on a grander scale. They are, in fact, components of the sliding catches which hold the complex structure of the buckle plate together.10 Another fascinating example of this type of skuomorph is to be found in dummy rivets found around the perimeter of the pectoral cross of St Cuthbert, Durham.11 It is intriguing that what was normally a very functional element should become a purely decorative one. It certainly did not make the goldsmith’s job easier to incorporate this feature.

Almost more interesting, however, is that the importance of metalwork as a model for other media can be demonstrated almost throughout the period. The case for fine metalwork pieces as prototypes for stone sculpture, for example, has long been accepted: the effect of metalwork design on early Northumbrian sculpture was profound, becoming a major element of the period style. There were large-scale examples of jewelled metalwork crosses. A picture and a small fragment survive of the great standing garnet and gold altar cross reputedly made by the seventh-century Frankish goldsmith, Eligius (chapter 8). The eighth-century Anglo-Saxon cross from Bischofshofen (11), made from bronze sheet on a wooden core, stands 158cm high. It has vine scroll decoration in true repoussé on the front and the sides are covered with panels in interlace in the Pressblech technique, nailed to the maple base. The cross is edged by punched beading and the front is inset with elaborate glass paste inlays adding colour and contrast. The inspiration of these larger crosses survives in stone skuomorphs such as Acca’s cross at Hexham.12 This had a head of the same type as the Cuthbert’s cross, of which only the lower arm survives, apparently attached to the shaft by a collar with alternate pelletted and square-cut mouldings, imitating metalwork forms such as beading. Sculptures at Hexham, Jarrow and Northallerton also represent jewelled cross heads with central settings and dogtooth borders and on the sides are details which have sometimes been said to be inspired by sculptured friezes of balusters, but which are more likely to be representations of joining strips and concealed rivets, as on the side of the Cuthbert cross.13 The colour

11 Idem, ‘The Pectoral Cross’, p. 318, pl. XVI (4) and (5).
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influence was also strong. The cross of the Crucifixion in the Durham Gospels, a Lindisfarne manuscript, is red painted over yellow, like garnets set in gold foil, and there is evidence for red paint, and even metal attachments, on stone crosses. In metalwork many of the edging details were originally functional elements, either essential to construction, as on strips which joined the back and front of a brooch, or a disguise to what would otherwise be an ugly join. For example the reeded strip discussed in chapter 4 is sometimes forming the join between the back and the front of composite brooches. This detail is found transferred directly to sculpture on for example part of an eighth-century pillar or church furnishing from Escombe, Co. Durham of which the front is a simple wire-like twist.

Some borders of cross shafts have edges like cable-twisted wire, such as on the eighth-century cross from St Andrew Auckland, and others have various forms of beading identical to those known from brooches, for example on the edges of some keystone garnet disc-brooches which can be compared to those on the edge of ninth-century or later grave marker from Gainford, Co. Durham. The implication of the influence flowing from metalwork to other arts is an indication of the esteem in which goldsmiths’ work was held throughout the pre-Conquest period.

Ecclesiastical and courtly influences

The kind of close connection with the design and ideas of the day demonstrated by the Cuthbert cross discussed above can also be found in the surviving work in silver from the later centuries of the pre-Conquest period. The Fuller brooch (35, pl. 14), dating to the late ninth century, is again an important example. On this there are figures representing the Five Senses, with Sight at the centre, and around them all a band of roundels, some purely decorative, others depicting aspects of Creation. The Five Senses are mentioned several times in the Homilies of Ælfric in the late tenth to early eleventh centuries, implying that it was a theme of continuing interest in theological circles. The style of the brooch and its

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16 Cramp, County Durham and Northumberland, pl. 55, nos. 266–9.
17 See, for example, lines 1–85 in his homily for the feast-day of a confessor, in which the five senses are related to the five talents in the parable of the talents: they are a positive benefit to mankind if
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coloration, however, still have many traditional features, for example the basis of the ornament in compass-drawn circles and zones of ornament, and the incorporation of structural features, such as the rivets, into the design. Moreover, the taste for silver inlaid with niello and for lively figural, zoomorphic, plant and interlace ornament set in small fields, link it with a style of design taking its name, the Trehiddle style, from a collection of silverwork found at Trehiddle, Cornwall, in 1774.21 This style too seems to show the makers of fine metalwork as the leaders in the development of a style which subsequently influenced other art forms.

More varied interpretations for the figure on the front of the Alfred Jewel (6, pl. VIIIa) have been proposed, but the two most interesting are that it represents Sight, like the centre of the Fuller brooch (35),22 or that it represents Christ as the Wisdom of God, while the plant motif on the backplate represents Wisdom, the Tree of Life.23 The various interpretations underline the fact that this is an important work, connecting the jewel with contemporary theological thinking and perhaps with contemporary royal affairs. It is not absolutely certain what was the function of the piece, but the most likely is still that it was an æstel, a pointer for reading a book or a book mark, such as those, each worth fifty muncuses, distributed by King Alfred with a copy of his translation of Gregory the Great’s Pastoral Care to every bishopric in his kingdom.24

These and other examples seem to show goldsmiths/designers working close to the centre of royal and ecclesiastical life (see chapters 7–9), and this should not surprise us given the costliness of the materials with which they worked. The influence of their style and technique on other arts, such as sculpture, indicate its contemporary importance compared to those arts we now think of as the ‘fine arts’, as we showed above. Dodwell showed that the style of drawing in metalwork and manuscripts was so similar as to suggest that the executors of work in the two areas were in fact the same people. The example he gave compared the engraving from a portable altar of the first half of the eleventh century, now in the Cluny Museum, Paris (19), with a Canterbury drawing of the same period.25 He also noted the paucity of information about painters and wall-painters, with work in these media only mentioned if it was associated with either a particularly saintly

used in God’s service, although inferior to the inner understanding which allows man to comprehend heavenly wisdom. M. Godden, Elfri’s Catholic Homilies, the Second Series: Text, EETS SS 5 (1979), II, 38; idem, Elfri’s Catholic Homilies: Introduction, Commentary and Glossary, EETS SS 16 (2000), pp. 647–8.


25 Florence, Biblioteca Medicea Laurenziana, MS Plut. XVII.20, f. 1: Dodwell, Anglo-Saxon Art, p. 80.
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figure, or because it was embellished with gold. It may indeed have been the case, as he proposed, that goldsmiths and painters employed by the highest courtly and ecclesiastical circles were in effect the same people. On a practical level, there must have been considerable co-operation between goldsmiths on the one hand and painters and embroiderers on the other, in that the two last named groups of practitioners required material prepared by the former (chapter 3).

DESIGN PROCESS

A major influence on design is the method used to lay that design out in the first place. The use of geometry is self-evident in much Anglo-Saxon art and design. Compasses were clearly an essential tool in the planning of many designs, and their use in the late seventh and eighth centuries in Northumbrian scriptoria is well attested. Radial symmetry in various forms is common, and cruciform arrangements would be a natural consequence of this, even without the influence of Christianity.

A useful example of the effect of this design is the cross found in the tomb of St Cuthbert in 1827, especially when considered alongside other surviving jewelled crosses such as the Wilton (83), Ixworth (43) and Burton Pidsea (Holderness, 41) crosses. In the case of all these cross pendants the design is based on concentric compass-drawn circles, and in the Ixworth and Wilton examples the curving sides of the arms are also arcs of circles for which the centres are spaced around the main circle according to some regular formula. It can be shown that a simple grid structure, in the case of Ixworth (the simpler of the two) of only four squares, and of the Wilton cross of sixteen squares, provides all the points necessary for centring the compass, and for maintaining the relative proportions of details of the designs (fig. 25).

The design principle of the Cuthbert cross is the same, but in style it clearly represents a development, for the narrower arms give greater emphasis to the form of the cross. The arms are still also based on arcs of circles but eight circles, not four, are needed to achieve them. Additionally, the lobes of the central setting are based on a square of which the edges are also equidistant from the centre of the cross, as can be seen by looking at the back. There are other refinements, playing on the theme of the cross, but all use the underlying grid. For example, the main construction cross has been made visible in the medial lines dividing cloisonné cells in the

26 J. Raine, St Cuthbert, with an Account of the State in which his Remains were found upon the Opening of the Tomb in Durham Cathedral, in the Year 1827 (Durham, 1828), p. 211; C. F. Battiscombe, ed., The Relics of St Cuthbert (Oxford, 1956), pp. 287–301. For a fuller discussion of the cross and its history, see E. Coatesworth, ‘The Pectoral Cross and the Portable Altar from the Tomb of St Cuthbert’.

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Fig. 25. Grid lines for construction of designs for Durham (Cuthbert, 22) (bottom right), Wilton (83) (bottom left), and Ixworth (43) (top) crosses.

widest part of the cross arms; other cell walls form a crosslet at the end of each arm; and the centre both has another cross formed in this way, and yet another set diagonally, composed of the central setting and its lobes. The Burton Pidsea (Holderness) cross is a further development because the arms are no longer based on compass-drawn arcs.

The relationship of the design of all these crosses to disc-brooches is very apparent, especially in their very characteristic centre, and all the crosses have other structural relationships with them.

All the features of design isolated above can be found in contemporary manuscript illumination. The artist of the Lindisfarne Gospels, for example, shows familiarity with the disc-brooch, for one carpet page depicts several of the circular central settings with their characteristic surrounds of white material.27 The design technique of grids and compass-drawn circles is immediately comparable to manuscript art of the same date, on which a great deal of work has been done to demonstrate the virtuosity of the Anglo-Saxon draughtsman-painters.28 In the Lindisfarne Gospels the working lines

27 Codex Lindisfarnensis, BL Cotton MS Nero D IV, f. 26v.
28 Coatsworth, ‘The Decoration of the Durham Gospels’; R. D. Stevick, ‘The 4×3 Crosses in the
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for many of the designs can still be seen: their interest for us is that they show, as fact and not speculation, exactly the same design process as has been suggested above for the work of the goldsmiths. One such design provides all the lines necessary, and at the same scale, to produce the Cuthbert cross, including the means to calculate the central circle and its surrounding square, and the centre and diameters of the circles for the arms. This structure, however, has been used in the manuscript as the basis for the apparently very different design at the centre of f. 94v.29 The method of constructing patterns has obviously been transferred from the metalwork to the manuscripts (the approach is quite foreign to the classically inspired exemplars from the Christian Mediterranean world), but in this case the design geometry is so strikingly similar, that we may wonder whether the link between goldsmiths and painters does not begin very early indeed. For example, the use of circles and grids as a basis for the very elaborate patterns in the Lindisfarne Gospels produces some of that manuscript’s most characteristic features, some of which are also reproduced in the cross. The cross (of the Ixworth/Wilton as well as the Cuthbert types) is found again and again in Lindisfarne, sometimes appearing as the void between four circles or roundels placed symmetrically.30 It’s particular form is therefore a result of the design layout method employed.31

An example of a related development is the pendant from Old Westgate Farm, Canterbury (15), which is in appearance a composite disc-brooch with a suspension loop.32 In fact this appearance is misleading because the piece is structurally very different from a brooch: it does however show the influence of a popular design crossing over into new forms. The design of the surface of the pendant is based on three concentric circles. The outer is completely filled with stepped and curved garnet cloisonné work. The middle circle completely contains an equal-armed cross with short stubby arms and semi-circular arm-pits also filled with cloisonné. The arms of this cross possibly originally held contrasting white shell. The raised central boss (the innermost circle) also has garnet inlay. There are in effect two central crosses: a saltire cross of garnets relieved against a white background cross. It is a simpler form of the play of multiple crosses seen in the Cuthbert cross and in manuscript pages. It appears to be a different experiment from the


29 Wilson, *Anglo-Saxon Art*, pl. 29.


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one in which the structure of the brooch itself was adapted to free the arms of the cross, but it is particularly important as showing the influence of the new religious motifs on contemporary secular taste.

Analysis of these methods of laying out design partly answers a question that might be asked, as to where and how design ideas were worked out. The necessity for a process from commission by a patron, through design to implementation are most obvious in the case of valuable and elaborate pieces such as the Sutton Hoo jewellery and the Alfred Jewel, but they must also apply to other works. As Scheller has pointed out, a work of art in the medieval as in all periods was the end product of a working process governed by workshop conditions and techniques.33 The artist must have applied his skills to bringing his commission to a successful conclusion, and one of those skills must have been drawing, which for expensive and complex pieces must have been essential. The evidence of the early Northumbrian manuscripts provides evidence for drawing skills and for a particular technique of drawing for the layout of complex patterns using compasses and grids which must have come initially from the repertoire of skills necessary in native media such as metalwork and woodcarving. The fact that many of the motifs in these manuscripts and in the stone sculpture, both of which media began in England at the same period and also as a result of the influence of the Mediterranean world after the Conversion, are drawn from the repertoire of the metalworker and jeweller would seem to confirm this point. The use of grids and templates for laying out interlace on pre-Conquest sculpture can be demonstrated from the seventh century.34 Bailey has argued the case for the use of templates to account for identical or near identical motif elements in sculpture, whilst accepting that layout on a grid could account for many similarities.35

Scheller, however, is also concerned to explain the lack of drawings, whether explicitly produced as models for the transmission of ideas, or as designs for a work in progress, in the early medieval period. Although there are reasons for a poor survival rate connected with the low value given to such drawings before the fifteenth century, he rightly points out that they could have existed on other supports, including utterly ephemeral media such as the ground, citing classical and biblical references to drawing in the sand.36 He could also have pointed to the practice certainly of later medieval architects, of drawing up decorative details on a plaster floor, which could be smoothed over and used again as a work progressed: an example survives

36 Scheller, Exemplum, p. 2–4.
in situ in York Minster, on the first floor of the vestibule to the chapter house. Scheller does however provide some useful early references confirming the use of wax tablets as a medium on which design ideas could be noted or worked out. Adamnan, abbot of Iona in the seventh century, asked Arculf, a Gaulish bishop, to make sketches of the holy places in Jerusalem on a wax tablet for him. 37 Notker, teacher and musician of the abbey of St Gall, mentions drawing an animal on a wax tablet with his stylus. 38 In the twelfth century, Alexander Neckam in a compilation intended to provide a basic Latin vocabulary in continuous prose, noted that a goldsmith’s unskilled apprentice should have a tablet covered with wax to draw floral ornaments, “lest he should fall into error”. 39 The remains of wax tablets have been discovered in both Ireland (seventh century) and England (eighth century), though in both cases with traces only of writing. 40 The use of bone ‘motif pieces’ or ‘trial pieces’ has already been discussed in relation to Pressblech (chapter 4, p. 109). The fact that some were finished to a degree that suggests they were used in this technique does not preclude their use as a medium for the working out of patterns, as a training medium, or for the transmission of ideas, however, and the very varying quality of the carvings on such pieces, as well as the degrees of finish, suggest that they were used for all these purposes. There are drawings on fly leaves and in blank spaces in early medieval manuscripts which might possibly represent traces of pattern books, or at least motif books in this medium. 41 There are many such in Anglo-Saxon illuminated manuscripts but three, in the Caedmon manuscript, which contains a compilation of biblical poems and an important illustration of the biblical smith Tubal-Cain (see chapter 7, p. 191), are of particular interest to us. 42 Temple believed that they were the work of one of the two artists of the book, so though they may be regarded as additions unrelated to the decorative scheme they are of the same date. The first of these is an unfinished design on p. 225. It shows a repeating pattern of Winchester style acanthus, fully laid out in a square on a diagonal grid incorporating a variety of quatrefoil and more complex shapes, but with the acanthus detail only completed in a minority of

42 Oxford, Bodleian MS Junius 11, p. 54. E. Temple dates it to c. 1000, and ascribes it to Canterbury, possibly from Christchurch. E. Temple, A Survey of Manuscripts Illuminated in the British Isles, 2. Anglo-Saxon Manuscripts 900–1066 (London, 1976), no. 58. It has however been ascribed to other centres, including Winchester and Malmesbury, and to later in the first half of the eleventh century.
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compartments (pl. 29). Running alongside this square is a narrow rectangle of the same height which is laid out as a panel of ornament in the Scandinavian Ringerike style which dates it the period of Scandinavian influence when Cnut and his sons ruled England as well as Denmark, from 1016 to 1042. Kendrick thought this a piece of design work, but thought it was for the binding of the book.\(^{43}\) What the binding of the book was like is unknowable, however, but the layout of the acanthus can be compared very closely to that on a copper alloy mount of the mid tenth century in Winchester City Museum, where the design is laid out in square and triangular compartments, while the narrow strip has a parallel in a copper-alloy rectangular strip, also from Winchester, which has Ringerike ornament very close in layout and feeling to the drawing running along its length.\(^{44}\) No manuscript contains an area of unequivocal Ringerike ornament, or indeed a panel of pure ornament except as a rectangular border, but there are other examples in metalwork, and the combination of Winchester and Ringerike style is most likely in Winchester in the period of the Scandinavian ascendancy. The rectangular strip used to be described as part of a ‘weather vane’, but is now accepted to be a mount for a casket: both elements of this drawing suggest designs for a similar piece. The other


\(^{44}\) Backhouse, Turner and Webster, *Golden Age*, pp. 36–7, no. 18. For the rectangular strip, see *ibid.*, p. 107, no. 102.
two drawings in the manuscript, on page 230 (pl. 30), were described by Kendrick as clasps for the binding, and by Temple as ‘probably’ bracelets, which seems to us the more more likely explanation. These ovals also plausibly represent designs for brooches, with decoration which could be interpreted as either Ringerike- or as Winchester-style ornament if laid out in a ring. We cannot find any exact parallels in the form of brooches, but similar designs are found on Anglo-Saxon gold rings of the tenth century. However, arm rings and brooches remain distinct possibilities: as with most medieval drawings, there is no indication of scale. The appearance of metalwork designs as additional drawings in a manuscript need not surprise us, as fine metalworking was carried on in monasteries, and the relationship between manuscript and metalworking drawing styles can be exemplified for most of the period from the seventh century (see above, p. 165).

THE INFLUENCE OF CONSTRUCTION METHODS AND TECHNIQUE ON DESIGN

Some previous explorations of the origins and derivation of Anglo-Saxon jewellery design have looked at similarities and variations in and between groups of artefacts in order to draw conclusions about methods of production and distribution. Many other studies have been based on

45 Backhouse, Turner and Webster, Golden Age, pp. 98–9, nos. 88, 89.
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aspects of style, date and cultural influence. While both of these are, of course, vital elements in our understanding of the material, it is our belief that the techniques that Anglo-Saxon goldsmiths used are equally important as a differentiating factor and may also be used to determine relationships between objects in and between sites. For example, it can be shown that different sets of skills were required to make composite disc-brooches in which the cloisonné was made entirely from gold, from those required for those brooches in which the cloisonné was made from copper alloy (chapter 5). The distribution of the two materials and forms of construction is also different, with those made all of gold found only in Kent, apart from the Harford Farm example (39); while the copper-alloy cloisonné examples have a wider distribution (Berkshire, Bedfordshire, Suffolk, Cambridgeshire, Hampshire and now London, as well as Kent). Within each of these two broad groups, similarities can be found in the construction techniques employed in different pieces which may imply a common workshop. For example, in the gold cloisonné group, the Amherst brooch from Sarre (66) and the Kingston brooch (44, pl. 1b) have a very similar basic construction, particularly for their centres, and another two from Guiltón (38, pl. VIa) and Faversham (28) are sufficiently similar to each other and to the first pair to suggest that one or at the most two workshops were involved. In the copper cloisonné group, two brooches from Milton North Field (Abingdon, 3, pl. 28, and 4) and the Kennard brooch from Faversham, Kent (29, pl. IVa) are overall of comparable size, have the same type of brooch fittings, and all have comparable cloisonné employing rather small stones in simple, rectangular and half-honeycomb shapes. There are many differences in detail but their generally similar quality of workmanship and common characteristics suggest a common origin. There are differences in the filigree work between brooches in these groups, but evidence from observation supports the view, expressed first by Hawkes, that the maker of the filigree and the maker of the cloisonné were not necessarily the same.

An interesting parallel to the composite brooches is a very small group of tenth-century cloisonné enamel disc-brooches, several of which are gilt. Their number has been added to with the recent discovery of another, probably a metal detector find, in Cambridge (90), to which we have been privileged to have access (pl. V a, b). Because enamel is vulnerable to sudden heating and cooling, soldering cannot be used after the enamelling has been done, so it is necessary to design the piece in such a way that any soldering is done before the enamel is applied. On the other hand, not only is there a risk of the solder discolouring the transparent enamels used in

49 Buckton, ‘Late Tenth- and Eleventh-century Cloisonné Enamel Brooches’, particularly nos. 1–6.
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Fig. 26. Enamel brooch, unknown provenance (90). Section to illustrate construction. Stippled areas are enamel/glass, thick black areas are solder joins.

these brooches, but the enamel melts at a higher temperature than most solders, which means that previously soldered components would be threatened if the piece was enamelled afterwards. The solution with this group of brooches and some other examples, such as the disc from Brasenose College, Oxford (61), is that the enamel panel was made separately and when completed, set like a stone into a brooch of soldered construction. As a result, these apparently simple little brooches are, in reality, quite complex structures (fig. 26). It has been suggested that this type of brooch was usually cast,50 but Buckton describes them as soldered,51 and our investigation of the new brooch, and of good illustrations of some others, showed that this was indeed the case. If they had been cast, however, the need for soldering could have been eliminated, so the question as to why they were not cast arises. There are earlier examples of cast brooches with champlévé enamel (pp. 153–4). As the later ones are of copper alloy, it is unlikely that casting was ruled out on economic grounds. It is possible that the jewellers who made these brooches did not have casting skills, but the most likely explanation, which a modern craftsman would endorse, is that they could be constructed faster than they could be cast. The similarities between these brooches are also strong (p. 151) and they have a limited geographical distribution, so a common workshop is the most likely explanation of their common characteristics in style and design.

The range of knowledge and skills available to the Anglo-Saxon goldsmiths influenced the objects they designed and made, and given that they were working in what must have been a traditional hierarchical working environment in which skills were passed down from master to pupil, changes were likely to have been small and incremental. In the field of handicrafts, the discovery of, and expertise in, any new method of working a material will inevitably lead to innovations in design. While influences from other media and traditions were an important factor, the development of

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design through process is well-known among practitioners in many media today. Once a new technique or method has been discovered, and the practical difficulties solved, the tendency is to capitalise on the knowledge. An example of this is the reeded strip-making, described in chapter 4, where it was shown to have been utilised in a wide variety of applications, some of them relatively trivial. The making of beaded wires in a variety of sizes, the production of waffle-pattern foils to back garnets and the insertion of contrasting materials into glass and garnet are other examples. All these would tax a modern goldsmith severely, if he had to accomplish them without modern equipment, but although found in numerous examples, which give the appearance of being from different workshops, there is remarkable consistency in the quality with which these techniques were accomplished.

The influence of technique on design is not, of course, restricted to new-found techniques. The Anglo-Saxons were accomplished carvers in stone, wood, bone and ivory, and this skill was also applied to metal but in a somewhat indirect way. In fact, the craftsman’s knowledge of his materials and tools dictated a better, more time efficient method: the use of carved models in the making of casting moulds has been discussed in chapter 3, and the carved matrices used in the production of Pressblech panels, in chapter 4.

An impressive feature of Anglo-Saxon goldsmithing, especially from the late sixth-century onwards, is the complexity of some of the construction. The great composite disc-brooches and the Sutton Hoo regalia have been closely studied from this point of view, but many other types have only been assessed structurally on a piecemeal basis. Belt buckles, for example, are often complex arrangements of casting, filigree, gilding, garnet work and niello, while sword pommels and hilts, during their long history, incorporated almost all the goldsmith’s techniques at some stage, with consequent changes in construction. The complexity of the finest gold cloisonné composite disc-brooches as exemplified by the Kingston Brooch (44, pl. 1b) is best illustrated by an exploded drawing showing all its components (fig. 27). This makes us realise what an extraordinary production this was, but it was not needlessly complicated. Each element was essential to the overall effect aimed at, given the materials, tools and techniques available to the goldsmith, and the constraints on him, such as the need to make a little gold go a long way and to use the luxury imported garnets.

Pragmatic considerations including the economical use of recycled material could also apply. Bruce-Mitford showed that the centre of the Cuthbert cross (22, pl. IIIb), a large, flat-topped garnet set into the top of a gold tube, surrounded by several collars of gold filigree and anchored in a setting of white material, is an exact parallel of the central settings of some disc and composite brooches. If it was cut down and adapted from the centre of such a brooch, this gives an insight into the working practices of late seventh century goldsmiths, and into their experimental approach to
Fig. 27. Kingston Down composite disc-brooch (44). Exploded drawing: (1) components of the central boss; (2) garnets and filigree panels; (3) gold backing foils; (4) cloisonné cells; (5) beaded rim wires; (6) base plate; (7) reeded rim strip; (8) back plate.
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design. Its date also provides us with a glimpse of a traditional jewellery style still developing alongside the new monastic arts of manuscript illumination and sculpture.

A small piece found at the Dalriadic metalworking centre at Dunadd appears to be another detached setting, possibly a cover from a concealed rivet, from an Anglo-Saxon pendant or buckle: it is a gold-set cabochon garnet c. 6mm across backed by very fine gold foil and surrounded by three vertically placed bands of very fine gold filigree.\(^52\) It is possible that this was made in Northumbria, and is evidence that settings could be made for one piece, detached (perhaps when the original became old-fashioned or broken) and re-used, like that at the centre of the Cuthbert cross. This in itself is an indicator of working practices and of an approach to design which made the fullest possible use of available materials.

The great silver disc-brooches of the late ninth to early eleventh centuries are not all as simple as they might at first appear. For example a disc-brooch from King’s School, Canterbury is a complex piece 14.1cm in diameter, made of two dished silver sheets riveted together.\(^53\) The upper disc is pierced with shaped compartments and similarly shaped gold filigree panels are clasped between the two discs. The base plate of each of these panels extends beyond the filigree, and it is this which keeps them in place. The few examples of hollow vessels which survive sometimes show more complexity than we would expect. The prime example is the Ormside Bowl (60, pl. IIa,b) which has inner and outer shells, inner and outer base-plates, rivets in collared settings and a complex system of binding around the rim. The domed rivets around the exterior appear to be false – where they are missing the true rivets can be seen. The domes have been set to look like gems, while in fact they are merely a cover for the functional rivets. Many other examples of pre-Conquest goldsmith’s work would repay structural investigation. The complexities of some of these forms are immense, but we know of none where they were not a direct result of the material and technological constraints to which the craftsmen were subject.

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\(^{52}\) Campbell and Lane, ‘Celtic and Germanic Interaction in Dalriada: the Seventh-century Metalworking Site at Dunadd’, p. 56 and fig. 6.6b. Lane and Campbell, Dunadd, pp. 150–1, figs. 4.53, 4.54.

Part II

THE GOLDSMITH IN HIS SOCIETY
7

Imagined Goldsmiths: the Representation of Smiths in Anglo-Saxon Literature and Illustration

In the preceding section, most of the evidence considered came from archaeological sites or from technical descriptions and analyses of the surviving objects. Here we will investigate whether the Anglo-Saxons left any more direct account of their attitudes to smiths, their works, or their working practices, either in their literary or non-literary works or in the inscriptions by or about them which have survived in manuscripts and on the metalwork objects themselves. It is to be expected that the contribution from any single example of these possible sources will be very slight, but the accumulation of small details may nevertheless contribute to the wider picture. Descriptions of objects from contemporary sources, which are usually short on detail other than the precious materials of which they were made, are not included here. This section should, however, be seen in conjunction with the first. The intention is to look at all the evidence, epigraphic, documentary and archaeological, including the technical evidence from the objects themselves, with a view to assessing what it is possible to know about the Anglo-Saxon goldsmith: his place of work and working methods, and the tools and technology he used or had available to him. It should be possible, therefore, to assess where the objects themselves are the only surviving witnesses to either tools or practices, and, indeed, to what extent there is any kind of fit between the evidence from documentary, visual and archaeological sources at any part of the period.

The evidence to be considered here might be regarded as ‘soft’ compared to the ‘hard’ evidence from archaeology and the objects themselves: that is, the manuscript illuminations and the literature, poetic, homiletic and pedagogic, of the Anglo-Saxons. These sources, however, contain many references to smiths and their work, in visual or metaphoric illustration to religious or poetic themes: few if any other occupations are so well represented. Of course the origin of some of the material illustrated is not original to the Anglo-Saxons: for example from the Old Testament a verse of the Book of Genesis, and two of the Psalms have illustrations of smiths. Others however occur in contemporary works of art and literature, and although some of these too have models or analogues outside England,
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contemporary illustrations of smiths and their tools in art and literature are numerous enough to suggest a significant degree of interest in the subject: they are certainly too rich a potential source to be ignored. We believe that (especially taken alongside some of the comparable continental material) they can provide us with some significant insights, especially into the perception of smiths, and their role and status in society.

There are only a small number of representations of smiths at work, or at least identifiable by their accompanying tools, or their working areas. The chronological spread is wide, but not all centuries are represented. There is none earlier than the eighth century, then there is a gap with only some very stylised examples from Anglo-Scandinavian sculpture of the late ninth to tenth centuries. These are all from Northumbria. They are followed by some southern English manuscript depictions of the tenth to eleventh centuries. Three important continental manuscripts of the ninth century, one of them influential in later Anglo-Saxon art, help to fill in the gap. How reliable visual sources are as representations of contemporary objects is, however, a matter for debate. The archaeologist Martin Carver cautiously concluded, from a detailed study of the illustrations in the Harley Psalter (below, p. 193) that some details which differ from its exemplar, the Utrecht Psalter, especially when supported by surviving or rediscovered artefacts, could be said to ‘have probably approached as near to proof of a realistic rendering as possible’.¹ His method involved an examination of the earlier manuscript, and other possible earlier and contemporary manuscript sources, in order to isolate as narrowly as possible that which was genuinely innovative. He was concerned with single objects and building details rather than with scenes illustrating processes, so it remains to be seen whether his method works in these cases. The art historian, Dodwell, looked at a different group of tenth- to eleventh-century manuscripts, The Old English Illustrated Hexateuch and some late Anglo-Saxon Calendars, all discussed below. He was convinced, from his great knowledge of both the Anglo-Saxon and the continental material that these were genuinely innovative, having no identifiable pre-existing models from which to copy. This would make them particularly valuable as evidence for contemporary scenes.² Some details, such as the depiction of the signs of the Zodiac in the Calendars, certainly have classical forerunners, but even in these some details, such as the scales carried by Libra, would have been familiar objects throughout the medieval period, associated with goldsmiths and moneyers.³ Several examples have survived from the Anglo-Saxon period in archaeological contexts (p. 61). Only two of

the poems to be considered were written down earlier than the tenth century: both Æthelwulf’s *De Abbatibus* (Northumbrian) and Alfred’s version of Boethius’ *De Consolatione Philosophiae* (Southern English) are of the ninth century. The remainder survive only in tenth and eleventh century manuscripts and it is arguable whether they incorporate any earlier, perhaps even orally transmitted, material. Other sources include brief forays into biblical exegesis, mainly by Bede in the eighth century, and from homilies, all of which date from the tenth and eleventh centuries.

WELAND AND THE SMITH OF SECULAR POETRY

The most detailed version of the legend of Weland the Smith survives in a poem preserved in an Icelandic manuscript of c. 1270. It starts with Weland and his brothers taking as wives three women who had come flying in from the south, and who are kept from escaping by having their swan-shapes hidden from them. However, they do escape after nine years, and two of the brothers leave to search for them. Weland stays at home, and carries on making rings, and waiting. A king, Nithhad, takes Weland captive along with his treasure; he is hamstrung to prevent his escape, and put to work on an island as the king’s goldsmith. Weland takes his revenge by enticing Nithhad’s sons to come near, when he kills them. He makes jewels for the queen from their eyes, brooches from their teeth for the king’s daughter, Beadohild, and silver-plated bowls from their skulls for Nithhad. When Beadohild brings him a ring to mend, he gives her a strong drink, and rapes her. Then he escapes by making himself wings, and completes his revenge by telling Nithhad what he has done with his sons, and that Beadohild is carrying his child. The legend as recorded in the poem suggests that Weland made swords as well as gold rings, worked bone as well as silver, and set jewels.

The earliest surviving version of the story anywhere, and the earliest surviving illustration of Weland in his forge is not a literary nor even a manuscript illumination. It is on the Franks casket, a whalebone casket of the first half of the eighth century (plate 31). The casket echoes the form of early Christian reliquary caskets, and self-consciously makes use of images drawn from Christian and pagan Germanic narratives, as well as from Roman and Jewish history. The language of the inscriptions uses a Northumbrian or north Mercian dialect, and it would therefore appear to have been made in an educated milieu of the period, undoubtedly a monastery such as Ripon, York, Monkwearmouth/Jarrow or Lindisfarne. The full

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Plate 31. Franks casket, British Museum, detail of front panel showing Weland the Smith.

meaning of its programme has been the subject of much speculation, but the inscriptions, especially of the Germanic scenes, are too enigmatic to allow for a definitive interpretation, although parallels and connections with the religious and historical scenes are clearly intended.5

The scene with the smith is on the front panel. The left hand of the two scenes on this face shows a composite scene from the pagan Germanic legend of Weland the Smith. It has no accompanying inscription.

The evidence for Anglo-Saxon knowledge of this legend comes from poetry (discussed below) and the Franks casket: all these concentrate on Weland’s imprisonment and revenge, or on his status as a smith, omitting the romantic story of the lost swan-wives. The front panel of the casket shows Weland in his forge with the headless body of one of Nithhad’s sons lying at his feet, while he hands Beadohild the laced drink.6 His bent leg possibly refers to his laming. More importantly for us, he is shown working


6 U. Dronke, *Poetic Edda*, p. 270, sees the cup-like object in Weland’s hand as the ring brought by Beadohild, shown in profile. This is possible, but an object of the same form in a scene at the lower left on the back is held by a figure crouched beneath a throne, also possibly Weland: here it is almost certainly a cup.


*Imagined goldsmiths in literature and illustration*

at a bench, represented as a solid block, usefully shown as if in section. The bench is hollowed out on the right-hand side to hold a stake (the small ‘anvil’ of a specialist goldsmith, pp. 64–6) over which he is holding, with a pair of long-handled tongs, the skull of one of Nithhad’s sons represented as a head with hair, held horizontally. On the left-hand side of the block another stake has been driven in, ready for metal to be shaped against it using one of the hammers in the background: one of these may represent the set of tools which in a workshop would most probably be hung in a convenient position on the walls. The hammer hovering in front of Weland, as if held in a third hand, suggests we are meant to see this as an ‘action shot’ in which he is ready to shape the bowl/skull. The semi-circular object in front of Weland’s head could be the mouth of a small furnace. Thus, although the image is stylised, it has the merit not only of being early, but of actually illustrating a narrative in which a goldsmith, albeit a mythological one, is at work, using tools very similar to those in prints of sixteenth century workshops (see pl. 32a, b). There seem to be no earlier parallels for this scene, either in England or in Scandinavia, although of course there may have been examples in wood carving which have not survived. Dronke cites an apparent literary parallel in the cruel treatment meted out to imprisoned slave smiths by Queen Giso of the Rugii, a tribe settled on the Danube in the fifth century, in an eleventh-century life of St Severinus. The slaves are ‘barbarians’, that is pagan Germans. The story includes a young son, taken hostage and threatened to secure the slaves’ freedom. Possibly this story illustrates a phase in the social standing of Germanic smiths, but Dronke considered that the Weland story was probably adapted from the life of the saint.7

Some Viking period cross shafts have images drawn from the Weland story, although all those identified seem to refer to his flight.8 The images of Weland and his flying device are identified by reference to Viking picture stones, such as Ardre VII, Gotland, Sweden, which may be eighth- or more likely ninth-century, and which have fuller versions of the story, but the

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Plate 32. Two views of a sixteenth-century goldsmiths’ workshop, engravings by Étienne Delaune. Both show numerous tools in use or hanging on the walls. (a) Of particular interest are a heavy raising stake at centre front and two lighter examples, one on the floor to the right and another on the wall above it. (b) On the left a goldsmith is drawing wire at a drawbench. Above him, suspended on the wall in two sling-like hangers, are two or three drawplates pointed at each end. One is in use on the drawbench. There is another small stake on the bottom right.

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Plate 32 (a)
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depictions of the forge and tools add no new information. Other images on sculpture which include details of a forge refer to the story of Sigurd, the killing of the dragon, and the traitor smith Regin, often depicted as a headless body, so there may have been some confusion between the two scenes. The cross shaft at Halton, Lancashire, is one of the most complete of these scenes, and it shows two pairs of bellows, tongs of different sizes and hammers. One of the pairs of tongs has a handle, hooked the wrong way to be useful as a grip for pulling (pp. 50–3), but it is unclear whether this was a stylistic flourish, or an attempt at a realistic detail.9

Weland makes several appearances in Anglo-Saxon literature, all of which take a very positive view of him as a smith and as a man. The hero of the poem Beowulf describes his ‘best of battle garments’ as ‘Welandes geweorc:‘ the work of Weland’10. A few lines earlier (405b–406) Beowulf’s mail corselet had already been mentioned – ‘on him byrne scan/ searonet seowed, smipes orpuncum: ‘on him the corselet shone, the shirt of mail sewn by the skill of the smith’. This poem survives in a tenth-century manuscript although its story is set in a much earlier period, and there has been much discussion as to what extent it incorporates genuinely earlier material from the eighth century; or whether it is essentially a product of a tenth-century Christian and courtly milieu and so is indicative of attitudes of that period and background. Opposing emphases have been expressed by two recent writers. One, Lapidge, using evidence of scribal copying practices, the development of linguistic forms and literary comparisons with other eighth-century work, posits an eighth-century archetype, recopied in the late ninth or early tenth century, and a final copying c. 1000, which involved considerable scribal intervention to re-interpret the story for a contemporary audience.11 A rather different view is expressed by Owen-Croker, who sees the poem as the product of a single shaping historian-poet of c. 1000, exploiting older material from the pre-Christian and conversion periods which may have come down in metrical form.12 It is clear that the theme under consideration here was popular in the tenth to eleventh centuries. From a similar date and milieu to the Beowulf manuscript comes a minor heroic poem which mentions Weland, Waldere.13 In this poem (a fragment of a longer poem, of which there is a version, Waltharius, written in Latin in Germany in the tenth century), Waldere is encouraged to fight by being reminded that ‘surely the work of Weland

9 Bailey, England’s Earliest Sculptors, fig. 47, p. 92.
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(‘Welandes weorc’) will not fail any man, of those who can hold war-like Mimming’.\(^{14}\)

The most positive reference of all, however, is in King Alfred’s version of Boethius’ \textit{De Consolatione Philosophiae}, of the late ninth century, in which the figure of Weland, described as ‘the wise’, is substituted for the Roman consul Fabricius, of whom it was said that it was harder to turn him from honesty, than it was to turn the sun from its course. As Dronke pointed out, this is a remarkably forceful statement to apply to Weland.\(^{15}\) The lines in which Weland is praised talk about his dedication to his craft (substituting this for the honesty of Fabricius) and an important point is that the craftsman’s skill is seen as given, or rather lent, by God:

Where are now the bones of the wise Weland, that goldsmith who long ago was the most famous? Therefore I say the wise Weland’s bones, because no one among the inhabitants of earth may lose the skill that Christ lends him. One cannot from a wretched man more easily take away his skill, than one can cause the sun to turn aside, nor can any warrior (turn) this swift sky from its right course. Who knows now, of the wise Weland’s bones, in which grave mound they cover the earth?\(^{16}\)

There is nothing here of the story of enslavement, ill treatment and revenge, such as are alluded to both on the Franks casket and in the later Icelandic saga.

These stories are touched on, but only tangentially, in both \textit{Waldere} and \textit{Deor}.\(^{17}\) In the second of the two fragments of \textit{Waldere} there is a reference to Widia, kinsman of Nithhad and son of Weland, but only as an heroic figure in his own right, with no hint of the story of Weland’s rape of his mother Beadohild. \textit{Deor} also alludes to parts of these stories, but Weland is described as an ‘anhydig eorl’: ‘a resolute (or single-minded) nobleman’

\(^{14}\) A. Zettersten, ed., \textit{Waldere} (Manchester, 1979), lines 2–4a.

\(^{15}\) U. Dronke, \textit{Poetic Edda}, p. 284, n. 61.


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and a ‘better man’ than Nithhad who imprisoned, fettered and hamstrung him. He is an exemplar of suffering and exile: he endured, and his sufferings passed. Similarly Beadheid is also a symbol of suffering and endurance, but although the death of her brothers and her pregnancy are the cause of her grief, Weland is not alluded to as the cause of either. Of course that may have been understood, and the juxtaposition is certainly significant. Deor is interesting and important in the history of the development of the Weland legend, but for us it is significant because though it does not refer to him as a smith, its poet, like Alfred, saw him as a positive figure.

The remaining mentions in secular poetry fall into two categories: those which develop the theme of talents or gifts of men as in Alfred’s translation of Boethius; and those which allude to the products of the goldsmith’s skill, either directly and admiringly, or allusively, as a metaphor for some other admired thing or creature.

In the first group comes the poem The Fortunes of Men lines 72b–76: ‘For some a wondrous gift is wrought by the work of the goldsmith; full often he hardens and well adorns the corselet of the powerful king, who gives him broad lands as a reward. Gladly he enjoys it.’

If this appears to indicate that a goldsmith and weaponsmith/armourer could be one and the same, the best known of this type of poem, The Gifts of Men, also from the Exeter Book, implies a distinction between jeweller and weapon maker:

... some [are] skilled in gold and gems when a protector of men bids him set a jewel with splendour. Some can make many weapons for use in war, a cunning smith when he shapes a helmet or short sword or corselet, gleaming blade or round shield for the war of men; he can make them fast against the flying spear.

The same theme is found in Cynewulf’s Ascension, again in the Exeter Book, lines 240–241a: ‘Sum maeg styled sword./ wæpen gewyrca: ‘Some can make an iron sword, a weapon.’


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The second group describes the products of the smith’s (usually the goldsmith’s) workshop. In the *Phoenix* (also from the Exeter Book) the eye of the bird is described as a bright jewel which has been set by the art of the smith into a setting of gold.

The nature of its eye is striking, in colour most like stone, a bright jewel, which has been set in a golden setting by the skill of smiths.\(^\text{21}\)

Lines 1–380 of the Anglo-Saxon poem are an adaptation of the poem *de ave phoenice* by the early fourth-century Christian Latin poet, Lactantius. The passage in Lactantius’ version reads:

Her eyes are large: you would think them twin sapphires from the midst of which lucent flame flashes.\(^\text{22}\)

The reference to the gold setting and the skill of smiths is therefore the Anglo-Saxon poet’s own contribution, a metaphor to illustrate the brightness of the phoenix’s eyes for his audience. The word used for the setting, ‘goldfate’ could mean thin gold plate or gold foil or leaf (see appendix A), or possibly a container. The brilliancy of the garnets in the Early Anglo-Saxon gold and garnet jewellery was enhanced by setting it in a gold cloison, against a background of stamped gold foil, but this dates from the sixth to eighth centuries, while the date of the poem is uncertain, though it is possibly of the late ninth century.

The Riddles in the Exeter Book refer to the works of smiths, sometimes in allusive descriptions of something else, sometimes, though still allusively, to the works themselves or the smith’s tools. Of the first type is Riddle 11 in which an ornamented cup is described as a ‘dress’ for the wine:

My dress is grey-coloured, bright with a jewel,
red and gleaming on my garment.\(^\text{23}\)

Riddle 14 refers to a drinking horn, once the weapon of a wild beast:

I am an armed warrior. Now a proud young warrior covers me with gold and silver, wound about with wire ornaments.\(^\text{24}\)

\(^{21}\) Is seo eagebyrd
steac ond hiwe stane gelicast,
gladum gimme, þonne in goldfate
smilpe orþoncym bisetæ weor_deck.


\(^{22}\) ingentes oculi: credas geminos hyacinthos,
quorum de medio lucida flamma micat.


\(^{23}\) Hraegl is min hasofæg, hyrste beorhtæ,
reade ond scire on reafe minum.


\(^{24}\) Ic was wæpenwiga. Nu mec wolne þeceð
geong hagostealdmone golde and sylfore,
woum wirbogum.


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Riddle 20 describes a sword in similar terms.\textsuperscript{25} Riddle 26 describes a book, possibly a gospel book, in words which remind us not only of surviving examples of rich book covers, but also of a gift by goldsmiths Ælfric and Wulfwine for the covers of the Thorney Abbey Gospel Book (p. 222):

Afterwards a man covered me with binding, stretched a skin over me, adorned me with gold; thus I am enriched by the wondrous work of the smith, wound about with wire.\textsuperscript{26}

The solution to no. 55 is more disputed: it could refer to a cross, a sword, or a sword rack. Whatever it is, it is ‘adorned with twisted gold, plated in silver, inlaid with jewels’.\textsuperscript{27}

Those that refer to tools or materials are rather interesting. No. 83 is thought to refer to the raw material, ore.\textsuperscript{28} No. 91 has ‘a key’ as its solution, but refers to its process of making:

My head was struck by hammers,  
scared by a pointed implement, scoured by a file.\textsuperscript{29}

The pointed implement could be a drill, a scriber or a graver, but the first is the most likely in connection with a key. Nos. 37 and 87 describe bellows through their actions.\textsuperscript{30}

In general, therefore, the poetic references with their associations with a courtly and educated secular milieu are expressive of a positive pleasure and interest in the works of smiths, particularly weaponsmiths and goldsmiths. It is not clear what the inclusion of smiths and weapon smiths in lists of those with specific gifts tells us about smiths’ own status, but their association with the interests of the wealthy elite is perfectly clear. The treatment of Welend belongs essentially to the same milieu: Welend was held captive by and worked for a king, and he is held up as an example to be admired, both for his steadfast endurance and for his skill as a smith in the areas of weaponry and jewellery which would have interested the audience for the poetry most.

\textsuperscript{25} Krapp and Dobbie, \textit{Exeter Book}, pp. 190–1, lines 1–8a, 32.

\textsuperscript{26} \textit{Ibid.}, p. 193, lines 11b–14:

\begin{quote}
Mec sip\textit{pan} wrah  
ahale\textit{ð} hleobordum, hyde bepene\textit{d}e,  
gierede m\textit{ec} mid golde; for\textit{h}\textit{jon} me gli\textit{w}edon  
wa\textit{el}tic\textit{e} weorc smi\textit{p}a, wire bif\textit{ong}en.
\end{quote}

\textsuperscript{27} \textit{Ibid.}, p. 208, lines 3–4.

\textsuperscript{28} \textit{Ibid.}, p. 236.

\textsuperscript{29} \textit{Min heafod is} homere gep\textit{ur}en,  
searopila wund, sworfen feole.  
\textit{Ibid.}, pp. 240–1, lines 1–2.

\textsuperscript{30} \textit{Ibid.}, pp. 198–9, 239.
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TUBAL-CAIN AND THE SMITH OF BIBLICAL AND HOMILETIC COMMENTARY

The remaining illustrations are manuscript paintings and drawings of the tenth and eleventh centuries, and the probability has to be considered that some or all of them are copied from other manuscript models. The earliest manuscript illuminations of smiths, though not Anglo-Saxon, are very interesting therefore, because both illustrate the same passage from the Psalms but in very different ways. The first, the Stuttgart Psalter of c. 820–30, was possibly made in northern France at a centre such as Amiens, Corbie, or St Germain-des-Prés (pl. 39). In it, illustration of the psalms provides in some instances a literal rendering of the text. The scene in question is the only painting of a smith at work, and it is part of the illustration to Psalm 105 (106) which at v. 19 refers to the making and worshipping of the Golden Calf. It shows both the finished image and on the left a smith hammering a bar on what looks like a substantial anvil. He is forming the bar against the flat of the anvil. His assistant, who is seated on the ground, keeps the fire going with a pair of bellows. The Utrecht Psalter, made at Reims c. 820–23, illustrates Psalm 11 (12), on f. 6v, in a less literal way (plate 33). This psalm has, as a metaphor for the purity of God’s promises, an image of silver refined seven times in the furnace. This is rendered as a smith working with hammer and tongs at a hearth/forge apparently represented as raised on legs like a table. The process depicted refers to the art of the smith in changing metal, not his skill in refining, but this in effect means that the smith is a metaphor for God as Creator. What must be the refined silver runs from the fire in a stream. The last detail is poetic, since neither shaping with a hammer nor cupellation for silver would result in a flowing stream. His assistant, who is presumably working the bellows, is protected behind a fire screen. The hearth stands beneath a canopy with a tiled roof representing the workshop.

Another illustration, on f. 74r, for Psalm 128 (129) has at its centre a forge at first glance of the same design as that on f. 6v, but viewed from a different angle (plate 34). This rather confusingly seems to show that the hearth is not a table after all, but in a screened area (perhaps to shelter the fire from the wind), with a fire screen to protect the bellows at one end, and with a post for the stake or anvil, or the cushion stake itself, close to the fire. Both versions should be compared to the reconstruction of the

33 De Wald, *Illustrations*, pl. CXIII.
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Plate 33. Utrecht Psalter (Utrecht University Library MS 32), f. 6v.

Plate 34. Utrecht Psalter (Utrecht University Library MS 32), f. 74v.
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Plate 35. Utrecht Psalter (Utrecht University Library MS 32), f. 35v.

goldsmith’s hearth and fire screen as described by Theophilus (see pp. 29–32 and fig. 2).

The third scene shows swordsmiths at work, but is an interesting depiction of some relevant equipment. It is on f. 35v, and illustrates Psalm 63 (64).34 It shows two methods of filing and grinding swords, an extraordinarily detailed look at this process since the Psalm is saying that true protection lies in God, not in swords and bows and arrows (pl. 35). In the first scene a swordsmith sits astride a bench and grips a large file in both hands, using it to file the flat of a sword blade. The other shows a grindstone mounted on an axle set between two crude posts. One worker turns the grindstone by means of a handle, the other perches apparently above it and sharpens the edge of a sword against the edge of the grindstone. The position of the grinder above the stake may be realistic as this action requires less muscle power than pushing a blade against a turning wheel from the front.

Anglo-Saxon manuscripts with scenes of smiths are later, dating from the tenth to the eleventh century, and from southern England.35 One is the Harley Psalter, the eleventh-century Anglo-Saxon copy of the ninth-century

34 De Wald, Illustrations, pl. LVIII.
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Plate 36. Harley Psalter (British Library, MS Harley 603, f. 6v, detail).

Utrecht Psalter. The illustration on f. 6v illustrating Psalm 11 (12), showing the psalmist and two smiths at a forge, is simply a rendition of that in Utrecht. A number of details illustrate this point: for example the hammer looks more like an axe, the fire screen looks less solid, and the fire is perched uncomfortably near the edge of the hearth (pl. 36). These changes do not, unfortunately, suggest either copying from life, or revision of the exemplar from contemporary knowledge. This scene dates from the first half of the eleventh century and is by Hand A, who has been described as the least accurate of the earliest group of copyists of the Harley Psalter. There are


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Plate 37. Harley Psalter (British Library, MS Harley 603, f. 67r).

no other scenes of smiths in this manuscript, but several others show men or demons using tools which could also be used by smiths. For example, the illustration to Psalm 38 (39), on f. 22v, shows figures with a variety of measuring techniques. In front of the psalmist are three demons: one counts on his fingers, one holds a measuring tape, and the third holds a pair of scales and an open coffin. On the upper left, a man sitting in the porch of a building holds another set of scales. This scene is by Hand B, also of the early eleventh century, and is close to the original in Utrecht. The illustration to Psalm 119 (120) on f. 64r shows a worker with a hammer and a chisel, clearly a stone mason. This drawing is by the late eleventh-century Hand F, the most original of the Harley artists, who devised his own compositions though often borrowing elements from the Utrecht Psalter.37 The same hand drew f. 67r, the illustration to Psalm 128 (129) but instead of a forge, it has in the centre two figures attacking a hunched bearded man (a personification of Israel) with a hammer and a pair of tongs holding a burning coal (pl. 37).38 This is a much more literal rendering of the text than in Utrecht.39 The Utrecht Psalter, therefore, shows two versions of a hearth setting, of which the Harley Psalter merely copies one, while the second is replaced with another motif, alas, by the most original of the Harley artists, so we have no new or

38 Ohlgren, Anglo-Saxon Textual Illustration, pls. 2.39, 2.83, and 2.89.
39 ‘“Sorely have they afflicted me from my youth,” let Israel now say – “Sorely have they afflicted me from my youth, yet they have not prevailed against me.”’ Psalm 129, vv. 1–2.
confirmatory data of a smith’s working area from this source. Apart from the illustrations of Psalm 11 (12), the forge and smiths with their tools tend to be symbols of human futility or cruelty: the smith can represent either God the Creator or the Devil and his works, according to context.

Two other illustrations in this manuscript show men with the kind of long-handed tongs which may have been essential for some operations in the smithy, though in both cases they illustrate men baking bricks: on f. 18v, in an illustration of the building of the tower of Babel (Genesis 11, v. 3); and on f. 80, illustrating the afflictions of the Israelites in Egypt (Exodus 5, v. 14). On f. 19r two men are shown at work attaching elaborate wrought iron furniture to a door of the tower of Babel. Two different types of hammer are represented, including a claw hammer, and they seem to be hammering nails with large flat heads. Although the iron work must have been made by smiths, the men represented are clearly carpenters assembling the door.

There are other manuscripts which incidentally illustrate other relevant tools, though not in connection with smithing. For example, an eleventh-century calendar illustrates July with a scene of mowing with six men: the first on the left sharpens his scythe with a file. The scene for November, building a fire, shows a man tending the fire with tongs.40

The two remaining depictions of smiths in Anglo-Saxon art illustrate

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40 London, BL MS Cotton Julius A. IV, ff. 6 and 8.
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Genesis 4, v. 22: Lamech took two wives, of whom the second, Zillah, bore Tubal-Cain ‘the forger of instruments of bronze and iron’. The first depiction, in a tenth-century compilation of biblical poems, shows Tubal-Cain with hammer and tongs at a very stylised stake (pl. 38). It has been described as the type of horned anvil driven into a heavy block of wood, as found in Scandinavia, but this is not accurate. It is in fact more like the heavy cushion stake, or ‘teist’ used until very recently by cutlers, for example in Sheffield (the centre of British cutlery production), and therefore suitable for the production of blades. This is the same manuscript as that which includes possible patterns for metalwork objects (pp. 168–70). The second is rather more informative. The eleventh-century Anglo-Saxon illustrated Hexateuch shows, on f. 10, Lamech with his two wives, Adah and Zillah. On the right, Tubal-Cain and his assistant work at a smithy rather more fully realised than any since the Franks casket (pl. VIIb). The assistant stands on the left with a pair of tongs, ready to take and re-heat, or perhaps having just handed over, the wedge-shaped object the smith is working on. In his left hand he holds the bellows, ready to fan the fire when needed. Tubal-Cain stands behind a substantial bench apparently built up out of blocks of stone. More wedge-shaped objects lie awaiting attention (or finished) on the upper surface. At the end of the work bench is a stout post into which a stake has been driven. Tubal-Cain is working the object on the stake with a hammer. Relative to the smith this is a big hammer, possibly a sledge hammer, which suggests he is not doing fine work. The scene possibly illustrates the earliest stages of forming a blade or a spear-head. Tongs, hammer and anvil are realistically drawn which may lead us to conclude that the objects being worked are similarly realistic. Two men working, one heating and the other hammering, suggest blacksmith’s work. It is interesting to note in support of this that the smith appears to be holding the object he is working in his hand, which suggests it is not hot, as most modern viewers would expect. It could be a malleable metal, such as copper-alloy, silver, or gold or, more likely, it could be an accurate depiction of a smith exploiting the poor heat conductivity of iron in the manufacture of a blade.

The two depictions of Tubal-Cain differ from each other, but both have some possibly realistic detail, distinguishing them as workers in bronze and iron rather than goldsmiths. It also appears likely that they have no

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forerunners and are genuinely innovative iconographically, unlike the Harley Psalter smiths, but like the scene on the Franks casket. Dodwell argued strongly for the originality of the full programme of scenes in the Old English Hexateuch.\textsuperscript{45} It has been argued that the illustrations of both manuscripts with Tubal-Cain images go back to a lost Byzantine original, but even on this reading, the scenes with Lamech and his family seem to be different from anything in the putative pre- and post-history of the theme.\textsuperscript{46} The possibility that Tubal-Cain is being clearly represented as that specialist blacksmith, the weapon-smith, is interesting in the light of the theological connotations of this figure.

For Tubal-Cain could be a rather negative image of the smith, especially in his role as weapon-smith. He is after all, a descendant of the murderer Cain. This view depends on how much weight is placed on the influence of traditions drawn from the Old Testament apocrypha, particularly the Book of Enoch, on Anglo-Saxon thought. In Genesis 6, vv. 1–4, it was the ‘sons of God’ who ‘saw the daughters of men were fair, and took to wife such of them as they chose’ and had children by them ‘the mighty men that were of old, the men of renown’. In I Enoch 8, v. 1 this story is elaborated on and considerably darkened: the ‘sons of God’ have become fallen angels who fathered giants and other monstrous progeny, and one of them, Asael, ‘taught men to make swords and daggers, and shields and breast-plates’.\textsuperscript{47} Much has been made of this connection in the particular case of the poem Beowulf, in which the monster Grendel and his mother are of ‘the race of Cain’ from whom sprang monsters and giants, condemned to the wilderness as a result of Cain’s crime, while the sword which slays Grendel’s mother is ‘the work of giants’.\textsuperscript{48}

There was undoubtedly a strong Jewish tradition, reflected also in early Christian writers such as Origen, that smithcraft was inherently evil. In Christian art, depictions of smiths could certainly be associated with human folly or wrong-doing as in the making of a graven image from the Stuttgart Psalter (pl. 39). However, there was an alternative Christian view, for example in the work of the fourth-century Christian poet, Claudius Marius Victorius. In his poem Alethia, based on the first chapters of the Book of Genesis, Adam and Eve after their expulsion from Eden attack a serpent, the image of their betrayer. One of the stones they throw causes a spark which starts a huge fire, which they watch in fear and awe from a safe vantage point. The earth pours forth its metals, gold, silver, copper and iron

\textsuperscript{45} Dodwell and Clenoe, The Old English Illustrated Hexateuch, pp. 65–73.
\textsuperscript{48} Beowulf, lines 107 ff and 1258 ff. For a summary of this reading of the poem and the effect on the image of the smith Tubal-Cain, see for example A. Orchard, Pride and Prodigies: Studies in the Monsters of the Beowulf-Manuscript (Cambridge, 1995), pp. 64–6.
in separate streams, which then change colour, stiffen and solidify as they cool. Adam and Eve recognise both fire and fire’s usefulness as an undeserved gift of God, and quickly experiment with the lumps of metal, recognising first the softness and relative ease of working gold, to which they are also attracted by its beauty, gradually working their way through the metals, silver, copper and iron, in order of hardness and practical usefulness.\footnote{The account given above is a synopsis of the translation of Alethia, Book II, lines 90–162, in O. J. Kuhnmuench, Early Christian Latin Poets (Chicago, 1929), pp. 333–46, esp. pp. 332–9. The full Latin text of the poem is in P. F. Hovingh, ed., Claudii Marit Victorii, Alethia, CCSL 128, pp. 115–93, esp. pp. 150–3.} The poem survived from antiquity in one ninth-century manuscript.\footnote{Paris, Bibliothèque Nationale, MS lat. 7558.}

There are two points which should be made here. One is that the passage in The Book of Enoch does not stop with the reference to the making of weapons. Asael also taught men:

the metals of the earth, how to make gold, to fashion [adornments] and about silver, to make bracelets for women, and he instructed about antimony, and eye-shadow, and all manner of precious stones and about dyes and varieties of adornments; and the children of men fashioned them for themselves and for their daughters and transgressed.

It is generally puritanical, and goldsmiths and the makers and users of cosmetics are included in the condemnation. It is in mapping this on to the biblical figure of Tubal-Cain, the maker of bronze and iron, that the connection with weapon-smithing is made.

Plate 39. Stuttgart Psalter (Stuttgart, Württembergische Landesbibliothek, MS bibl. fol. 23), f. 121r.
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Bede, who is sometimes cited as an example of the influence of the Old Testament Apocryphal tradition, actually takes a much less dramatic view. He agreed in his commentary in Genesis that, if mankind had behaved in accordance with natural law after the expulsion from the Garden, it would have had no need for crafts such as metallurgy. He added that nevertheless:

there were among God’s people men “learned in all the works of bronze and iron” and of silver and gold as well, but [God] Himself instructed them to apply this art to the construction of His tabernacle. The prophet (Isaiah II, 4) as he was preaching the joys of the Lord’s incarnation, also foretold that hurtful works of iron must be taken away and altered for the better.\(^5\)

His view seems to echo the story in the poem Alethia where metallurgy was a gift of God. At the very least, even in biblical exegesis there was a distinction between the smith as an exemplar of fallen humanity, and smiths required for necessity and for the beautification of the church. This distinction is probably also present within the pages of Beowulf, since it is hard not to take ‘Weland’s work’ and other references to objects and hangings adorned with gold, as other than admiring descriptions.

In the poem Genesis A, which appears in the same manuscript (Junius 11) as the first of the two depictions of Tubal-Cain described above (plate 38), Tubal-Cain is described in terms which suggest he was seen by the writer as a benefactor:

Also in that tribe [of Cain] there was at that time a young man called Tubal-Cain. He, a son of Lamech, through the innate power of wisdom was skilled in smithcraft, and through intelligence of mind, the first of men the originator on earth of the forging of ploughs, when the people, town-dwellers, widely knew how to employ bronze and iron.\(^5\)

This approach to the smith could be connected with a marked change in attitudes to what we now call crafts, in the early medieval period.\(^5\) Isidore

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Swylce on ðiere megðe maugæ wæs haten on þa ilcan ðid tubalcain se þurh syntro sped smiðcraftega wæs and þurh modes gemynð monna ærest, sunu lamehæ, sulhgeweorces fruma wæs offer foldan sūðan folca bearn æres cuðon and isernes, burhsittende, brucan wide.

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of Seville in the seventh century associated medicine, astrology and certain crafts defined as *mechanicae* with the quadrivium, which means they were associated with the liberal arts and with philosophy. The evolution of the term *mechanicae* or *artes mechanicae* to include those crafts which in the ancient world had sometimes been described as *artes sordidae*, implies the development of a concept of technology, and this has been described as a distinctively medieval achievement. It was probably the pre-existing high regard for arts such as metalwork and textiles among the Germanic peoples that led to this change in attitude (see chapter 6). There was therefore no necessary conflict between the secular admiration for the goldsmith, weaponsmith, or even blacksmith, and the religious view. In fact there was considerable flexibility in the use of the smith in imagery in both art, as we have already seen in the variety of images in the Stuttgart, Utrecht and Harley Psalters, and literature.

To take another example, one of the most attractive smiths in Anglo-Saxon literature was the monk-blacksmith Cwicwine, the pious worker in iron (*ferrario*) in the poem *De Abbatibus* by Æthelwulf, written at the very beginning of the ninth century and describing the foundation and growth of a cell of the monastery of Lindisfarne in the eighth century. Cwicwine is commended for his active piety, but there is also a lively account of his smithing which makes it clear he was a blacksmith: ‘His hammer under wise guidance crashed on the iron placed under it in different positions on the anvil while the forge roared.’ A blacksmith would be able to turn his hand to working copper or copper alloy, and indeed we are told that ‘the hammer rang on the anvil as the metal was struck, and as it flew and smote the empty air, it decked the table of the brothers by beating out vessels’ – a technique applicable to copper alloy but not to iron (see chapter 1). The description of iron being moved into different positions is an accurate description of forging whatever the metal: it is the metal which is moved not the position of the hammer. This would not necessarily mean, however, that Cwicwine was practised in the techniques appropriate to fine metalwork.

Perhaps unsurprisingly, however, the darker tradition of smiths and smithing as an exemplar of fallen humanity appears in homiletic literature, often based on stories from the early church fathers. Homilies and sermons like most of the poetic literature survive only in manuscripts dating from the late tenth century and later. Popular subjects in these, as in many later sermons, were the end of the world and the hell which follows for the sinner. They have a completely different tone from the poetry. The smith and his forge occur in them as metaphors for the devil and the horrors of hell respectively. It is not necessary to detail every example, but one or two can

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give the general flavour. A typical version is in the Tiberius manuscript in the British Library, which preserves the full version of a story in which the devil visits an anchorite and reveals to him the horrors which await the unrighteous in hell, and the delights reserved for the saved in heaven. The description of hell starts on line 35, and translated reads:

Then spoke the devil to the anchorite thus: “Yet one encloses the ocean from the outside with iron walls and fills it with fires as far as heaven’s roof and outside besets it all with smith’s bellows so close together that they touch each other, and at every bellows is seated a man with the strength of Samson . . . and then besets with iron plates the fire’s roof, and it is all filled with men, and each has a hammer in his hands, and then begin all together to shout and beat the hammers, and nevertheless in spite of all the din, the soul that had been in hell for one night cannot rest therein from the terrors that it had seen sufficiently that he should ever be able to forget that anguish for one half hour of the day.”

An interesting version of this story explicitly uses the smith as a metaphor for the devil.

For he did not want to be with Our Lord in glory with prosperity and with bliss without toil, therefore God gave him an abode which he will never inhabit toilless, for he is a smith, and his hearth is tribulation and miseries. The hammers and the bellows are the trials (temptations), the tongs are persecutions, and the files and saws are the punishments (?torments, ? evil deeds) of men, which produce hatred between fellow Christians, so that joyfully they speak evil. Through such a smith and through such a tool, Our Lord purges (?cleanses, purifies) the holy souls, but from the evil men God Himself takes the punishment.

There is therefore a contrast between the literary and homiletic approaches to smiths and smithing, probably reflecting the different preoccupations and


58 þa cwæþ se defol þu git to þan ancræþ þu: “peah mon þun garsig mid isenan wæalle utan betyne and hine man þanne fylle feores of heofones hrof and hine mon þanne utan besite æal mid smjobjegum swa þice þet hiora ale orprum anhrine and si þonne to eghwylcum gelge man gesitted, and se hebbe Samsones srengþe . . . and mon þonne gesytte isern þel ofer þes feores hrof, and þet sio eal mid mannum þonne afyllod, and hiora hebbe æghwylc hamor on onda, and hit þonne anginne eal ætgidre brastangan and þa hameres beatian, and þeahhwæper for eallum pisam gendene ne meg sio saule hi gerestian inne of þan egesan þe he ær geseh þo þet heo þa yrmbe æfre ma forgtian mage ane helfe tid dages þe ær wes ane niht an helle.”

For he hold beon mid uren Drihtene on wuldre mid wele 7 mid blisse buten gesewine, þa gef God him ane wica þæt) he nære ne byð (ge)swnycleas, for he is smið, 7 his heorð is seo gedrefodnysse, 7 seo tyntrega. þa hameres 7 þa beliges synden þa coostina, þa tangen synden ehteres, þa fielen 7 þa sagen synd þære manna tungen, þe wyrcð hatunge betweene heora emcristene, 7 blödelice specað yfel. þurh swycle smið 7 þurh swycle tol, gechlæsa ðre Drihten ðære halgena sawlen, ac of þan yfelæ mannað God sylf nynnð þa wræce.

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interests of the milieus in which they were composed. It is notable, however, that even in the second of the two examples above, the devil-smith is still within the compass of God’s plan for salvation. In the case of the sermons, however, the tradition which associated Tubal-Cain the smith with the ‘race of Cain’ clearly did prevail, but it is equally clearly a metaphor for man’s fallen condition, not to be taken literally as a judgement on real smiths and their works. It is also the fire, heat and noise of the blacksmith’s forge which prompts the metaphor, not the more small-scale operations associated with the goldsmith. The noise and dangers which placed smiths’ workshops in monasteries, but also put a distance between them and other workers in quieter occupations and even more between them and the spiritual life of the monastery, must have provided a practical reinforcement of the homiletic point (see pp. 23–6).

It is fair to say, therefore, that there is a distinction between the literary treatment of the goldsmith and top-level weapon smith on the one hand, and the ordinary blacksmith on the other, and this may be connected with their different status in society. The blacksmith is seen as of general use and benefit, as in Genesis A, and in De Abbatibus, but is also more prone to be used as an exemplar of fallen humanity. All the smiths who are identifiably blacksmiths appear in homilies, or in poetry which is clearly from a monastic milieu, whether it is describing examples of possibly real blacksmiths such as Cwicwine, or in biblical paraphrase. The goldsmiths and weapon smiths may have a biblical connection, but they also appear in secular poetry and art: their context is very clearly with the social and economic elite.

THE SMITH IN COLLOQUIES, GLOSSARIES AND GRAMMARS

There is another source of evidence for vocabulary related to smiths and smithing, which belongs clearly to the tenth and eleventh centuries, although it too has earlier roots. This is the work of Ælfric of Eynsham, specifically in the colloquy, grammar and glossary written by him.

Colloquies (from the Latin ‘colloquia’: ‘conversations’) are a ‘form of school-room exercise designed to teach young oblates how to converse in Latin’.\(^{60}\) They were not a new pedagogic technique, having originated in late Antiquity, but from the late tenth century and especially as a result of the Benedictine reform of the monasteries, they became an important tool in the revival of Latin literacy and learning. As they were intended to be practical guides to real conversation, we should take notice that words for smith’s tools and smithcraft play a role in this developing educational

\(^{60}\) M. Lapidge, ‘Colloquies’, Blackwell Encyclopaedia, eds. Lapidge et al., p. 117.
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literature. Ælfric’s Colloquy is famous for making the school pupils take on the roles of craftsmen and tradesmen, including the smith.

Alongside this, however, must also be seen Ælfric’s other great educational text, his grammar and its related glossary. This is recognised as a radical departure from traditional approaches to the teaching of Latin for a number of reasons. One is that Ælfric uses the vernacular as his medium of instruction, so that even if Latin learning failed again, it could be relearned as long as anyone could read English. Because this was related to the same practical project as the Colloquy, it is as much concerned with vocabulary as inflections, and he used vocabulary examples of local usefulness and vignettes from real life, supplemented by a Latin-English glossary with the same bias. In these as well as the Colloquy, the smith and his tools figure largely.

The Colloquy, of course in Latin, is preserved in four different manuscripts, one with an interlinear gloss in Old English: opinions differ over whether this was provided by Ælfric himself, or by another teacher using his material. One argument against his authorship is that Latin words in the Colloquy are glossed differently to the same words in the glossary. Examples of this include some words connected with the smith: for example ferrarius (ironsmith) is glossed ‘isenesmēþ’ in the Colloquy gloss and ‘isewyrhta’ in the glossary; aerarius (bronzesmith) appears as ‘arsmiþ’ in the Colloquy, ‘maestlingsmiþ’ in the glossary. However, we should remember these are teaching tools which would have been used by many teachers subsequent to Ælfric himself, any of whom might have used a different English word for his translation. From our point of view, it might be useful to know that ‘arsmiþ’ and ‘maestlingsmiþ’ were sometimes treated as synonyms (see appendix A).

The point of the colloquy as a method of instruction was that the pupils had to be provided with an adequate vocabulary for every day use, for they were supposed to avoid the vernacular at all times. The many glossaries in late Anglo-Saxon manuscripts were presumably drawn up to fill this need, and the Colloquia of Ælfric of Eynsham and Ælfric Bata, his pupil, were a pleasanter though still traditional method for getting students to commit Latin words to memory and so improve their vocabulary.

The section of Ælfric’s Colloquy gloss concerning the smith goes as follows (lines 203–32):

O monk, you that address me, behold, I have proved that you have good and very necessary companions; and I ask who they are.

I have smiths, ironsmiths, a goldsmith, a silversmith, a bronzesmith, a carpenter, and many other different craft workers.

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Imagined goldsmiths in literature and illustration

Have you a wise counsellor?
Certainly I have. How is our gathering to be instructed without a counsellor?
Wise man, which craft do you think is first among these?
I think God’s service holds the primacy among the crafts, just as it says in the Gospel: “First seek the kingdom of God and his righteousness, and these things will be added unto you”.
And which do you think holds the primacy among the secular crafts?
Agriculture, because the farmer feeds us all.
The smith says: From where does the ploughman get his plough share or couter, but from my skill? Where the fisherman his hook, or the shoemaker his awl, or the tailor his needle, if it is not from my work?
The wise man replies: Truth verily says, that all of us would rather dwell with you, farmer, than with you, because the farmer gives us bread and drink; you, what do you give us from your smithy, but iron, fire sparks and clanging sounds of beating hammers and the blowing of bellows?
The carpenter says: Why is my art not more useful than yours, when I make a house and various vessels, and ships for you all?
The goldsmith replies: O carpenter, why do you say so, when you cannot make even a hole without my skill?

The wise man goes on to repeat that God’s service supersedes all secular skills, but a beginner’s vocabulary has in the meantime been enriched by some necessary words for daily life. Smiths of various kinds appear to be differentiated at the beginning of this account, but towards the end ‘smith’ and ‘goldsmith’ appear to be interchangeable terms, which was not necessarily generally true, as goldsmiths were also distinguished in some documentary sources as specialists in the service of the wealthy (p. 213). The noise associated with smithing and fire again emerge as defining themes.

A few more details from Ælfric’s Grammar can be added to show how he used examples drawn from everyday life, often in the vernacular, to illustrate points concerning the parts of speech or the declension of nouns. Many examples are drawn from smiths and smithing and the products of smiths’ work. For example in the section headed PRAEFATIO DE PARTIBUS ORATIONIS he explains the relationship between possessive adjectives and nouns using the words for metals, a more pointed example in Old than in modern English where only ‘lead, leaden’, and ‘gold, golden’ preserve a different but related form for the adjective. He also uses faber ‘smith’ as an example of a noun of the second declension, and gives the English equivalent for every case, while the metals usefully exemplify the Latin neuter nouns ending in -um. Other declensions produce more words in this area and verbs and adverbs refer to the same practical world. Among adverbs, for example, on p. 235, we have faber ‘smið’, affabre ‘craeftlice’.

64 J. Zuñitza, Ælfrics Grammatik und Glossar, Sammlung Engllische Denkmäler I (Berlin, 1880).
65 Ibid., p. 15.
66 Ibid., pp. 26–7.
67 Ibid., p. 30.
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The word lists from Ælfric’s Glossary show the same concern with practical matters, with, for example a list of the names of various workers and some related words; and a list of tools and materials. None of this indicates that all oblates, for example, were expected to take up metalworking, or that metalworking was even carried on at every monastery, but the interests of a community must always have included having such work done, or managing tenants with such skills on their estates. It would be hard to deny the practical usefulness of the metalworking vocabulary to monastic managers.

The relationship between Ælfric’s Grammar and its glossary and other Anglo-Saxon glosses and glossaries lies outside the present work. However, Ælfric’s glossary belongs to the type of glossary known as a ‘class glossary’, because it gathers together groups of words of related meaning or on a particular topic (on metals and metalworking, for example), and was primarily intended for learners of Latin, to improve and widen their vocabulary. Terms relating to the work of the smith can be also be found in interlinear glosses, glossae collectae (i.e. originally interlinear glosses collected together but left in the order of the original source) and alphabetical glossaries. A list of terms related to metalworking is given in appendix A, with a discussion of the difficulties in relating words to practice. The glosses and grammar fall somewhere between the literary and visual allusions discussed above and the documentary sources, and it is to the evidence from these that we turn in the next chapter.

68 J. Zupitza, Ælfrics Grammatik und Glossar, pp. 297–322.
69 Ibid., pp. 301, 318–19.
Real Goldsmiths: the Historical Evidence

CHRONICLES

The goldsmiths named in chronicles were only mentioned because they were saints themselves, or involved in a miraculous event, or important in some way in the history of a monastery. None can be associated, by inscription or by tradition, with any surviving artefact, unlike the sixth- to seventh-century Frankish goldsmith saint, Eligius. His story, and those of other continental artists are of some interest, however. Eligius was born near Limoges in Aquitaine in 588, and died on 1 December 660 as bishop of Noyon and Tournai. This cleric, the patron saint of medieval goldsmiths, first became enormously wealthy as a layman because he was a moneyer—a connection between minting and goldsmithing which we shall see in the Anglo-Saxon evidence too—a role which also made him a royal counsellor.¹ Eligius is unusual, even exceptional, in that apart from his chronicled life, a garnet and gold inlaid altar cross from St Denis which is ascribed to him (though it survives now only as a fragment) was pictured complete in a painting by the Master of Saint-Gilles c. 1500.² Other works possibly by him, however, survive only as drawings or reconstructions. Like the chronicled Anglo-Saxon goldsmiths, he seems to have been recorded only because of his important position as a cleric and counsellor—his craft was a secondary though still important aspect of his fame.³ He is especially interesting however, because he became a cleric after winning fame as goldsmith and moneyer. Other continental goldsmiths of the same period seem to have been clerics, such as Tuotilo of St Gall, who, like some of the Anglo-Saxons to be described below, worked in many arts including ivory

² Vierck, ‘Werke des Eligius’, pl. 27.
³ Roth, Kunst und Handwerk, p. 124. Of course, the willingness of the cleric to turn his hand to simple toil was an aspect of saintliness, and part of the Benedictine way of life, but Dodwell suggests that it was because goldsmith’s work was so highly regarded that it could be practised by (and recorded of) high-ranking clerics: Dodwell, Anglo-Saxon Art, p. 58.
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carving.4 He was also recorded as having made an image of the Virgin in
gold sheet in Metz.5

There are other named smiths from western Europe, including Wolvinus
who is known only from an inscription like several Anglo-Saxon gold-
smiths. It is an important inscription, however, on the back of one of the
most important examples of a goldsmith’s work to have survived from the
early medieval period. This is an altar of the first half of the ninth century in
Milan, decorated with gold, silver and enamels, commissioned by arch-
bishop Angilbert: on one panel on the back it shows the patron saint, St
Ambrosius, blessing Wolvinus, who is described as a master smith
(pl. VIIa).6 It is not clear whether Wolvinus was a cleric or not. What is
clear from all the continental evidence is that the situation of such workers
was very diverse – from free men of high status like Eligius, through
dependants who might sometimes work on their own account, to slaves and
to men who might have been enslaved temporarily, like the German
goldsmiths imprisoned by Queen Giso in the fifth century (see p. 103).

All the examples of named goldsmiths in Anglo-Saxon chronicles are
from the tenth or eleventh centuries, and all are either ecclesiastics or
workers in a monastic milieu. St Dunstan, for example, has a posthumous
(indeed, post-Conquest) reputation as a skilled worker in gold, silver,
bronze and iron, but there is no evidence linking him to any surviving
piece. This reputation, conveyed by Osbern, the late eleventh-century
chronicler of Canterbury, implied a particular skill in engraving.7 An
eleventh-century abbot of Evesham, Mannig, was known for his work as
an artist in several fields – calligraphy, painting and goldsmith’s work (and
indeed was part of Dodwell’s evidence for suggesting a link between
painters and goldsmiths).8 Mannig was also one of those invited to make
artistic objects at other monasteries and churches, at Canterbury and
Coventry.9 His greatest masterpiece, according to the chronicler of his
house, was a shrine of gold, silver and gems for St Ecgwine, the patron saint
of Evesham.10 Mannig, however, had secular goldsmiths working for him

4 See for example the covers of the Evangelium Longum (Cod. 53, Stiftsbibliothek, St Gallen), in
5 Roth, Kunst und Handwerk, p. 126.
6 Ibid., p. 124; illustrated in G. Haseloff, Email im Frühen Mittelalter: Frühchristliche Kunst von der
Spätantike bis zu den Karolingern (Marburg, 1990), pl. 51a.
7 ‘Moreover skilled in all things, he could do painting, calligraphy, engraving with a small
engraving tool, and could make whatever he pleased from gold, silver, bronze and iron’:
‘Praeterea manu aptus ad omnia, posse facere picturam, litteras formare, scalpello imprimere,
ex auro, argento, aereo et ferro, quaququid liberet operari’: W. Stubbs, ed., Memorials of St
Dunstan, Rolls Series (London, 1874), p. 79.
8 ‘... he was skilled in very many arts, for example calligraphy, painting, and considerable
knowledge of the work of the goldsmith’; ‘... plurimus artibus fuerat imbutus, videlicet cantoris,
scriptoris, pictoris, aurique fabrilis operis scientia pollens ...’: W. D. Macray, ed., Chronicon
9 Ibid., p. 86.
10 ‘Here he made, among other things which were much praised, a shrine ... dedicated to Ecgwine’.
Real goldsmiths: the historical evidence

on this project, and it is not therefore clear how much of the work he would
do himself. The master craftsman responsible to him was called Godric, the
father of a later abbot of Evesham, and he was in charge of 'very many'
skilled craftsmen, the 'artificiosi'. A story about him gives a rare glimpse
of a goldsmith at work: 'As this kind of task requires, he was intent on the
work, again and again casting and hammering and engraving with a chisel.
One day, as he was sitting as usual and with his chisel very carefully
applying little figures, he suddenly by accident injured his left hand with the
tool he was holding . . .' The range of techniques is a general description
of a goldsmith's work, but the emphasis on engraving, as for St Dunstan, is
interesting. The accident described is a very common one when engraving.
The word translated above as 'applying' (coaptans) was translated by
Dodwell as 'fitting together', an operation unlikely to be performed using
a chisel, but 'adapting' or 'applying' are other possible senses of this word.

The third example of an important historical goldsmith is from the same
late period, the interestingly named Spearhafoc (Sparrowhawk), abbot of
Abingdon c.1047–51, described by a contemporary who knew him personally
as 'outstanding in painting, gold-engraving and goldsmithing'. Like Mannig,
Spearhafoc was called on to exercise his metalworking skills at Canterbury,
creating huge figures at the invitation of abbot Ælflstan. He beautifully
illustrates the incidental nature of references to craftsmen, for he fled from
England with his bags stuffed with the gold and jewels provided by King
Edward the Confessor for the making of a crown, and other revenue
belonging to the bishop, never to be seen again.

'Hic inter caetera quae multum extollenda operatur est, scrinium sancto . . . Ecgwino dedicare',
ibid., p. 44; 'Also the tomb of Ecgwine was made of gold, silver and precious stones': 'Feretrum
etiam sancti Egwini ex argento, auro, et lapidibus pretiosus compositum'; ibid., p. 86.

'Then there were very many craftsmen, of all of whom he was master, he who of course was the
father of Clement, later Prior of Evesham: 'Aderant tum quamplures artificiosi, quorum
omnia magister erat quidam, pater videlicet domini Clementis postmodum Eveshamensis
priors'; ibid., p. 44.

'Is quum, sicut hujusmodi opus exigat, saepius fundendo et tandem ac sum sculpturo incidento
labori insisteret, quadam die more solito sedens et cum sculpturo parvas imaginulas diligentissime
copiant, subito casu tam graviter manum in sistrum cum ferro quod tenebat vulneravit . . .': ibid.

See R.E. Latham, Dictionary of Medieval Latin from British Sources (London, 1975), under
'coaptare'. Latham gives the same example under the primary sense of 'to fit (things) together',
but gives the other possible senses of the word in addition.

Goscelin, Historia translationis S. Augustini Episcopi, PL CLV, cols. 13–46, esp. col. 46: ' . . . hie
tunc apud sanctum Augustinum invitatux ab abbate Elstano operabatur . . . Eius [Letardii] quippe
et venerabilis reginae Bertae . . . imaginis enormi magnitudine ac decore effigiat, ac super ipsius
tumulum solemniter erexit': 'He [Spearhafoc] made statues of enormous size and beauty . . . of
Letard and the venerable Queen Bertha, which he solemnly erected over his [Letard's] tomb.'

J. Stevenson, ed., Chronicon monasterii de Abingdon, 2 vols., Rolls Series (London, 1858), 1,
pp. 462–3: 'rex quendam monachum de ecclesia Sancti Eadmundi regis et martyris, aurificis arte
perissimum, nomine Spearhaucæ, Abboniææ abbatem constitut. . . Spearhaucæ autem a rege
civitati Lundonensi eodem . . . anno in episcopatum promotus, dum auri gemmarumque
electarum pro corona imperiali cudenda, regis ejusdem assignatione receptum haberet copiam.
Hinc et ex episcopi pecunia marsupiorum farsisset plurimum receptacula, clanculo Anglia
secedens ultra non apparuit.'

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WILLS AND CHARTERS

There are several types of legal document which collectively provide some indication of the social status of the smith. These include law codes laid down by Anglo-Saxon kings. The earliest we have date from the seventh century and then, after a gap which may mean that some have not survived, they continue from Alfred in the ninth century to the end of the period.\(^{16}\) The information from these is scanty (see below), and charters are potentially a more interesting source. Charters, short texts in Latin recording a grant of land or privileges by a king to a person or religious house, have mainly been preserved because they had the legal status of title-deeds for estates in the possession of the latter.\(^{17}\) A few of the more than a thousand surviving documents record bequests to goldsmiths. More interesting though less numerous are the Anglo-Saxon vernacular charters which are usually called wills because they record the personal bequests, including personal effects, of ecclesiastics and wealthy laymen as well as royalty.

There are about sixty surviving Anglo-Saxon wills, dating mainly from the tenth and eleventh centuries.\(^{18}\) It is difficult to tell how representative these survivals are, since like the Latin charters they were preserved mainly because they record bequests made to churches and monasteries. They attest to secular wealth, and to the personal wealth of individual high-ranking ecclesiastics, in a variety of forms, including estates, flocks and herds, and people, who were sometimes freed but could also be left to heirs along with other assets. They also attest to the variety of personal, portable possessions indicating wealth, including textiles (bedding, wall-hangings and clothing) and, occasionally, furniture. Among this last group and among the most frequently mentioned items, are objects of personal jewellery and plate, and also quantities of gold, expressed in mancuses. A mancus is said to be worth 30 silver pence and the price of an ox, but it is also a weight of gold equal to about 70 grains.\(^{19}\) Textiles, plate and jewellery were the most frequently mentioned categories of property in wills and inventories throughout the Middle Ages, because both through the costliness of the often imported raw materials and through the elaborateness and therefore costliness of methods of manufacture, and elaboration of form, they were the chief means of expressing both wealth and status.\(^{20}\)


\(^{20}\) See P. Eames, 'Documentary Evidence Concerning the Character and Use of Domestic Furnishings in England in the Fourteenth and Fifteenth Centuries', *Furniture History* 7 (1971), pp. 41–57 for a thorough discussion of this point.
Real goldsmiths: the historical evidence

The question for us is whether the wills tell us anything more about the goldsmith or his work. Only a few items, however, are clearly translatable into modern terms. For example a wealthy tenth-century noble-woman called Ælfgifu left a ‘sweorbeag’ – a ‘neck ring’ or necklace, to her queen. It was worth 120 mancuses and if this value related to weight, it weighed over one pound avoirdupois. A ‘sweorrod’, a pectoral cross was appropriately left c. 1042–3 by an archbishop, Ælfric, to a fellow archbishop, Wulfstan. The Anglo-Saxon word ‘preon’, which occurs several times, means brooch or fastener. It appears as an Anglo-Saxon gloss to the Latin word ‘fibula’ so its meaning is in little doubt. It is also found combined with the word ‘mentel’: ‘mantle’ – ‘mentelpreon’ in the mid tenth-century will of a lady called Wynflæd, and therefore clearly means the brooch seen in many manuscript illustrations fastening a cloak at the throat or on the shoulder. The meaning of ‘bul’ however is more doubtful. It occurs only once, in the will of a man called Wulfhric, who leaves to his god-daughter ðo[ne] bûle þe wæs hire eaeldermoder: ‘the bul that was her grandmother’s’. Whitelock noted that a strong noun ‘bolas’ for ‘bul’ glosses the Latin ‘murenulas’ which means neck ornament in the Durham Ritual; and that Wright-Wülker shows a weak noun ‘bula’ glossing the Latin ‘bulla’ which could mean ‘boss’ or ‘stud’ or anything rounded. The ‘bul’ left to Wulfric’s god-daughter could therefore be an amulet, a pendant, or a brooch.

The most frequent references are to the bequest of a ‘beag’ a ring, sometimes translated by Whitelock as such but often as an ‘armlet’; and a ‘bænd’ or ‘bend’, usually translated as a ‘headband’. These items are frequently described only in terms of their weight or worth in gold, and sometimes the descriptions indicate these objects were in a form in which they could easily be split up or added to. Ælfswith, for example, left half a ‘headband’ to Rochester Cathedral, and half to St Augustine’s Canterbury, between 973 and 987. In this case there is no doubt that headband was meant, as a Latin version of the will translates ‘bænd’ as ‘vittam capitis’. Another woman, Wulfwaru, left a gold headband worth twenty mancuses between four servants. Wynflæd left to a male relative, Eadwold, ‘hyre goldfagan treowena[n] cuppan þæt he ice his beah mid þæm golde: ‘her gold-adorned wooden cup in order that he may increase (or enlarge) his

21 Whitelock, Anglo-Saxon Wills, p. 20, lines 21–2.
22 Ibid., p. 54, line 1.
25 Whitelock, Anglo-Saxon Wills, p. 50, line 16, and p. 159.
26 Wright, Anglo-Saxon and Old English Vocabularies, 360.25.
28 Ibid., p. 64, lines 20–1.
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armlet (ring) with that gold’. A ring given by Ælfhæð to Ely is described as
the pair of ‘bes beahges’ (the ring) given as a burial fee for her husband,
Byrhtnoth. Whitelock links this with the ‘torque’ mentioned as part of
the benefaction given to Ely by Ælfhæð in memory of her husband.29 A torque
should imply a collar or neck ring, and one made of twisted metal. Neck
and arm rings and headbands of solid gold are, however, difficult to relate
to anything in the surviving material or archaeological record from Anglo-
Saxon England. As far as we know, such objects are not found in Anglo-
Saxon graves of the pagan period, although a few twisted copper-alloy
armlets of forms going back to the Roman period are found, usually in
children’s graves, some of them possibly of Roman manufacture.30 On the
other hand, an illustration in the Tiberius Psalter, also eleventh-century,
picturing the Temptation of Christ, shows a richly decorated sword, a gold
chalice and shallow bowl, a drinking horn with a decorated mount around
its lip, possibly a rich head-dress or perhaps a collar, and torque-like rings,
of varying sizes (pl. VIIIb).31 The rings are clearly penannular, and clearly
made up of two or more twisted and tapered rods. Such rings, for fingers,
necks and arms, are frequently found in hoards of Viking silver and gold,
often alongside looted objects from Anglo-Saxon England and elsewhere in
Europe: a good example is a gold hoard buried at Hoen in Norway in the
860s, which included torques, gold coins (some Anglo-Saxon), and frag-
ments of gold mounts including one fine Carolingian piece and others which
may be Anglo-Saxon.32 The full publication of the Hoen hoard is awaited,
but preliminary indications from the project web site indicate that more
of the hoard is regarded as of native manufacture, and less imported, than
has been thought.33 The manuscript, however, could be showing Scandinavian
influence, as it dates from the period of the Scandinavian ascendancy
in England under Cnut and his sons. This, however, only makes the problem
of the missing Anglo-Saxon neck and arm rings all the greater. It still seems
to us probable that, while some (perhaps most) of the twisted rings known
from Viking hoards and graves are undoubtedly of Viking design and
manufacture, some were actually Anglo-Saxon. These objects were seen as
portable wealth, and in Christian England were passed on as inheritances,
melted down and re-used and after the early eighth century, of course, they
would not have been buried with the dead. The headbands found in rich
Anglo-Saxon female graves of the sixth to eighth centuries are probably
tablet-woven, certainly brocaded with gold thread, and it may surprise us to

29 Whitelock, Anglo-Saxon Wills, p. 12, lines 18–21 (will of Wynnflæd), and p. 40, line 11 (will of
31 London, BL Cotton MS Tiberius C VI, f. 10v: the relevant detail is illustrated in Dodwell, Anglo-
Saxon Art, pl. 5.
33 Spring, 2002, Signe Horn Fugelsang, pers. comm. The site is at:
http://www.hf.uio.no/middelaldersenteret/prosjektbeskrivelse/felles/skatt.html
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think of these as divisible carriers of bullion. Illustrations of the headbands are also ambiguous. In the eleventh-century Old English Illustrated Hexateuch, often cited in this connection, illustrations show men and women with yellow headbands which might refer to gold circlets, or could again be showing the woven or embroidered versions. However, it is probable that gold-embroidered bands were divided for their gold value. There is a story in Gregory of Tours History of the Franks which illustrates this. Bishop Praetextus of Rouen was accused by King Chilperic of stealing gold and jewels which had belonged to Queen Brunhild. The bishop defended himself against the charges, saying that the property had been placed in his safe keeping.

The king replied: ‘If this property was only deposited in your safe-keeping, why did you open one of the bundles and remove a belt with threads of gold, which you then cut into pieces and gave to certain men who were to drive me out of my kingdom?’

Praetextus denied any dishonesty, but did not deny the act, for which he claimed an innocent explanation.

Very few entries in the wills refer to any identifiable technique. Exceptions are ‘goldwreken’ – ‘gold inlaid’ referring to a spear in the will of WulfSige, and an ‘agrafanan beah’, an engraved or possibly inscribed ring left by Wynlæd. Engraved and inscribed rings are known from ninth century examples (above, chapters 3, 4) and as no weight of gold is given, in this case it is possible that a personal finger-ring is meant. Wynlæd also left a ‘gewiredan preon’, a brooch decorated with wire, or filigree.

Perhaps the most interesting aspect of the wills is the evidence for goldsmiths attached to wealthy households in the tenth century, valued, but not necessarily free. Æthelgifu, for example, freed her goldsmith, Mann, together with his wife and two sons, and also his ‘cnapan’, ‘boy’, possibly his assistant. In addition he and his wife were given two of the men on the estate. This evidence is confirmed by the archaeological evidence for smiths’ workshops on royal or noble estates (pp. 28–9). Wynlæd’s will does not mention a goldsmith, but does refer to her estate at Faccombe (Netherton), Hampshire, which she left to her son Eadmær. One of her

35 London, BL MS Cotton Claudius B IV, for example in ff. 76, 77v. Dodwell and Clemoes, The Old English Illustrated Hexateuch.
37 Whitelock, Anglo-Saxon Wills, p. 74, line 7. ‘Goldwreken’ may imply an action of pushing, pressing or forcing (Gale Owen-Crocker, pers. comm.), which could support Whitelock’s translation of ‘inlaid’ (see pp. 114–16, above).
38 Ibid., p. 10, line 7.
39 Ibid., p. 14, line 12, p. 113.
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bequests (p. 212) assumes that a gold-decorated cup could easily be transformed into a ‘ring’, and this is fascinating in view of the fact that there is evidence for gold-working at Faccombe in the relevant period.\textsuperscript{41} There are also grants of land by landowners to their goldsmiths, who must therefore already be free or freedmen. For example, at the end of the tenth century one Ælfhelm left half a hide of land to his goldsmith, Leofsi.\textsuperscript{42} King Edgar left land to his goldsmith Ælfsi because of his service to the king in ‘gold and silver work’.\textsuperscript{43} These references suggest that fine metalworkers were not all of the same rank in society, probably depending on whether they were free or not, their relative prosperity, and the prosperity of those they worked for. Many craftsmen would have been ‘ceorlas’, the great mass of the population who were free but not noble. However, it was possible for a freeman to claim the rights and privileges of the higher class (the ‘gesithcund’ or ‘eorlcund’, generally referred to by rank as ‘théngs’) if he owned five hides of land, a church and belfry, a ‘burgh-gate-seat’ and a special place in the king’s hall.\textsuperscript{44} The wealth and landed status implied by bequests by and to smiths suggest that, in the tenth and eleventh centuries at least, some could have attained this class.

LAWS

The law codes offer very little help on the question of the status of the goldsmith, legally or socially. Smiths are referred to only a few times in the Anglo-Saxon law codes, and only weapon smiths are ever differentiated. The earliest references show something of the importance of the smith, not in his own right but as a servant of the king or other important man. For example, in the laws of Æthelbert (I, king of Kent 560–616) we read:

7. Gif cyninges ambitsmið òþe laadrincmannan ofshcð, meduman leodgelde forgelde: If [he] slays the king’s official smith, or a messenger belonging to the king, he shall pay an ordinary (or medium) wergeld.\textsuperscript{45}

The section of laws in which this occurs is concerned with asserting the role and rights of a king. It dates from a period in which kingdoms were being established, gradually subsuming the earlier tribal territories, and the power of a new elite was being forged. The law says nothing about the legal status of a smith (whether he was free or unfree) but implies that, free or not, a servant of the king was protected in law by a wergild possibly higher than he

\textsuperscript{41} Whitelock, Anglo-Saxon Wills, p. 10, line 17.
\textsuperscript{42} Robertson, Anglo-Saxon Charters, p. 145.
\textsuperscript{43} W. de G. Birch, Cartularium Saxonicum, 3 vols. (London, 1885–93), no. 879.

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would have had as a ceorl, certainly higher than he would have had as a slave. This law seems to establish the importance of some smiths to the development of a royal and aristocratic elite. By less than a century later, it is clear that the smith was regarded as a necessary functionary to an important household from a law of Ine (king of Wessex, 688–726):

63. [Be gesīcundes mannes fare.] Gif gesīcund mon fare, þonne mot he habban his gerefan mid him ð his smið ð his cildfesran: If a nobleman moves his residence he may take with him his reeve, his smith, and his children's nurse.46

This provision may have had something to do with the fact that people tied to an estate did not have the right to move away or travel without permission. Again, this is a useful fragment of information in thinking of the relationship of a practising smith, especially a goldsmith, to a place.

Only in the laws of Alfred (king of the West Saxons, 871–99) do we detect any concern for laws to protect the public against bad workmanship:

19. §3: ‘Gif sweordhīwa ðores monnes wæpn to feormunge onfó, ðore smið monnes andweorc, hie hit gesund begen agifan. swa hit hwæðer hiora æðr onfenge, buton hiora hwæðer ær pingode, þæt he hit angylde healdan ne þorfe.’: If a sword-furbisher receives a weapon or a smith receives a piece of metalwork belonging to another man in order to refurbish it, in either case the article shall be returned in as good condition as that in which it has been received, unless it has been stipulated that there shall be no liability on the part of the said furbisher for the damage done to it.47

The laws of Æthelstan in the tenth century also included a provision that ‘no shield maker shall cover a shield with sheepskin’.48

In none of these laws is there any distinction made between types of smith, but it would be unwise to deduce from this alone that in practice most smiths dealt with all types of work. Part of the interest of this material is that it provides a brief glimpse into an earlier part of the period than either the chronicles or the wills.

It is interesting to compare these brief mentions with those from a Celtic area of the British Isles. The Welsh laws which go under the name of Hywel Dda (king of Gwynedd, 942–50) are sometimes cited as an example of the honour in which the smith was held in the Celtic world. They deal with the dues and privileges of the members of the court of a king. The smith is one of fourteen officers who have chairs in the court: ‘the court smith at the end of the bench, before the priest’s knees’.49 The court smith is

49 D. Jenkins, The Law of Hywel Dda. Law Texts from Medieval Wales Translated and Edited (Dyfed, 1986), pp. 7–8. The text on which Jenkins’ translation is based is a composite, but the main source is from a thirteenth-century manuscript, London BL MS Cotton Titus D. ii. This also forms the basis for the edition of the of the Laws published by A. Rhys Wiliam, Lyfr Iorwerth (Cardiff, 1960), for which Jenkins, Laws of Hywel Dda in effect provides a translation. Both passages cited in this chapter are clearly indicated as translated from this source.
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... entitled to his land free, and his food in attendance, and a dish when the King is there.

It is right for him to fulfil all the court’s needs free, except for three things; those are the rim of a coulter, and the head of a spear, and the socket of a fuel-axe; for each of those three things he is entitled to payment for his work.

It is right for him to fulfil the needs of the officers of the court free; it is right for them at every presentation to honour him.

He is entitled to the amobrau of the daughters of the other smiths. He is entitled to the ceinion; the ceinion are the first liquor that comes to the hall.

His place in the court is the end of the bench next to the priest of the household. His protection is when he begins to do his work in the morning until he finishes that night. His sarhaed is six kine and six score pence; his worth is six kine and six score pence.50

The amobrau was a fee payable by a girl’s father to his lord on her marriage (and implies a ranking among smiths); his sarhaed and his worth were duties payable on his injury or his death: these place him in the ranks of freemen. Indeed, lords were warned against losing rights over people who become smiths: ‘Three arts a villein’s son is not entitled to learn without his lord’s leave (and though he should learn them, the lord is entitled to retake them, except for the clerkship after he takes orders): these are clerkship and smithcraft and bardism. 51 The picture that emerges is a little more detailed, but it is not contradicted by the briefer details of the Anglo-Saxon laws. We are also told that the value of a smith’s tools were:

six score pence. A large anvil, sixty pence; a bicorn (horned or spiked anvil), twelve pence; bellows, eight pence; pincers, fourpence; a sledge-hammer, fourpence; a bender (pacer, rasp), fourpence; a nail-maker (bore drill), fourpence; a furrower, fourpence; a vice (?vice), fourpence; a hoof rasp, fourpence; an iron file, fourpence. A grindstone, fourpence.52

Some of these tools relate specifically to blacksmith’s work (for example, the large anvil, sledge-hammer, vice and hoof rasp). The main problem with this fascinating material, however, is that it has come down to us in

50 Jenkins, Law of Hywel Dda, pp. 37–38. Rhys Wiliam, Llyfr Iorwerth, section 39, p. 21: Nauet yv e gos llys; ef a dele e tyr en ryd a e wyt pressvel a seic pan uo e brenhyn. Ef a dele gynethrur reydwy e llys oll en rat, eythrur try peth: sef yv e rey henne, kant kvlter a pen guau eu a theldyf byvial knenut; am pob un o’r try peth henne ef a dele tal e lawr. Ef a dele gynethur eu reydew eu svydogyn e llys oll en rat; vyntru a deletant urth pob anrce e anredelu ef. Ef a dele amobreu merchet e gowynt eryll. Ef a dele e keynon; sef yv y keynon, e wyravt gyntaf a del e’r neud. E le yv e llws yv en tal y uynce, en essaf e’r effeuyat teylu. E navd yv o’r pan dychreuho gynethur e weyth e bore ene teruyhno e nos honno. E sarhaet yv chue buv a chue ugeyn o aryan; e werth yv chue buv a chue ugeyn muv.


52 Jenkins, Law of Hywel Dda, p. 300 notes that the identification of some of the smith’s implements must be tentative. The most significant alternative translations offered by Rhys William are give in enclosed brackets. Rhys William, Llyfr Iorwerth, section 141, p. 94: Offer gof, cxx. Eynyaun uaur, lx. Eynyaun kyrriauc, xii.k’’. Megyneu, viii.k’. Geul gof, iii.k’’. Ord, iii.k’. Kamec, iii.k’’. Kethraul, iii.k’’. Kuynysyll, iii.k’’. Trooryd, iii.k’’. Karnllyf, iii.k’’. Hayarnllyf, iii.k’’. Breuanllyf, iii.k’’.
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manuscripts of the thirteenth century and later, and although it is said to be based on a core of tenth-century material, it is not a perfect witness for the standing of smiths, even court smiths, or for their tools, of any part of the period in which the Anglo-Saxon goldsmith flourished. If the passage above could be dated to the pre-Conquest period, however, it would have extraordinary interest, for a vice is a tool which seems essential to us but which has not so far appeared in any recognisable form in the archaeological record (see pp. 63 and 59–60). Unfortunately, the word translated as ‘vice’ (‘Trooryd’) is the only example of the word, and although both translators endorse it, one is more tentative than the other. As with Anglo-Saxon documents, it tells us nothing of techniques or working practices, except that again it does not appear to distinguish between smiths working in different metals, or making different products.

There are two other documents which are often considered alongside the laws and charters. Both discuss the role and status of estate workers, though the role and status of the documents themselves is the subject of debate. The longest of these is Rectitudines Singularum Personarum (RSP), which survives in Old English in one manuscript, a collection of Anglo-Saxon laws and related texts, Cambridge, Corpus Christi College, MS 383. It also survives, translated into Latin, in five of the eleven extant copies of a collection of Anglo-Saxon laws known as the Quadripartitus.53 It is a systematic account of the rights, including prequisites, and obligations of workers and tenants on an English estate, possibly of the mid-tenth century, though apparently revised and brought together into the legal compilation in the early eleventh century by Wulfstan or under his influence.54 In its list of workers and tenants of various classes, free and unfree, it does not mention priest, miller, or smith, and this has led to a view that, ‘A century before the Norman Conquest [the vill] possibly would not have had a miller, and we may wonder whether it would have had a smith: the omission of the smith from the Rectitudines Singularum Personarum is interesting and may well be significant.55 However, RSP mentions only agrarian occupations, it does not mention any other non-agrarian worker or service, including textile production. As there is archaeological evidence for both textile production and metal-working on Anglo-Saxon estates, and documentary evidence for textile workers and smiths attached to estates, of which the

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evidence for the latter has been discussed above, RSP cannot be the definitively complete account of a rural community or estate management that the argument from its silence has been taken to imply.

The second document, ‘Be gesceadwisan gerefan’ (‘On the Sensible Reeve’) usually shortened to Gerefa, survives only as an addendum to RSP in the only document in which that appears in Old English, Cambridge, Corpus Christi College MS 383. It is not clearly distinguished from RSP and as it is a description of the qualifications and duties of the reeve, in this context the estate manager, it can be seen as complementary. Recent research has suggested, however, that it is an eleventh-century literary exercise, since in terms of the tasks to be undertaken by the reeve, and the lists of tools he is to provide for the workers on the estate, it is neither systematic nor comprehensive. The writer frequently comments on his lack of detailed knowledge of the subject, and it is much more like a school exercise such as Ælfric’s Colloquy (chapter 7, pp. 203–5). It is interesting, however, for two reasons. One is that, even acknowledging the lexicographic problems which can arise when a document survives in only one copy, the lists of tools contain a number of technical terms not recorded elsewhere in Old English. The first of these lists includes a few tools which would be useful to a smith, though a smith is nowhere named in the text, and most of those mentioned could be used by a carpenter or other worker. However, fire-tongs and scales could certainly be useful to a smith. Secondly, exercise or not, a brief paragraph suggests that a reeve might be in charge of skilled workmen, ‘smeawyrhten’ as well as agricultural workers. The examples of miller, shoe-maker and lead-founder or -smelter are given, followed by ‘7 oðran wyrhtan – ælc weorc sylf wisað, hwæt him to gebyræð; nis æenig man, þæt atellan mæge ða tol ealle, ðe man habban sceal’: ‘and other workers – each occupation will itself show what pertains to it; there is no man who can enumerate all the tools which one must have’. The examples include one metal-worker, the worker in lead, at least as specialised as a smith. Gerefa is therefore complementary to RSP in filling out the picture of a late Anglo-Saxon estate, in a sense other than that usually given.

PLACE-NAMES

Place-names as a source of evidence for historical smiths require only brief mention, as most uses of the word ‘smith’, while quite frequent as an element, can tell us nothing of the type of smith meant. The Anglo-Saxon

57 Harvey, ‘Rectitudines’, pp. 8–12.
59 Swanton, Anglo-Saxon Prose, p. 27.
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words for smith and smithy occur as place-name elements, for example in
Great Smeaton, North Yorkshire and Smeatham Hall, Essex (both ‘the
smith’s tun’); Smisby in Derbyshire (the smith’s by’); Smethwick/Chester-
shoe (the smith’s dwelling); Smeaton (farmstead of the smiths) and Smeeth
in Kent (‘smithy’) to give only examples which go back to Domesday Book
or earlier.60 These may indicate that smiths’ forges were important features
of a local landscape, and that some smiths were men of standing in their
communities, but they do not tell us whether the smiths in question were
blacksmiths only, or workers in fine metals instead (or as well). Street
names, if they can be shown to be earlier than the Norman Conquest, might
be more indicative, as possibly in the case of ‘Goldestret’ in Winchester (see
p. 237).

One interesting ‘smith’ name occurs in the case of Wayland Smith’s Cave,
Berkshire, in fact a megalithic tomb. The name occurs in a charter possibly
dating to 955, but surviving in a copy of c. 1240: the entry reads ‘(be eastan)
welan& smi&dan’, where ‘smi&dan’ is the dative singular of ‘smi&bue’:
‘smithy’. There was a tradition that the legendary smith would shoe
horses in return for a groat placed on the roof slab of the tomb.61 If the
name was current in the tenth century, it would attest to the interest to the
legend in that period also demonstrated in the poetry (see pp. 181–8).

Potentially the most interesting place-name is provided by Faversham in
Kent, of which the Anglo-Saxon graveyard has provided the most extensive
collection, and also some of the finest and most interesting of the gold and
garnet jewellery of the sixth to seventh centuries. ‘Faver’ is considered by
philologists to be a loan word in Old English (*faer, otherwise unrecorded)
from Latin faber. Gelling has described it as ‘either a remarkable coin-
cidence’ or a reference to the existence at Faversham of a centre of metal-
working in the ‘phase of overlap and controlled settlement which preceded
the historical coming of the English’.62 Because *fafer occurs in the place-
name in the genitive singular, she thought it represented a personal name, or
a meaningful nickname, so the place-name could be translated as either ‘the
village of the smith’ or ‘the village of the man known as The Smith’ and
refer to an important workshop headed by a master craftsman. However
the further deduction that the master craftsman could not have been Anglo-
Saxon or the Germanic word smi&d would have been used, and that the term
must instead refer to an earlier Romano-British workshop also producing
fine metal-work seems too tortuous, unless archaeology can reveal such a
continuity of settlement and function.

60 See E. Ekwall, The Concise Dictionary of English Place Names (Oxford, 1947); A. D. Mills, A
61 M. Gelling, The Place-Names of Berkshire, II, English Place-Names Society (Cambridge, 1974),
p. 347.
62 M. Gelling, Signposts to the Past: Place-Names and the History of England (Chichester, 2nd ed.,
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INSCRIPTIONS

Inscriptions are an important source of evidence for the prestige and wealth of goldsmiths, and even, occasionally for the location or actual social position of a named individual, for three smiths in two inscriptions can be located at a specific site or at least in a particular milieu. It is especially interesting that goldsmiths could be commissioners of objects, and that we know this because, unusually among commissioners, they identify themselves as such. It is important, however, to consider what this evidence means. Of the hundreds, even thousands, of pre-Conquest objects of fine metalwork, only fifty-one have inscriptions, yet of these, fourteen have inscriptions referring to makers, or to commissioners identified as goldsmiths.\(^63\) Both these facts must be taken into account in any discussion of the significance of the inscriptions. Even so the proportion of those identifying smiths or goldsmiths, among all metalwork objects with inscriptions, at c. 29\%, seems significantly high. This should be contrasted with the situation in sculpture, in which only three of many thousands of surviving pieces carry references to makers.\(^64\) The only other classes identified by inscriptions on metalwork are bishops and royal personages. There are four bishops, but only if we count the two, Eadfrith and Ætlwine, in the Lindisfarne Gospels colophon discussed below, as well as two (Ætlwine, ninth century, and Peter, eleventh century), on seal dies.\(^65\) There is also one pope, Marinus (tenth-century), named as a recipient on the silver hooked tags belonging to a purse found in Rome.\(^66\) There are two rings, one with the names of a king and one with a queen: Ægelwulf (48) and Æðelswīð (1), both ninth-century; a brooch of an ‘Eadward, king of the English’, probably tenth-century; and a tenth-century coin brooch with a coin of


\(^{65}\) Okasha, *Hand-list*, no. 38; *idem*, ‘A Second Supplement’, no. 187. These two seal dies are made of bronze and lead, respectively. There are of course more seal dies of other materials, including stone and ivory.

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Eadward.\(^67\) Finally there is the ninth-century ‘Alfred’ Jewel (6, pl. VIIIa), of which the commissioner is not named as king but is presumed on reasonable grounds to be Alfred the Great.\(^68\) That is, there are nine in total explicitly identifying members of these very important social and religious élites to the fourteen naming makers. One of these is really a coin, while of the two bishops in the complete Lindisfarne colophon discussed below, only one has anything to do with the book binding, and possibly not with any goldsmith’s work associated with it. However, we can perhaps restore the total to eight or nine by adding the commissioner and intended recipient recorded on both the late-tenth-century gold-embroidered stole and maniple I from St Cuthbert’s coffin: queen Ælfleda, wife of Edward the Elder, and Frithestan, archbishop of Canterbury.\(^69\) The remaining personal names (sometimes more than one) on seventeen metalwork objects, are unaccompanied by any reference to status or occupation. Five of these seventeen also belong to the group with named makers. The remainder have incomplete, incomprehensible or descriptive texts including saints’ names, but without other personal names.

Given there is proportionately such a small number of inscribed metalwork objects, but that a high proportion of these carry makers’ names, the arguments for the significance of the maker inscriptions must be considered very carefully. Okasha suggested that an inscription on an object in Anglo-Saxon England had prestige value, ‘precisely because so few people could read it’. She also suggested that a motive for a maker’s name might be a wish to advertise, though she qualified this by saying that objects with both maker’s and owner’s name might represent the pride of the owner or commissioner, rather that that of the maker.\(^70\) Bredehoft was more positive about the inscriptions as evidence for literacy, and particularly for the vitality and innovativeness of the vernacular literacy tradition in Old English. He was particularly interested in what he saw as ‘anglicised’ forms of the Latin maker formula ‘\textit{N} me fecit’: used and usable by Anglo-Saxons because of its very ‘ubiquity and fixity’\(^71\). These views are best commented on through a discussion of the surviving inscriptions themselves.

Advertising, however, does seem to be found in some continental Germanic belt-sets of the seventh century from Donzdorf, Nördlingen and Weilstetten. These all carry Latin inscriptions, of which that from Donzdorf can be translated as: ‘He may be happy who can buy me and is girdled by me.’ The Nördlingen example has ‘Who has seen me and has not one like me shall try to

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\(^{67}\) Idem, \textit{Hand-list}, nos. 70, 104, 107, 154.

\(^{68}\) \textit{Ibid.}, no. 4.


\(^{70}\) Okasha, ‘Commissioners, Makers and Owners’, pp. 73–4.

\(^{71}\) Bredehoft, ‘First-person Inscriptions’, esp. p. 106.
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buy me.’ The final example refers to Psalm 91, v. 11, which is ‘For he will give his angels charge of you to guard you in all your ways’, rendering it ‘Because he has commanded his angels that I [presumably the belt] protect you in all your ways.’ Roth suggests that even at this period we have to see the commercial world of competition affecting the behaviour of secular smiths outside the protected world of the monastery.72 There is nothing as dramatic as these, however, in the surviving Anglo-Saxon examples.

Two of the inscriptions are in fact in manuscripts, and refer to gold or goldsmith’s work on the covers which are no longer extant. It is probably not surprising that it is in these inscriptions that the named goldsmiths can be related to specific sites or social milieu. The first is the Colophon in the Lindisfarne Gospels.73 The manuscript dates to the end of the seventh century, but the Colophon was added by Aldred, probably a provost of the Community of St Cuthbert when it was based in Chester-le-Street, Co. Durham, probably in the late tenth century, but presumably based on earlier records. The two relevant sentences are:

And Æthelwald, bishop of the Lindisfarne-islanders, impressed it on the outside, and covered it – as he well knew how to do. And Billfrith the anchorite forged the ornaments which are on it on the outside and adorned it with gold and gems and also with gilded-over silver – pure metal.74

Bruce-Mitford and others concluded that the work of Æthelwald was the binding of the book and the tooling of the leather binding. Billfrith died in the late eighth century, and it seems likely that he did his work during Æthelwald’s episcopacy (721 × 724–40), some time after the manuscript was bound.75

The second inscription occurs in a Gospel book which once belonged to Thorney Abbey:76 ‘Ælfric 7 wulfwine. Eadgāfe goldm̄eaf geaen to broþerrædenne twegen orn weghenes goldes þæt is in þis ilce boc her forútæ geweld:’ ‘Ælfric and Wulfwine, Eadgifu’s goldsmiths, gave to the brethren two ores of weighed gold that is on this same book here ornamented with wire on the outside.’ This tenth-century book was in Thorney by c. 1100, when it was used as a Liber Vitae of the abbey. The two

73 London, BL MS Cotton Nero D IV, f. 259r.
74 E. G. Millar, The Lindisfarne Gospels (London, 1923), p. 3 has an expansion of the abbreviations in this text. We have followed the transcript in T. D. Kendrick et al., Evangelium Quattuor Codex Lindisfarennis, 2, p. 84.
75 T. D. Kendrick et al., Evangelium Quattuor Codex Lindisfarennis, p. 85. Recent work has suggested that the manuscript was entirely made at this period and not at the end of the seventh century as believed by Bruce-Mitford. M. Brown, M. P. Brown, ‘In the Beginning was the Word’: Books and Faith in the Age of Bede (Jarrow Lecture 2000).
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goldsmiths were clearly wealthy men in their own right, but nevertheless belonged to the household of a wealthy woman. Whether they were free men or slaves, however, is not stated. Presumably they also made the wire for the decoration of the book. As usual, there is no indication of the technique by which the wire was made.

The inscriptions on objects stretch across the whole period. The earliest is the recently discovered composite disc-brooch from Harford Farm, Markshall, Norfolk (39). This is dated to the period 610–90 by the position of the grave in the cemetery, by its stylistic similarities to other seventh-century composite brooches, for example Milton, Abingdon (3 and 4) in Oxfordshire and an example from Ixworth, Suffolk, and by the gold content of the brooch. The brooch may have been old and battered when buried, and had certainly been repaired, but those who have studied it see its manufacture earlier in the century and its repair in the decade or so either side of 650.77

The repair is the subject of a runic inscription, which starts on the back plate and overruns on to the mounting for the pin: it starts with the personal name writ large, and the verb and object of the sentence squeezed into the remaining space. Transliterated, it reads: ‘ludagibææsægila’: ‘Luda repaired [the] brooch.’ Hines takes the same view as Bredehoft, saying that this seventh-century inscription is an early example of the appropriation of writing by craftsmen for their own purposes, including prestige and advertisement. He also suggests that this is slightly earlier than, or nearly contemporary with, coins with runic inscriptions which may be moneyers’ names, such as the pada series. This is therefore another indication that there must have been a considerable overlap between moneyers and goldsmiths. The early Anglo-Saxons learned the use of coins from their Merovingian neighbours, but their first use for imported coins was as ornaments mounted in jewellery or as necklace pendants.78 Few royal names were recorded on these early coins before the mid-eighth century, and those with runic names are thought to be those of moneyers or private individuals sponsoring the issues.79 It is impossible to say whether the brooch is earlier than all the runic coins with named moneyers, but it is very likely that the need to validate the coinage inspired the goldsmith’s practice.

The next inscription in date is on the Mortain reliquary casket (59), which dates from the late eighth to possibly the early ninth century. This is a wooden casket with a roofed top, covered with gilded copper and with two texts, one naming the figures, Sts Michael and Gabriel, on the back, and a

78 For example the hoard from St Martin’s Canterbury or the cross pendant from Wilton, Norfolk: Webster and Backhouse, Making of England, pp. 23–4 and 27–8.
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runic text on the roof. This transliterated reads ‘+ good helpe aeadan þiiosne cismeel gewarahtae: ‘+ may god help Aeadan [who] made this ?reliquary’. The prominent position of the text could be interpreted as an advertisement, which Okasha accepted as the sub-text of some inscriptions on Anglo-Saxon objects, though she acknowledged piety as another. The placing of the text on this piece could instead be taken to suggest that the casket was a pious offering by the goldsmith, though it is not certain, of course, that there was no other owner or commissioner.

There is one more from the ninth century, on a gold ring from Lancashire (47). This is nielloed around the outside of the hoop with an inscription in gold lettering in a mixture of Anglo-Saxon capitals, insular majuscules and runes. It reads ‘+ aedred mec ah eanred mec agrof’: ‘+ Aedred owns me, Eanred engraved me’. This is interesting on two counts. First it supports Okasha’s idea of the prestige accruing to the owner of a ring made by a (presumably) famous goldsmith. Second, like the Thorney Abbey manuscript inscription it appears to refer to a particular technique, this time carving or engraving. The verb ‘agrafan’, however, though it can mean to engrave or carve, also carries the meaning ‘to inscribe’. In this case therefore it may mean that Eanred inscribed the ring, in the sense of adorning it with an inscription, without reference to a particular technique. However, it is likely that the technique employed to decorate the ring with the inscription was engraving or carving, so the implication of the inscription is ambiguous.

The Sittingbourne seax (70, pl. IIc), dated from the late ninth to early tenth century, also has a maker and owner formula. It is an iron knife consisting of a blade and handle tang with legible texts on both faces of the blade. The text on one face, incised into panels of silver and copper-alloy, reads ‘+ s[il]geberehte me ah’: ‘Silgebereht owns me’. That on the opposite face is in silver lettering on copper-alloy, and reads ‘+ biorthelm me wolte’: ‘+ Biorthelm made me’.

A sword pommel guard from Exeter (24) cannot be dated more closely than ninth to eleventh century. It is made from copper-alloy, and the text is incised in panels on the convex face. It reads ‘eoft[r] me f[e]: ‘Eofter made me’.

There are two inscriptions from Canterbury, both tenth-century. The first, Canterbury (16), is on a circular silver brooch with a centre imitating a coin. On one face is an inscription in Latin ‘nom[ine d]om[ini]’: ‘in the name of the lord’. and on the other, also set around the central disc is the maker formula ‘+ wvdeman feci’: ‘+ Wvdeman made (me or this)’. This is an example of what Bredehoft considered an ‘anglicised’ form of the Latin ‘fecit’: ‘made’. The second piece, Canterbury (17), is the very interesting portable sun dial in gold and silver, with its pin or gnomon attached by a

80 Okasha, ‘Commissioners, Makers and Owners’, pp. 73–4.
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gold chain: an object of status if ever there was one. It is inscribed in Latin. The text on the top gives the months of the year and relates to the object’s function. Those on the edge read ‘[salvus factori | [p]ax possessor[i]’: ‘salvation to the maker, peace to the owner’. Because of the absence of names, this does not support the notion of validation or advertisement, but perhaps it is more genuinely pious.

The Brussels cross (14, tenth- to eleventh-century) is a major piece of Anglo-Saxon goldsmith work. It is a wooden cross containing a space for a relic, protected by a modern gold cover. The cross has its original but incomplete cover of silver sheet with legible texts on the surviving face and the two edges. The edge texts read: ‘+ rod is min nama geo ic ricne cyning | bær byfigynde blode bestemed’: ‘+ Cross is my name. Once, trembling and drenched with blood, I bore the mighty king’; and ‘pas rode het Æþlmaer wyrican 7 Æcelwold hys beroþor criste to lófe for Ælfrices savle hyra beroþor’: ‘Æþlmaer, and Æcelwold his brother, ordered this cross to be made to the glory of Christ, (and) for the soul of Ælfric their brother.’ Those on the face read ‘agnvs di’: ‘Lamb of God’ (in the central roundel and a description of it), and ‘Drahmal me worhte’: ‘Drahmal made me’. This is very prominently set out across the arms of the cross. However, this is also the back of the cross, the principal face is now lost.

Finally, the tower-shaped copper-alloy censer cover from Pershore, Worcestershire (63, pl. 8), which is also dated tenth- to eleventh-century has a very prominent maker formula along the base of one gable; ‘godric me wuorht’: ‘Godric made me’.

CONCLUSION

The analysis of historical, literary and visual sources in this chapter and the one before clearly has limitations, not the least of which is the chronological spread of the evidence from these sources in relation to that of the surviving material remains. Very few of the sources considered above – a few of the inscriptions, one visual source, one poem – can confidently be ascribed to the period before 900. This contrasts strongly with the spread of the remaining artefacts of fine metalwork, the bulk of which date from the earlier part of the period. The bias of written sources towards the wealthier parts of society, however, is perhaps not such a handicap when considering the work of craftsmen whose products would largely have been commissioned by the rich. It is not perfectly clear from these sources that weapon-smiths were clearly distinct from jewellers: in The Fortunes of Men it seems that the goldsmith is the one who makes the corselet for the mighty king; in The Gifts of Men the goldsmith is followed by the weaponsmith, which may imply a distinction. Weland made both weapons and jewels in the Icelandic sagas. In the Anglo-Saxon poems it is his weapon-making skill which is
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largely commemorated, but in the depiction on the Franks casket (eighth century) he is making the bowls from the skulls of the young princes. Laws and other documents such as wills sometimes define a smith as goldsmith, but these documents, like the chronicles, recount the works of the wealthy and well-connected, ecclesiastical as well as secular. The distinction might therefore be between the blacksmith, the maker of tools for other trades, who perhaps, like Cwichwine for his monastery, also turned his hand to beating out bowls or providing imitations in less valuable materials of the splendid jewellery of the day, and the ‘fine smith’ who from the evidence in this chapter moved from one ecclesiastical centre to another, or from one estate of his lord to another, working on commissions for the elite groups of Anglo-Saxon society. It is clear that the social standing of the goldsmith reflects the social standing of his patrons, and this reinforces the view that goldsmith’s work was admired, and that the general, secular, view of him and his work was positive, in spite of the use in homiletic literature of the forge, possibly the blacksmith’s forge, as a vision of hell. However, it must be born in mind that such documents tell us nothing for certain about the early part of the period, and next to nothing about the development of settled groups of independent smiths in towns. The manifest gaps in this account can only be addressed from the study of the archaeological remains (chapter 2), and perhaps from notions of the development of towns in the modern sense (chapter 9).
HAVING looked at the Anglo-Saxon goldsmith through contemporary references, through traces of his activity on archaeological sites, and above all through an examination of his products, we should ask: is this figure any less shadowy than he was before this study was begun? With respect to his achievements, we may say with some confidence that he is, but it is still necessary to pull all the evidence together in respect of his social position. In the period covered by this book, Anglo-Saxon England itself changed and developed, from a collection of kin-based units of diverse origin into a single political entity with a small but growing urban market economy. It might be argued that technological studies per se can reveal nothing of the social standing or economic function of the goldsmith. This has not, however, been the position of many archaeologists or social and economic historians, who have used the material remains of metalworking in their discussions of issues such as the development of craft specialisation, the relationship of this to the growth of towns, whether (and when) people with craft skills worked at their craft full-time or part-time, were fixed at one site or itinerant, free or unfree, ecclesiastics or laymen.

The documentary sources laid out in the last chapter provide a partial answer for goldsmiths working for the ecclesiastical and secular elites, but only for southern England and only for the tenth and eleventh century. This leaves the question as to the status of goldsmiths (and, indeed, all smiths) in the centuries before the tenth, and particularly the status of those in towns. In the case of the early centuries, this begs the further question of what is meant by a town. Arguments for the development of towns, and indeed about what constitutes a town, and the physical evidence for specific working practices all impinge on, and are sometimes held to define, the social role and status of craftsmen. Some of the discussion around these issues has concentrated on the period from the fifth to the seventh or early eighth centuries. This is because the bulk of the surviving products of the fine metalworker comes from grave finds of this period. Grave finds can be compared with finds from other cemeteries of comparable or other dates to provide evidence for period or regional groupings, and with the contents of other graves in the same cemetery to give indications of gender and social distinctions. Occasionally they can reveal the presence of individuals from different regions or even countries, their dress distinguished by different
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brooch types and other fasteners or metal trimmings, or the presence of objects imported into the area whether through loot, gift exchange or trade. This evidence of social context is important, and it is usually lacking for the later centuries, but it is evidence only for one final use of metalwork, and its relation to the methods and organisation of production must be treated with care.

THE EARLY ANGLO-SAXON PERIOD: THE FIFTH TO THE EARLY EIGHTH CENTURY

Wics, proto-towns and the role of the elite

Much recent research has tended to emphasise distinctions between seventh- to ninth-century sites which may be classified as urban (or as having features which would be regarded as typically urban in later sites) and true towns based on a market economy which only developed (in England) from the late tenth century onwards, with the setting up of the burh system in the intermediate stage.¹ The discussion should properly begin, however, with a return to the fifth to seventh or even early eighth centuries when there is evidence, especially towards the latter part of the period, for a change to some craft specialisation, and regional and long-distance exchange of goods, even if neither was on a large or commercial scale, and the use of coinage appears to have been restricted to elite groups.² Scull has pointed to features of the archaeological record from the late sixth century which appear to indicate both social differentiation and political centralisation.³ Whereas in the fifth and early sixth centuries there had been little variation in burial practices within a site or between settlements within a region, implying occupation by small familial or tribal units, after this period there were differences within and between cemeteries, in particular the appearance of identifiable princely burial; the development of a settlement hierarchy (indicative of a territorial authority able to exploit subject estates for their surpluses); and the existence of commercial or trading settlements (named variously wics, emporia or beach markets) which may also have been an expression of a new centralisation of economic and political power. The implied changes in social and economic structures are obviously relevant to the employment and status of craftsmen, and particularly to those in luxury goods such as the goldsmith.

There has been until recently broad agreement on these changes, but not

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a complete consensus on how they came about. One model which sought to predict the emergence of territorial statelets based on ‘central places’ has been applied to Anglo-Saxon England. Scull dismissed this model because in fifth- to sixth-century England political centralisation seems to have focused on central persons rather than central places, and, as he pointed out, even attempts to apply the model to the Anglo-Saxons centred not on settlements but on rich burials. His answer was to look to two other models. The first, peer competition between local groupings with the winners becoming progressively more powerful would, he argued, lead to centralisation of power and the establishment of kingdoms if some of the competing groups learned to promote their new status both through demonstration of their external political contacts and through the deliberate use and manipulation of symbolism and ideology, and of ethnic and cultural identity. The evidence for this phase can be found in obviously princely burials such as those of Sutton Hoo and Taplow, with their rich trappings, including jewellery and richly ornamented weaponry and armour. Elite groups such as this clearly had need of fine metalworkers who were weaponsmiths, goldsmiths and jewellers, and since there could not have been many of them, they were probably, like Weland, all three. The goldsmith who inscribed his name on the repair of the Harford Farm brooch (39) was working for the elite only a few decades later in the middle of the seventh century (pp. 171, 223). The second model is not incompatible with this: it relates to renewed pressure on land as a resource, specifically related to groups coming in from the continent in the fifth century, and taking land or establishing lordship over existing inhabitants: any limit on expansion would lead to external conflict and internal competition, resulting in land-holding and the concentration of power in fewer and fewer hands.

The first of these models has been more widely accepted than the second. Carver suggested that the fifth to the eighth centuries in Europe can be ‘characterised by a net transfer of investment, from the extant cities [of the Roman world] to small multiple power centres’. He was in essence arguing against the ‘Pirenne thesis’ which placed the era of the collapse of the originally Roman economic system as late as the seventh century and as a result of the rising tide of Arab conquest in the Mediterranean under the influence of Islam. However he was also arguing against archaeologists

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5 Scull, ‘Social Archaeology’, pp. 18–22.
6 See Webster, ‘Ideal and Reality’, for an interesting discussion on the different statements made by these two graves.
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who accepted there was a change, but placed it earlier – from the fifth century – and attributed it solely to ecological and economic factors (climate change and stress from diminishing resources). He argued forcefully that the changes were the result of ideological choice, of alternative investment strategies by a ‘fresh and vigorous Baronial power’. East Anglia, with its change from flat grave and cremation cemeteries to tumuli with their final phase at Sutton Hoo exemplified the arrival of kingship and the re-imposition of territorial taxation. He pointed to the site of the village of West Stow, which seemed to shift and nucleate in the seventh century, at the same time that a new type of settlement – the wic – appeared. His point about these sites is that they represented a deliberate strategy on the part of the rising elite, and were designed to create wealth for it, rather than a revival of market forces. It is interesting that West Stow has evidence of pottery, some of which may have been crucibles, from earlier than this period. The mould from the village of Mucking also precedes this period of the consolidation by the elite (p. 70).

Other writers have looked at the history of production and distribution in western Europe in the same period and come to conclusions with a rather different emphasis in which the development of an aristocracy played a supportive rather than a central role. Lebecq gave the Anglo-Saxons an active role in the transformation of trade routes in the fifth to eighth centuries. He took issue with the Pirenne thesis, believing that the trade with the Mediterranean did in some fashion continue until the seventh century, but only as a secondary process in which a few merchants supplied wealthy individuals with luxury goods and churches with splendid objects to enhance church buildings and the conduct of worship. He also thought the change from the south to the north started earlier than Pirenne believed, but that it was influenced more by plagues which affected the Mediterranean world than by the Arab conquests. However his main reason was the development of the North Sea as a trading area, when the sea-faring peoples of the north established contacts with the Scandinavian worlds and, along the Seine and Rhine, with the markets of Europe. Lebecq saw the Anglo-Saxons and Frisians as leading this expansion, which he attributed to a new dynamism fuelled by a return of agricultural growth supported by a powerful aristocracy (his concern was not with how this aristocracy developed); and the development of the silver coinage, better adapted to volume and value of trade than the old Byzantine-based gold standard. According to this argument, wics, as new trading ports, were an important

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9 Carver, Arguments in Stone, pp. 50, 56, 61 and passim.
11 Webster, ‘The Brooch Mould’.
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element in the expansion of northern trade, and as centres for the collection of wealth through tax or tribute. The Anglo-Saxons and Frisians began minting silver coins c. 600, so their active role was important here too. The consequences of the change of focus from the south to the north were far-reaching in terms of luxury materials available to craftsmen: Lebecq noted as important changes the replacement of gold by silver, papyrus by parchment, olive oil for lighting by wax and elephant ivory by walrus ivory. The reduction of the gold supply and its consequences for the jeweller is a frequently noted phenomenon (pp. 33–4). Less often noted are the changes in other materials needed in various processes. The disappearance of garnet at some stage by the early eighth century was also a change of some importance. It may be therefore that the broader outcomes of the changes, rather than their causes, are more important for the present study.

However, recently there has been something of a challenge to one of the underlying premises of all the theories mentioned above, that of the identification of certain sites as special trading places. The identification of emporia (wics) and their relationship to the development of elites goes back to Richard Hodges’ extremely influential work, *Dark Age Economics*. In this he laid down criteria for trading places established for the control of prestige goods by contemporary rulers, both places for annual or seasonal fairs (type A) and firmly controlled, more permanent sites (type B). He provided a gazetteer of such sites, supported by archaeological evidence, in England and across northern Europe.\(^\text{13}\) He continued to develop this idea through a number of influential books and papers.\(^\text{14}\) Most recently, he has emphasised the role of *emporia* as centres of craft production, as much as mercantile trading places.\(^\text{15}\) This development in interpretation coupled with other, archaeological, evidence, has recently brought the whole notion of *emporia* under attack on the grounds that if places such as Southampton were centres of craft production as well as trade, there is nothing to differentiate them, in effect, from the traditional notion of a town or city. *Hamwic* (Southampton) and Ipswich then take their place as small towns, London and York as rather larger and more important towns (and royal and ecclesiastical centres), in a Europe in which towns, and certainly the idea of towns, never went away.\(^\text{16}\) This argument gains in credibility when looking at the longer history of some of the towns mentioned below.

\(^{13}\) R. Hodges, *Dark Age Economics* (London, 1982), see esp. pp. 66–86.


\(^{16}\) See M. Anderton, ed., *Anglo-Saxon Trading Centres* (Glasgow, 1999), and especially the paper by R. Samson, ‘Illusory Emporia and Mad Economic Theories’, pp. 76–90.
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It has however been worth dwelling on the seventh century as it was in this period that the first sites which may be claimed as urban, even if not towns in the true market economy sense, emerged.17 Those settlements discussed in general above as _wics_ were all coastal or riverine trading settlements – Ipswich, Southampton, London and pre-Viking York (to which may be added Whithorn), all emerged in this period. This phase, as also suggested above, did not only belong to Anglo-Saxon England, but is found in other countries of northern Europe. For example, one interpretation of the evidence from the trading settlement of Birka in Sweden establishes it as a local assembly- and exchange-centre for iron, furs, raw materials and semi-manufactured goods to be sent on to other parts of western Europe.18 It is important that such sites, like the Anglo-Saxon _wics_, have been seen by archaeologists as related to estates of ‘kings’ or ‘chieftains’ who made part of the manorial farm available as a market or manufacturing centre: thus they very much belong to the same pre-market economic world of ‘gift exchange’ and barter – and surplus extraction – as the Anglo-Saxon sites.19 Swedish scholars have tended to be bolder in saying that such sites themselves must have stimulated a demand for food, fuel, and fodder which could have been obtained from local rural settlements in exchange for simple jewellery and craft products found in considerable quantities in their cemeteries. The problem with the English towns is that as Christianity took root jewellery and other objects ceased to be buried with the dead, so that the relationships between _wic_ and hinterland have been harder to determine, though much more evidence for this too is now being put together.20

Whether these early centres were permanent or seasonal trading places, or the beginnings of true towns, then, may not matter so much as the fact that groups of craftsmen were to be found working in them, or at least in some of them. Ipswich, for example, developed in the seventh century,21 Southampton was laid out on a gridded plan c. 700,22 and there is evidence from the seventh century for London. It is clear that whatever the status of the place, the centralisation of power round a local aristocracy was the truly


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important feature. It is not coincidental that the sixth to seventh centuries also saw the two most significant early laws in respect of smiths: the first affording protection to a king’s smith as to his messenger when travelling away from his base, and the second assuming that a magnate would have his own smith or smiths, and would take one with him on his travels (pp. 214–15). Neither the archaeological evidence for smiths in towns or trading places, nor the laws, offer any evidence for completely independent itinerant smiths although they do not disprove their existence.

This impression is confirmed by Celtic sites such as Mote of Mark and Dunadd in Scotland. The latter site had strong Northumbrian connections in the seventh century, and may actually have been under Northumbrian overlordship in the mid seventh century, the period for which there is also evidence of industrial scale metal-working activity on the site. This does not necessarily mean that Anglo-Saxon craftsmen were working there, although the presence of moulds with themes developed from Northumbrian art and buckle moulds of a specifically Germanic type found widely in Northumbria (p. 83) could suggest that smiths did indeed travel there with their kings/lords. The site is regarded as one of the places where early medieval art became ‘Hiberno-Saxon’, from the mingling of art styles from Germanic and Celtic sources. However, it is also seen as a high-status site partly because of the presence of specialist craftworkers: ‘control of the craftsmen went with other sources of power’. Although the site types in which they are found are rather different, the message of wics in relation to craftsman status seems to be the same as that from the fortified Celtic sites.

Monasteries and other major ecclesiastical centres as producers of fine metalwork must not be forgotten for this early period. Northumbrian monasteries such as Hartlepool and Jarrow have both produced evidence of metalworking in the seventh to eighth centuries. There is also evidence from Canterbury, like York a royal and ecclesiastical centre. An inscription in the Lindisfarne Gospels commemorates the work of the goldsmith who adorned the cover of the book in the early eighth century (p. 222).

The only slight evidence in England that a goldsmith might himself have been the high ranking individual in charge comes from the place-name Faversham and its association with rich products of the goldsmith’s art as grave goods from its cemetery (pp. 218–19). However there is no grave there identified as the grave of a metalworker/high-status figure such as grave 10 from Hérouvillette in Normandy (pp. 41–2). One inscription with a maker’s or rather a repairer’s name falls within this period, that from Harford Farm (39).

23 Campbell and Lane, Dunadd, pp. 34–6.
24 Ibid., p. 253.
25 For Hartlepool see chapter 2, above; For Jarrow see Bayley, ‘Non-ferrous Metalworking in England’, p. 245.
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It is interesting here to take up again the case of the smith from Tattersall Thorpe, recently re-dated to the seventh century. In the most recent discussion, Hinton has pointed to the difficulties of confirming the local bonded or itinerant status of the smith from the very varied but incomplete range of objects he had with him. He raised some other interesting possibilities, one of which was the possible presence in the area of a pre-Viking royal estate.\(^{27}\) Hinton suggested that an itinerant smith might have come there seeking patronage and died during his stay; the lonely site of his burial might indicate his status as a stranger, and perhaps that such a skilled stranger was an object of fear. If there was a major or royal estate there, however, we could link this with that higher level of itinerancy, in which the smith of a king or noble according to early laws was allowed to travel on behalf of or with his lord (above and pp. 214–15). Such a person might still be seen by locals as a stranger. The whole collection of objects this smith had with him is rather enigmatic in fact, in that all the tools are small-scale, and therefore unsuitable for heavy blacksmithing operations and yet there are only a few traces of precious metals within the assemblage. Perhaps this is an indication that gold was too valuable to be owned by at least some of the smiths who worked it. The presence of a stock of copper-alloy oddments does, however, reinforce the notion that smiths were not necessarily exclusively focused on a particular metal or trade. None of the copper objects appears to be work in progress, although they are obviously a deliberate collection.

THE MIDDLE SAXON PERIOD: THE EIGHTH TO THE EARLY TENTH CENTURY: BURHS AND ESTATES

Carver went on from his discussion of the development of early elites to note the establishment of *burhs* under Alfred and his successors (after the collapse of the *wics* in the ninth century) as non-commercial centres – inland, fortified sites under the control of the king, dedicated to collecting taxes and for the minting of silver pennies, centrally controlled.\(^{28}\) These new towns were part of the new administrative and defensive organisation of a unified England in response to the Viking invasions. Of those earlier sites identified as *wics*, however, only Ipswich appears to have continued into this phase (eighth to early tenth century) with no hiatus of either activity or location, although of course some of the earlier high-status or ecclesiastical centres (that is, for example, Canterbury, London and York) also acted as foci for this type of proto-urban development.\(^{29}\) The argument as to why


\(^{28}\) Carver, *Arguments in Stone*.


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dthis happened from the late ninth century and no earlier is supported by the coming together, for the first time since the Roman period of administrative, jurisdictional and economic functions, especially the establishment of mints, in the same centres. In the case of the older administrative centres, however, it is the establishment of mints which seems to be the really distinguishing feature. This would inevitably have led to a concentration of skilled fine metalworkers.

This burh phase, however, still belonged to a ‘redistributive’ rather than a commercial market economy. In this respect, towns even of the eighth to ninth centuries, seem to have shared characteristics with the large ecclesiastical and secular inland estates, such as Cheddar (for which we have evidence from the ninth century), which also had a resident non-agrarian population, though possibly on a smaller scale. This site also produced evidence for fine metalworking. Hinton in fact pointed to the importance of large estates, both ecclesiastical and secular, for our understanding of the development of craft production at this period. One example he used is Ramsbury, Wiltshire. The importance of this site is attested by the sculptures preserved in the church, and by the fact that it became the seat of a bishopric in the tenth century. On this probable royal estate, considerable evidence for ironworking has been found, including several furnaces for smelting, and also evidence for the making of iron tools. The level of production seems to have been in excess of merely local requirements, and the presumption is that iron objects were produced for distribution within an exchange or barter system. Other estates where metalworking, some of it fine metalworking, appears to have been carried on were at Northampton, Flixborough (Lincolnshire), and Brandon (Suffolk), although at the last two no actual evidence of production areas has been found. These seem to carry on the exploitation of estates by the elite for their surpluses, identified as a motivating factor for the development of wics for the same purposes in the early period. The only problem with this is our inability, in the absence of written records, to distinguish between many sites of this period as monastic or secular. Cheddar was clearly a royal

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estate (chapter 2, pp. 22, 28 and index), but what actually was the status of sites such as Brandon or Flixborough?

The literary and documentary evidence for this period is greater than for the earlier centuries, but still slight. Representing the visual arts there is only the Franks casket with its scene of Weland the smith, probably from Northumbria or Mercia in the eighth century (pp. 181–8). In poetry there is Alfred’s version of Boethius’ De Consolatione Philosophiae and the Phoenix: both, however, important in revealing the interest of the southern English elite in the goldsmith and his work in the ninth century. At the same period in the north Æthelwulf’s De Abbatibus provides us with a picture of a smith as part of a monastic community: one who does both blacksmith’s work and at least some work with copper alloys, in beating out vessels for domestic use (p. 201). One of Alfred’s Laws shows a concern for standards of workmanship and consumer protection which is slight evidence for smiths working independently of an estate or a landowner (monastic or lay), and which might relate to the developing towns (p. 215). Three inscriptions with maker’s names: on the Mortain reliquary (59), a gold ring from Lancashire (47), and the Sittingbourne Seax (pl. IIIc) (70), fall into this period.

THE LATE ANGLO-SAXON PERIOD: THE TENTH AND ELEVENTH CENTURIES

Evidence for the development of towns with definable areas of craft production in the last two centuries of the Anglo-Saxon period certainly occurs in relation to major administrative centres such as York, Winchester, Lincoln and London, although the scale of production at any one of them is usually uncertain.36 Many of these sites have histories as major centres over a long period. For example, York was at one point the centre of a Viking kingdom, as well as an ecclesiastical centre, and as Carver pointed out, had functioned as a centre of royal and ecclesiastical power as well as a trading and production centre, through all the phases of pre-Conquest history, and through all the presumed changes of economic and social change from the seventh century, from wic to burh to fully fledged commercial centre.37 Evidence for minting activity has been found there in the same area in which evidence for fine metalworking has been found.38 Winchester had sixth- to seventh-century cemeteries around the site of the Roman city,
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evidence for small private estates of thegns within the walls from the seventh century, and a cathedral from the 660s. It was extensively reconstructed under Alfred in the ninth century, and continued as a seat of Anglo-Saxon and Anglo-Scandinavian royal power to the end of the period, and, as a major ecclesiastical centre, was particularly affected by the tenth-century monastic reforms. Its medieval street names record the growth of its local industries at least from Alfred’s time, with the goldsmiths probably remembered in ‘Goldestret’, recorded in the Winton Domesday.\(^{39}\) Winchester is important too because the close relationship between moneyers and goldsmiths has been examined there, for the late pre-Conquest and immediately post-Conquest period.\(^{40}\) For example one goldsmith (aurifaber), Brithmarus, may also have been Edward the Confessor’s moneyer. Lincoln had a church from the seventh century, and may have been the site of a bishopric: its major urban development began when it became a Danish borough in the 870s. It grew and was an important mint centre in the tenth century, and became a major trading port with Scandinavia under Cnut.\(^{41}\) In London the first archaeological evidence of post-Roman activity is from the late sixth to the early seventh century, and there is numismatic and archaeological evidence for London being a major port (Lundenwic) by the mid seventh century. Lundenwic suffered as a result of the Viking incursions of the ninth century and its re-foundation by Alfred lay within the walls of the Roman city, which had previously been an ecclesiastical and probably an administrative centre. On this site, the town flourished and there is evidence for fine metalworking in copper alloys and precious metals.\(^{42}\)

The documentary sources for the elite goldsmith in southern England in the last two Anglo-Saxon centuries are particularly rich. At this high level there were clearly specialists in goldworking, although they may have worked in allied crafts involving gold, such as wall and manuscript painting (pp. 207–14). In monasteries, some of these goldsmiths seem to have been ecclesiastics and some laymen, although if the former they could, like Spearhafoc, also undertake secular commissions, and they could travel at least within the ecclesiastical milieu in order to pursue their craft. In the case of Evesham, there appears to have been a workshop of some size, in which Mannig, a high-ranking ecclesiastic, was in charge of a lay master-craftsman, Godric, who was himself in charge of several craftsmen. The evidence from the similarity of design between manuscript illumination and engraved goldsmith’s work is also evidence for goldsmiths’ workshops in the major ecclesiastical centres (pp. 162–4). Wills and charters also reveal

\(^{40}\) Ibid., p. 421 and table 35.
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the existence of goldsmiths attached to the estates of royalty and wealthy laymen and women (pp. 210–14). Some of these were unfree, and they are mentioned because they were freed and provided for under the terms of a will. Presumably such craftsmen, before they were freed, were not able to work away from the estate to which they were tied without the permission of their lord. There is archaeological support for workshops of jewellers and goldsmiths on both royal and lay estates in the same area and at the same period.

The literary and visual evidence for this period and area are also unusually full compared to previous eras. There are relevant illustrations in three manuscripts, and one manuscript has a poem and an illustration of the biblical smith Tubal-Cain (pp. 197–200). Much of the poetry celebrating the fine metalsmith and his work was written down in the same milieu, and even if, as is often supposed, these poems preserve earlier material, the preoccupations they reveal were obviously also of the period in which they were written down in their latest form. This was also the period of the homilies with their darker view of blacksmiths, and of the interest in the practical vocabularies of smiths and smithing represented by Ælfric’s Colloquy and his grammar and glossary (pp. 203–6). Five of the inscriptions referring to smiths and their work date from these two centuries (pp. 220–5).

PRODUCTION METHODS AS EVIDENCE FOR SMITHS’ SOCIAL ROLE

The social importance of goldsmiths, and the respect in which they were held, does not seem to have depended on their legal status (chapters 7 and 8). The objects themselves sometimes contain epigraphic evidence which can add to our small store of precise knowledge about fine metal smiths (chapter 8): the number of inscriptions which seem to refer to makers must, as we have suggested, bear some relationship to their importance in society and to the same phenomenon in west European sources generally. These inscriptions also cover the whole period, not only the last two centuries. Chapters 7 and 8 showed that admiring references to smiths and their products are actually quite common in pre-Conquest visual, documentary and literary sources, even though in only a few cases (in wills, chronicles, and dedications mainly of the tenth and eleventh centuries) were named individuals identified as goldsmiths. One might assume that such men were not also weaponsmiths or blacksmiths, but in spite of the listing of smiths in different metals in Ælfric’s Colloquy, it is nowhere made clear in the documentary record that distinctions were drawn between the producers of different categories of metalwork. There is no equivalent of the manual of Theophilus to tell us about the actual workshop practice of any individual. Consideration of this point touches on a number of issues

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which elsewhere have been raised by social and economic historians, or by archaeologists influenced by these disciplines. These issues have been approached by looking at the products of the smiths and attempting to make deductions from methods of manufacture as to whether they were made in settled workshops or by lone itinerant smiths. The major part of this work, however, deals only with the products of the early centuries.

There has been only one attempt to discuss these issues as they relate specifically to the smith in the Anglo-Saxon context. K. B. Brown examined a number of different theories of the development or appearance of craft specialisation, mostly based on Roman or Scandinavian evidence, and often on the evidence of bone working rather than metalworking. These theoretical models support a development from ‘home production’ (characterised by evidence of metalworking debris, but no clearly defined workshop or production area); itinerancy (characterised by identifiable workshop areas in several places on an excavated site, each with a limited production period); and craft specialisation (several workshops concentrated within one area, each with a long production period). Attempts have been made to link these phases to the surviving objects, on the assumption that non-specialisation would be characterised by a greater variation in design, techniques and skill levels, and specialisation by a diminution in this variety, culminating in forms of mass production. Brown rightly points out that there are difficulties in relating these models to what survives on the ground in Anglo-Saxon England and also called into question their applicability to Anglo-Saxon society. We have also pointed out that goldsmith’s work might in any case leave few traces (chapter 2), and while lack of traces, especially in the early centuries, might be construed as evidence for itinerancy, it could also mean that significant production sites are yet to be found, or that fine metalwork for a developing elite was not only small-scale work but that the finest work had only a limited production.

There have been attempts to relate methods of production to the different working conditions that might be supposed to prevail for an itinerant smith as opposed to one or more based in a workshop. A considerable discussion on this point has developed in studies based on the corpus of early Anglo-Saxon brooch types over the last two decades. For example, Dickinson in a study of cast saucer brooches published in 1982 discussed at some length the possible relationship between casting technology and working conditions. She summed up arguments, based on evidence from the continental mainland and largely on the work of Vierck, for the use of durable bronze models for the manufacture of two-piece clay moulds, as a first stage in the casting process. This theory has been used to promote the idea of itinerant

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craftsmen, carrying their permanent models with them, and making the finished products in investment moulds. As we have shown, however, and as Dickinson also noted, the evidence for investment moulds at this period is hard to find (chapter 3). Dickinson also put forward the arguments for the use of secondary wax or lead models, and the possibility of using wood or bone models, on the assumption that these were used to make piece moulds rather than investment moulds.

The nature of the casting process altogether, however, does not fit easily with the notion of itinerancy since, in comparison with the techniques involved in fabrication, it requires at least a semi-permanent workplace with ready access to supplies of suitable materials for the production of crucibles and moulds. The role of a bronze model must relate to other factors, it can have no bearing on whether or not the goldsmith travelled. Bronze models imply repeated production, and if this has not yet been found it may mean only that the remains are too small to be representative of the total production. There are, of course, no bronze models from Anglo-Saxon England though there are bronze dies for Pressblech which precisely were used to make repeat patterns (chapter 4).

Dickinson’s first conclusion was that at some time in the sixth century, there was a change from one preferred method of manufacture to another: from the use of bronze, bone or wax models to make both moulds of a pair, to a method involving different models for each of a pair, leaving wax or wood models as the only viable methods. She suggested that if wood models were used a workshop would be the only plausible context; if wax, a change to workshop organisation was again the most likely explanation, for while this did not imply large scale production, it did imply a significant addition to the production process. She further suggested that the greater variety and experimentation in the later brooch groups was most likely to be the product of a settled workshop environment. In a later study based on developments in the study of casting technology, however, an even more refined argument for workshops was put forward, based on wax models and the use of templates. More importantly, however, she concluded that ‘knowledge of production methods does not lead automatically to knowledge of how production was organised, especially if the hypothesised use of wax models and templates is accepted, for it dissolves the distinction, essayed in the 1970s, between use of metal models and itinerant craftsmen on the one hand, and more ephemeral models and group production (workshops) on the other’. The problems, as she pointed out, are that finds represent places of use and deposition rather than manufacture, and

45 Vierck, ‘Eine südskandinavische Reliefbibel’.

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that there is a lack of credible early production sites. We rejected the notion that permanent models implied itinerant smiths for different reasons (above).

Hines’ analysis, based on his study of great square-headed brooches, is rather different from Dickinson’s. He pointed out that, theoretically at least, the dispersal of ‘a brooch-form or any detail of a brooch-form’ could take place through the movement of the brooches themselves (through trade, gift, or movement of owner) which could then be copied ‘mechanically or free-hand’; through the movement of models or templates (if they were part of the production process); or the movement of craftsmen with any of these or with the necessary expertise. 48 He concluded that the first and third of these options are both more likely than the second, because of the doubt about the place of hard models in the production process. He was particularly dubious about the evidence for ‘workshop groups’ and believed there is little evidence from which to infer how local the place of production might have been in relation to the place of use or deposition. He noted some other features of cemetery groups which might need to be taken into consideration: for example, a high degree of consistency in form, treatment and date, on sites with more than one square-headed brooch. He strongly suggested that the limited chronological range apparent among brooches from individual sites requires explanation – perhaps by the occasional visits of peripatetic craftsmen – but also raises a problem of the supposed market, if indeed a site was only visited once, or only within a restricted period of time.

All these arguments centre around brooch types predominantly in gilt copper alloy. The workshop groups implied by similarities of construction in goldsmiths’ work in gold and garnet or copper alloy and garnet cloissonné work have been discussed above (chapter 6). For the later centuries, the archaeological evidence for the development of craft areas in towns bespeaks a more commercial approach, although unfortunately there is rarely sufficient quantity of any one type in the surviving material to enable this to be tested. The later Anglo-Saxon literature, supported by continental material of sometimes an earlier date makes it clear that goldsmiths worked in groups in settled workshops in the richer monasteries, and wills and the archaeological evidence shows the same pattern on rich secular estates.

CONCLUSION

The obvious conclusion arising from all the evidence gathered in this book is that we should expect goldsmiths to be found in centres of wealth and power. They are associated with the rise of the powerful royal and noble

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elite from the seventh century, in wics, on great estates, and in the craft centres of later fully developed towns. There is a case to be made for itinerant smiths, even itinerant goldsmiths: after all, moulds for objects of Anglo-Saxon design have been found in Dunadd in Argyll, albeit in a place with Northumbrian connections in the seventh century, and from Geneva at about the same period comes an Anglo-Saxon lead model. Early inscriptions such as that on the Harford Farm brooch repair (39) could imply a wish to advertise. As we know, however, smiths could travel on behalf of or with their lords, and there is evidence for their activity on royal, noble and ecclesiastical estates almost throughout the period: an itinerant goldsmith/weaponsmith/jeweller might be an essential part of the entourage of an important person, rather than an independent craftsman. No convincing evidence has been produced to differentiate the work of itinerant smiths from those who worked in settled workshops. There are scraps of evidence to show that goldsmiths were important and admired figures, whatever their legal status may have been – and this was obviously varied. In towns there seems often to be an association between goldsmiths and moneyers, perhaps not only because of a similarity in some of the techniques employed, but also because moneyers were men of wealth and high status who should probably be regarded as financiers, possibly arising out of the fact that they managed the exchange of old silver for coinage.\(^\text{40}\) It is in these later towns that the goldsmith seems to be emerging as an independent figure.

It is impossible to show that fine metalworkers before the Conquest worked exclusively in one area of work, such as jewellery or weaponsmithing, or in gold and silver rather than copper alloy. Many objects show a mixture of metals, and in the early period, for which we have most evidence, considerable skill was exercised in making a little precious metal look like more: not only through gilding, but in building up a gold front on a copper alloy back. Weapons could have inlays which demonstrate the fine metalworkers’ skill, and these inlays come in a variety of metals, to suit a range of patrons. Hilts and pommels too are often a display of wealth and of many aspects of the goldsmith’s art, as much as were the fine blades.

The varied role of smiths is particularly revealed through their involvement in repair work. The ability to make repairs should not be underrated. To repair a sophisticated piece of jewellery effectively requires skills that are at least the equal of those used in the original manufacture. Another possible inference from the objects and tools found with the Tattershall Thorpe smith is that a significant proportion of his work was concerned with repairs. The repair of worn or broken jewellery has been a necessary part of the goldsmiths’ lot since the first jewellery was made in precious

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metal. This would probably have been an even more important part of the Anglo-Saxon goldsmiths’ job than it is for his modern descendant. A number of pieces of Anglo-Saxon goldsmiths’ work can be seen to be well-worn, and were clearly not new when buried or lost. In a few cases they show obvious signs of having been repaired. Most of the examples known to us are from the sixth and seventh centuries. This can be explained by the change in burial practices which occurred during the late seventh and early eighth centuries, after which, it was no longer the custom to have rich inhumations. Before this, as we have seen in chapter one, the personal possessions of the deceased were buried with them. This would have included jewellery which had been in their possession for many years and, in some cases, had needed to be repaired. In later centuries, these would have been handed down until they reached an irreparable state, after which they would have been remade in the current fashion, or used as bullion. There are a number of sixth-century great square-headed brooches, for example, which had been repaired before being deposited, usually to join elements which had been broken off.50 In one or two cases, it is probable that the repair had been done more than once, as on the example from Ruskington, where the number of rivet holes in the area around the junction of the bow with the foot seems more than would be necessary for a single repair. The composite brooch from Harford Farm, Norfolk (39) has obvious repair work on it. This has already been mentioned in chapter three, since the repairer, Luda, scratched his name in runes on the back. The brooch had clearly been very badly damaged, with part of the front-plate and some of the pseudo-plait decoration around the rim having to be replaced.

Another recently discovered composite disc-brooch from East Anglia, that from Boss Hall, Ipswich, Suffolk (13), had also been repaired. A small plate had been riveted or pegged to the side, on top of the reeded collar. On this particular brooch, the reeded collar is much thinner than normal, and the applied patch is perhaps covering a torn area. A handsome silver-gilt buckle, decorated with gold filigree and garnet cloisonné, found in grave 16 at Alton, Hampshire (8, pl. 27), had been repaired at least twice before burial. Two reeded strips of silver-gilt were riveted across it, perhaps to hold it together, and also to fix it to a belt. A perhaps better known repair is that on the pectoral cross (22, pl. III a and b) found in the coffin of St Cuthbert when it was opened in 1827. This had been repaired twice in antiquity, in order to reconnect the lower arm which had been broken off. In both repairs small plates had been riveted inside the cross (chapter 3). An important factor in the need for repair to these objects may be the rather fragile nature of their complicated structures, all of which probably had paste fillers which would make them more vulnerable than all-metal constructions.

50 Hines, A New Corpus of Anglo-Saxon Great Square-headed Brooches, p. 293.
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It is difficult to find among late Anglo-Saxon fine metalwork any object which clearly has a long history of wear and tear, but there is the example of the small portable altar from the tomb of St Cuthbert which went through three phases not so much of repair as of refurbishment, from the seventh century to possibly the late tenth–eleventh centuries.\(^{51}\)

A comparison with modern practice in goldsmithing is instructive, in that at one extreme there are jewellers whose whole trade is in repairing damaged jewellery, while at the other there are large-scale manufacturers of gold jewellery. Between these two are many others, from those who make individual pieces to commission, to those who produce work in small batches. There are also those who specialise in particular skills, such as stone setting, polishing, engraving, and chasing. While in Anglo-Saxon times there may not have been such extremes, there are suggestions that there were different kinds even of fine smiths, and certainly when the jewellery is examined closely by the practised eye, different levels of skill become apparent, as they presumably were to the early medieval patron. We have pointed to the possibility, for example, that the filigree in the great composite disc-brooches may have been made by different smiths from those who constructed the brooch (p. 171).

A major attraction of Anglo-Saxon jewellery is the high level of technical accomplishment of the goldsmiths, evident in many of the surviving pieces: these high standards can be found throughout the period. For example the makers of a mid fifth-century quoit brooch from Sarre shows a sureness of touch in both design and making which their successors repeatedly equalled until the Norman Conquest.\(^{52}\) It may be the case that items such as the regalia from Sutton Hoo (see 73–8) represent a particular high point, and have become well known as examples of the finest quality, but there are many other less flamboyant and less famous pieces of late sixth- to early eighth-century cloisonné work which attest to the rich background of high quality goldsmithing which is the essential platform from which such heights are reached. These high standards did not apply only to work in gold, as can be seen from the gilt copper-alloy composite disc-brooch from Sarre (65), which would, when new, have been the equal of its all-gold contemporaries. The Fetter Lane sword pommel\(^{53}\) and the Ormside Bowl (60, pl II a and b), both from the eighth century, show us very different but equally impressive achievements in designing and making. From the ninth century the Alfred Jewel (6, pl. VIIIa) is deservedly famous, but its more modest though no less accomplished fellow, the Minster Lovell jewel (58) hints again at the existence of much more work of equal quality, now lost to us. From the same century, the Fuller brooch (35, pl. 14) shows us the

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\(^{51}\) Coatsworth, ‘The Pectoral Cross and the Portable Altar from the Tomb of St Cuthbert’, pp. 296–301.

\(^{52}\) For the Sarre brooch see J. Campbell, The Anglo-Saxons, p. 29 and pl. 6.

\(^{53}\) Wilson, Anglo-Saxon Ornamental Metalwork 700–1100, no. 41, pp. 148–9, pl. XXIII.
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extraordinary graphic qualities which some at least of the goldsmiths (perhaps goldsmith-painters) were capable of. The plain surface of this and some other silver disc-brooches gave a blank canvas for the craftsmen to demonstrate their sensibilities as both designers and makers. The finely inlaid seaxes of the ninth and tenth centuries remind us that the skills of the goldsmith were in demand to embellish the weapons of war throughout the period.

Most of the examples discussed above are in a good state of preservation, which is one reason for the frequency with which they have been illustrated in the literature, but from the practitioner’s point of view it is the damaged pieces which can offer the greatest insights. The damage often reveals details of construction which would otherwise remain hidden, and it is such information that often lies behind what was discussed in chapters 3–6. These damaged pieces can also, when mentally reconstructed, increase the impression of the breadth and depth of high quality goldsmithing as it was practised by the Anglo-Saxons. The empty and badly damaged gold composite disc-brooch from Faversham (28, pl. 7), although now in a sorry state, can with some imagination, and on the basis of a practical examination, be seen to have been exquisitely designed and made, the equal of anything else from the great period of garnet cloisonné work. One of the composite disc-brooches excavated by Bryan Faussett, that from Guilton (38, pl. VIa), must have been almost as fine, and probably came from the same goldsmith’s workshop. Although not badly damaged its present location and uncleaned condition are perhaps to blame for the fact that it has been rather neglected by scholars. The severely damaged tenth-century silver and gold disc-brooch from King’s School, Canterbury (see chapter 6) is another very informative piece.\(^\text{54}\) It too hints at the skill of which the Anglo-Saxon goldsmith was capable, at a period when perhaps resources of precious metals were more severely limited than they had been to some of his predecessors. So much has been lost to us of the goldsmiths’ work after deposition in graves ceased to be the rule, that it is difficult to make any useful comment on how representative such a piece is, but it is an accomplished work by any criteria.

An inescapable result of the intensive study of the Anglo-Saxon smith, particularly the goldsmith, is a realisation that they were aware of and used an enormous range of skills and techniques, even by comparison with a modern goldsmith. They could indeed be said to have been working at the leading edge of the practical knowledge of their time. It is no wonder, therefore, that they were respected, admired, and, as the Welad legend and its source (and perhaps also the position of the burial of the Tattershall Thorpe goldsmith) suggest, even feared in the early centuries. Most studies of their work, however, have concentrated on analysis of pattern types in

\(^{54}\text{Ibid.}, \text{no. 10, pp. 124–7, pls. XV, XVI.}\)
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the hope of distinguishing ethnic and regional groups, connections between
groups, and stylistic developments over time. We would plead that evidence
from constructional and decorative techniques can be used not only to
distinguish high points of craftsmanship and design, but also, when
sufficient examples survive, possible ways of distinguishing regional, or
even workshop groupings to add to the archaeologists’ and historians’
knowledge.
Appendix A: The Anglo-Saxon Vocabulary of Metalworking

The following word-lists owe a great debt to three sources: the great Anglo-Saxon dictionary by Bosworth and Toller; *A Thesaurus of Old English*; and the microfiche and on-line versions of the Old English Dictionary based in Toronto, although other sources were consulted too, acknowledged in chapters 7 and 8 and below.1 **Bold** in these lists means that the term is found only in poetry; *italics* that it is found only in glosses. Where glosses have provided one or more Latin equivalents, these have also been included. Modern English versions of the same words where they have kept anything of the original meanings have also been listed; there are a few still used by craftsmen which have fallen out of the general vocabulary; these are added to the modern English gloss where known to the authors, but there are probably more.

The Anglo-Saxon vocabulary of metalworking has to be teased out from various sources, most of them belonging to the latest part of the period. It may have been the case that at least one manuscript of *Mappae Clavicula* was known in pre-Conquest England (chapter 1), but no Anglo-Saxon manuscript of that date actually survives. There is therefore no document of which the principal concern is to describe a metalworking process, or provide a recipe (of a solder, for example). We can show that a vocabulary for some of the materials, tools, techniques and workers exists, but not very often how this was used in the work situation. The majority of terms come from poetry, homilies and saints’ lives, where they are sometimes used descriptively, but too briefly to provide a real commentary on an object’s structure, or the real skills of a famous smith, and where, especially in the homiletic literature, they may also be derivative from earlier, non-Anglo-Saxon sources. Glosses are another major source, and they are valuable where they are not the only source for a technical term, in giving a Latin equivalent which may have a history of its own. There is in Old English a rich vocabulary for processes such as heating, melting, mixing, thinning and thickening, all of which would be required for certain metalworking

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Appendix A

processes, but in general they are found in relation to the preparation of food or medicines. 2

Modern translations for verbs such as ‘âbrâcian’ and ‘âdrîfan’ can be very vague, including (for both) ‘to engrave, stamp, emboss’: that is, three different technical processes, the first of which also cannot in practice be confused with either of the other two, and all requiring different tools or at least different techniques. A master goldsmith instructing an assistant could not have been so vague in telling him what was required. We have tried below to differentiate such terms, where possible, in relation to both related meanings and Latin terms glossed by them.

One group of terms which rarely occur in pre-Conquest written records in relation to metalwork are the names of non-metallic materials which were (or most probably were) used in the preparation of materials (such as niello) or in construction and finishing processes. These include oil, soap, wax, resin, pitch, sulphur and polishing agents such as jeweller’s rouge. Most of these essential ingredients are referred to in pre-Conquest literature – as factors in complex metaphors in homilies, and as essential ingredients in medicinal recipes. Sulphur is included in the list of imports provided by the merchant in Ælfric’s Colloquy. 3 A mistake in translation in a medicinal recipe might give us pause, but also allows us to check that the correct substance is meant when glossing Latin: with ‘live sulphur’ (cum sulfure vivo) is translated as ‘cwicseolfor’ (quicksilver, mercury) in a stomachic remedy in one place (a disaster if ever taken literally) but ‘cwicseolfor’ correctly glosses argentum vivum elsewhere. 4 It is in fact in the medical texts that these substances turn up most often, wax for example as a base for salves. 5 The Latin obrizum metallum presumably in the sense of ‘pure or refined substance’ is glossed in one place as ‘âsoden weax’: ‘boiled wax’. In this context, boiled probably means heated to just above simmering, at which point it is possible to sieve out impurities. Wax would have to be purified for some of the operations required by the goldsmith, for example casting. These non-metallic substances have not been included in the lists below, although they were known and available, as they never occur in any text in connection with metal, except in a figurative sense, such as in statements that metals melt in heat ‘like wax’. As we have suggested above, they are amply attested elsewhere, and sometimes appear in the archaeological record. Where such discoveries are relevant, they are mentioned in preceding chapters.

One absence, however, is worth a mention. Niello, used for filling and enhancing recessed designs such as engraving, and which in Anglo-Saxon England was a composition combining either copper, silver and sulphur, or

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3 Garmonsway, Ælfric’s Colloquy, pp. 3-4.
4 M. L. Cameron, Anglo-Saxon Medicine, pp. 76-7. See also note 9 below.
5 For example, Cockayne, Leechdoms, Wortcunning and Starcraft, III, pp. 4-7 – a salve for bleared eyes.
silver and sulphur, was an important feature of Anglo-Saxon metalwork (chapter 4), but there seems to be no way of referring to it directly in Old English. Its modern name is derived from Latin nigellus, a diminutive of niger: ‘black’. Both terms appear frequently in Old English glosses, but mainly in connection with plant or colour names. In Mappae Clavicula the process of making niello and its use are described without giving a name to the process or substance: the chapter heading ‘niello’ is provided by the editors.6

It is also worth noting that the word ‘smith’ itself is in some doubt as to its primary meaning: it appears in Bosworth and Toller as ‘a worker in metal or wood’. The origin of this curiosity appears to lie in the status of Joseph in the New Testament, the description of whose work is faber in Latin (Greek ἡμαρτάνω), glossed in Old English as ‘smith’. But faber in this context was often interpreted not as ‘carpenter’ but as ‘smith’ in early medieval commentaries on the biblical text, so the confusion seems to be modern rather than ancient.7 Latin carpentarius meant carpenter in the later Middle Ages, but in classical Latin it meant a wainwright – a maker of wooden carts – and this explains why Jesus and Joseph are called fabri in the Vulgate.8 Every context in which the word is used in Old English denotes a worker in metal, and it seems unlikely that the word was used in any other sense.

The lists below have been divided into four groups: materials and by-products; tools and equipment; techniques and processes; and metalworkers. Notes to each section have been provided where necessary.

MATERIALS AND BY-PRODUCTS

<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossed</th>
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</thead>
<tbody>
<tr>
<td>ært/är</td>
<td>copper alloy9</td>
<td>aes; aeramentum/eramentum</td>
</tr>
<tr>
<td>æren</td>
<td>made of copper alloy</td>
<td>aeneus</td>
</tr>
<tr>
<td>grêne ār</td>
<td>green copper alloy</td>
<td>aurocalcium</td>
</tr>
</tbody>
</table>

6 Smith and Hawthorne, Mappae Clavicula’, p. 104. The facsimile of the Corning Manuscript shows no heading.
9 Copper alloy is the term now generally used for all the alloys containing copper. Some of these alloys are definitely either brass or bronze, in the modern meanings of the words. Brass = copper and zinc; bronze = copper and tin. The makers and users of these alloys must have had terms which distinguished them, and in fact they have different colours, roughly yellow (brass), pink (copper) and reddish-gold (bronzes). There is no native source of zinc, so brass must have been a deliberate choice, though possibly by recycling an alloy made elsewhere. Anglo-Saxon words include ær/ær, brass and mæstling and goldmæstling, but more work is needed to show whether these words were used to distinguish the different alloys, although goldmæstling would seem to imply metal in appearance like gold.
### Appendix A

<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossed</th>
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</thead>
<tbody>
<tr>
<td>ārgesweorf</td>
<td>filings of copper alloy</td>
<td>(see ‘gesweorf’)</td>
</tr>
<tr>
<td>ārgeweoroward</td>
<td>work of copper alloy</td>
<td>aeramentum</td>
</tr>
<tr>
<td>blōma</td>
<td>a mass, lump (of metal</td>
<td>massa, metallum</td>
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<tr>
<td></td>
<td>or dough) modE bloom:</td>
<td></td>
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<tr>
<td></td>
<td>a mass of puddled iron</td>
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<tr>
<td></td>
<td>hammered into a thick</td>
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<tr>
<td></td>
<td>bar</td>
<td></td>
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<tr>
<td>bræs</td>
<td>copper alloy: modE</td>
<td>aes</td>
</tr>
<tr>
<td></td>
<td>brass</td>
<td></td>
</tr>
<tr>
<td>bræsen</td>
<td>made of copper alloy:</td>
<td>aeneus, aereum</td>
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<tr>
<td></td>
<td>modE brazen</td>
<td></td>
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<tr>
<td>clympre</td>
<td>lump or clump (of metal)</td>
<td>metallum</td>
</tr>
<tr>
<td>coper</td>
<td>copper</td>
<td>cyprum</td>
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<tr>
<td>cypren</td>
<td>made of copper</td>
<td></td>
</tr>
<tr>
<td>cwicselofor</td>
<td>mercury: modE</td>
<td>argentum vivum(^\text{10})</td>
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<tr>
<td>fætt</td>
<td>a thin plate (of gold),</td>
<td>lamina, bractea</td>
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<tr>
<td></td>
<td>gold leaf</td>
<td></td>
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<tr>
<td>fýrbend</td>
<td>bar forged in fire</td>
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<tr>
<td>fýrclamm</td>
<td>bar forged in fire</td>
<td></td>
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<tr>
<td>gesweorf</td>
<td>filings modE swarf: lathe</td>
<td></td>
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<tr>
<td></td>
<td>or waste turnings</td>
<td></td>
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<tr>
<td>gold</td>
<td>gold</td>
<td>aureus</td>
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<tr>
<td>gylden</td>
<td>made of gold, golden</td>
<td></td>
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<tr>
<td>goldfiell</td>
<td>gold-plate or thin sheet</td>
<td>bracteus</td>
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<tr>
<td></td>
<td>of gold</td>
<td></td>
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<tr>
<td>gyldenfiell</td>
<td>gold-plated or with thin</td>
<td>bractea</td>
</tr>
<tr>
<td></td>
<td>gold sheet</td>
<td></td>
</tr>
<tr>
<td>goldgeweorc</td>
<td>object made of gold,</td>
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<td></td>
<td>goldwork</td>
<td></td>
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<tr>
<td>goldlaef</td>
<td>see readgoldlaef</td>
<td></td>
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<tr>
<td>goldlæaf</td>
<td>gold plate, goldleaf</td>
<td></td>
</tr>
<tr>
<td>gyldenlæaf</td>
<td>gold plate, gold leaf</td>
<td>bractea</td>
</tr>
<tr>
<td>goldmaestling</td>
<td>copper alloy</td>
<td>auricalcum, auri metallum</td>
</tr>
<tr>
<td>goldória</td>
<td>a mass of gold</td>
<td>auri metallum</td>
</tr>
<tr>
<td>on smētum goldōrum</td>
<td>in pure gold</td>
<td>in obriizium metallum</td>
</tr>
<tr>
<td>goldweccg</td>
<td>gold ingot, lump of gold</td>
<td>auri metallum, massa</td>
</tr>
</tbody>
</table>

\(^\text{10}\) One gloss has *electrum i. sucus arboris* ‘cwicselofor vel maestling’. Both Latin words mean ‘amber’ or ‘resin’, but *electrum* also carries the meaning ‘pewter’ another alloy, or it could mean a gold-silver alloy. See also ‘smylting’, which Hans Schabram argued strongly means an alloy of gold and silver in OE, and which has been wrongly translated as ‘amber’. His argument shows that ‘smylting’ appears consistently in lists of metals. He demonstrated that the mistake goes back to Isidore, who derived ‘succinum’ from ‘sucus’, translated in OE as ‘sep’. H. Schabram, ‘AE. smyting ‘electrum’. Polysemie Lat. Wörter als Problem der AE. Lexikographie’, *Problems of Old English Lexicography: Studies in Memory of Angus Cameron*, ed. A. Bamnesburger (Regensburg, 1985), pp. 317–30.
The Anglo-Saxon vocabulary of metalworking

<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossen</th>
</tr>
</thead>
<tbody>
<tr>
<td>glydne weóc</td>
<td>gold mine</td>
<td>aurifodina</td>
</tr>
<tr>
<td>òren</td>
<td>iron, made of iron</td>
<td></td>
</tr>
<tr>
<td>òse(r)n</td>
<td>iron, made of iron</td>
<td></td>
</tr>
<tr>
<td>òsen clut</td>
<td>iron plate or patch</td>
<td></td>
</tr>
<tr>
<td>òsen greáf</td>
<td>iron mine</td>
<td></td>
</tr>
<tr>
<td>òsenore</td>
<td>iron ore</td>
<td></td>
</tr>
<tr>
<td>òsen swēt</td>
<td>dross of iron (?rust or salts of iron) (^{11})</td>
<td></td>
</tr>
<tr>
<td>òsen þel</td>
<td>iron plate</td>
<td></td>
</tr>
<tr>
<td>læfer</td>
<td>a thin plate (of metal)</td>
<td>see glydne læfer</td>
</tr>
<tr>
<td>lēad</td>
<td>lead</td>
<td></td>
</tr>
<tr>
<td>lēadgedelf</td>
<td>lead mine</td>
<td></td>
</tr>
<tr>
<td>mæstling</td>
<td>copper alloy</td>
<td>auricalcum, electrum (^{12}), altilia(?)</td>
</tr>
<tr>
<td>oferscofrêd</td>
<td>plated with silver, silvered</td>
<td></td>
</tr>
<tr>
<td>öra</td>
<td>ore, unwrought metal</td>
<td>aes</td>
</tr>
<tr>
<td>plátung</td>
<td>plate, sheet of metal</td>
<td>bractea, laminis</td>
</tr>
<tr>
<td>rēadgoldlæfer</td>
<td>plate, thin sheet of red gold</td>
<td>auri obriza, lammina</td>
</tr>
<tr>
<td>scenn</td>
<td>a thin plate (of metal)</td>
<td>(on a sword hilt)</td>
</tr>
<tr>
<td>scelfor</td>
<td>silver</td>
<td></td>
</tr>
<tr>
<td>scelfren</td>
<td>made of silver</td>
<td></td>
</tr>
<tr>
<td>scelforhammen</td>
<td>coated with silver</td>
<td></td>
</tr>
<tr>
<td>sinder</td>
<td>dross, slag modE cinder</td>
<td>scorium, scoria</td>
</tr>
<tr>
<td>smynting</td>
<td>gold/silver alloy?</td>
<td>electrum (^{13})</td>
</tr>
<tr>
<td>spærstan</td>
<td>gypsum, chalk</td>
<td>gipsum, creta argentea</td>
</tr>
<tr>
<td>style</td>
<td>steel</td>
<td></td>
</tr>
<tr>
<td>stylelec g</td>
<td>steel-edged</td>
<td></td>
</tr>
<tr>
<td>styled</td>
<td>steel-edged</td>
<td></td>
</tr>
<tr>
<td>stylên</td>
<td>made of steel</td>
<td></td>
</tr>
<tr>
<td>tîn</td>
<td>tin</td>
<td>stâgnum</td>
</tr>
<tr>
<td>tînen</td>
<td>made of tin</td>
<td>stâgneum</td>
</tr>
<tr>
<td>wecg</td>
<td>mass, lump of metal, a wedge</td>
<td>metallum</td>
</tr>
<tr>
<td>wîr</td>
<td>wire, ? metal thread</td>
<td></td>
</tr>
<tr>
<td>wîrboga</td>
<td>bent or twisted wire</td>
<td>used as ornament</td>
</tr>
<tr>
<td>gewêred</td>
<td>ornamented with wire</td>
<td></td>
</tr>
</tbody>
</table>

\(^{11}\) See Cameron, Anglo-Saxon Medicine, p. 126, in which he points out that iron rust or salts derived from boiling an iron rod in water and/or wine were believed to be efficacious for certain conditions. Theophilus also uses the derivatives of heated iron in some of his recipes, so salts of iron is not an improbable translation.

\(^{12}\) See footnotes 9 and 10.

\(^{13}\) See footnote 10.
## Appendix A

### TOOLS AND EQUIPMENT

<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossed</th>
</tr>
</thead>
<tbody>
<tr>
<td>anfîhte/anfealt</td>
<td>anvil</td>
<td>incus, cudo</td>
</tr>
<tr>
<td>ãst</td>
<td>drying oven, kiln, ‘oast’</td>
<td>siccatorium</td>
</tr>
<tr>
<td>belg/bylig</td>
<td>bellows (leather bag)</td>
<td>follis, foggineis</td>
</tr>
<tr>
<td>bîtel</td>
<td>hammer, mallet modE</td>
<td></td>
</tr>
<tr>
<td>blæðbylig</td>
<td>bellows</td>
<td>follis</td>
</tr>
<tr>
<td>blæstbelg</td>
<td>bellows</td>
<td></td>
</tr>
<tr>
<td>blâwere</td>
<td>a furnace, smelter</td>
<td></td>
</tr>
<tr>
<td>byres</td>
<td>borer, punch, piercer</td>
<td>boratorium, foratorium</td>
</tr>
<tr>
<td>cimbrêren</td>
<td>joining iron, clamp</td>
<td></td>
</tr>
<tr>
<td>clawu</td>
<td>pincers, hook, claw</td>
<td></td>
</tr>
<tr>
<td>cnop</td>
<td>knob, knob, button</td>
<td></td>
</tr>
<tr>
<td>crafet</td>
<td>machine, instrument</td>
<td>machinam ingennum</td>
</tr>
<tr>
<td>cilen</td>
<td>(kitchen) oven, kiln</td>
<td>foracula, siccatorium,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>culina</td>
</tr>
<tr>
<td>feng</td>
<td>clamp, clasp</td>
<td>arpax, rostrum</td>
</tr>
<tr>
<td>fêol</td>
<td>file</td>
<td>lima</td>
</tr>
<tr>
<td>fyrpanne</td>
<td>firepan, hearth</td>
<td>arula, arula batilla</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(enclosed fire)</td>
</tr>
<tr>
<td>fyrtang</td>
<td>tongs</td>
<td></td>
</tr>
<tr>
<td>gnidil</td>
<td>pestle</td>
<td></td>
</tr>
<tr>
<td>græfsex</td>
<td>small chisel, graving tool</td>
<td>scalprum, scalpellum</td>
</tr>
<tr>
<td>hamor</td>
<td>hammer</td>
<td>malleus, porticulus</td>
</tr>
<tr>
<td>handhamur</td>
<td>small hammer</td>
<td>malleolus</td>
</tr>
<tr>
<td>heardhêaw</td>
<td>chisel, possibly punch</td>
<td>ciscillus, circillus navicula,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>foratorium</td>
</tr>
<tr>
<td>hecorr</td>
<td>hinge, pivot</td>
<td></td>
</tr>
<tr>
<td>heorpb</td>
<td>hearth</td>
<td>foracula</td>
</tr>
<tr>
<td>hôc</td>
<td>hook</td>
<td>hamus</td>
</tr>
<tr>
<td>lyniber</td>
<td>borer, gimlet</td>
<td>terebellum</td>
</tr>
<tr>
<td>mortere</td>
<td>mortar</td>
<td>mortariola</td>
</tr>
<tr>
<td>næfebor</td>
<td>auger or borer</td>
<td>rotrum, foratorium,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>terebrum</td>
</tr>
<tr>
<td>nafoðarb</td>
<td>auger or borer</td>
<td>terebellus</td>
</tr>
<tr>
<td>nægl</td>
<td>pin, peg, nail</td>
<td></td>
</tr>
<tr>
<td>ofen</td>
<td>oven, kiln, furnace</td>
<td>forax, caminus, clibanus</td>
</tr>
<tr>
<td>ofenraca</td>
<td>oven-rake</td>
<td>rotabulum</td>
</tr>
<tr>
<td>pile</td>
<td>mortar</td>
<td>pilum</td>
</tr>
<tr>
<td>pilstæf</td>
<td>pestle</td>
<td>pilum</td>
</tr>
<tr>
<td>pilstampe</td>
<td>pestle</td>
<td>pilum</td>
</tr>
<tr>
<td>pilstocc</td>
<td>pestle</td>
<td>pilum</td>
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</table>

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<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossed</th>
</tr>
</thead>
<tbody>
<tr>
<td>pinn</td>
<td>pin, peg, nail</td>
<td>pinna</td>
</tr>
<tr>
<td>punere</td>
<td>pestle</td>
<td>pilum</td>
</tr>
<tr>
<td>scear (usually plural)</td>
<td>scissors, shears</td>
<td>forfex, forfices</td>
</tr>
<tr>
<td>searopil</td>
<td>pointed implement, used in metalworking, (? a drill, see p. 190)</td>
<td></td>
</tr>
<tr>
<td>slecg/slic</td>
<td>hammer, mallet modE</td>
<td>malleus</td>
</tr>
<tr>
<td>slegebyðt</td>
<td>hammer, mallet modE</td>
<td></td>
</tr>
<tr>
<td>smíþbelg</td>
<td>smith’s bellows</td>
<td></td>
</tr>
<tr>
<td>smíþpe</td>
<td>smithy</td>
<td>officina</td>
</tr>
<tr>
<td>(ge)spang</td>
<td>clasp</td>
<td></td>
</tr>
<tr>
<td>stempingisern</td>
<td>stamping iron</td>
<td>celon, celox, cilon</td>
</tr>
<tr>
<td>tang</td>
<td>tongs</td>
<td>forceps, forcipis</td>
</tr>
<tr>
<td>twiðeolor, twiwaþge</td>
<td>scales, weighing machine</td>
<td>bilanx</td>
</tr>
<tr>
<td>þwearm</td>
<td>cutting tool</td>
<td>scalprum</td>
</tr>
<tr>
<td>wæge, gewiht</td>
<td>a weight</td>
<td>pondus</td>
</tr>
<tr>
<td>wægpundern</td>
<td>scales, steelyard</td>
<td></td>
</tr>
<tr>
<td>wægsceal, scealu</td>
<td>a scale of a balance</td>
<td>lanx, balances</td>
</tr>
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</table>

### MANUFACTURING AND DECORATIVE TECHNIQUES AND PROCESSES

<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ðbrācian</td>
<td>to engrave</td>
<td>caelare</td>
</tr>
<tr>
<td>ðbrācod</td>
<td>engraved</td>
<td>caelatum</td>
</tr>
<tr>
<td>ðdrifn</td>
<td>embossed</td>
<td></td>
</tr>
<tr>
<td>ðgeotan</td>
<td>to pour, to cast</td>
<td></td>
</tr>
<tr>
<td>ðgoten</td>
<td>cast</td>
<td></td>
</tr>
<tr>
<td>ðgimmed</td>
<td>set with precious stones</td>
<td></td>
</tr>
<tr>
<td>ðgraðan</td>
<td>to engrave</td>
<td></td>
</tr>
<tr>
<td>ðgraðen</td>
<td>engraved</td>
<td>in sculptilibus, caelatum, expolita</td>
</tr>
<tr>
<td>wundor ðgraðen</td>
<td>wondrously graven</td>
<td>sculpile</td>
</tr>
<tr>
<td>ðgraðenlic</td>
<td>graven</td>
<td></td>
</tr>
<tr>
<td>ðhirðan</td>
<td>to harden or temper metal</td>
<td></td>
</tr>
<tr>
<td>ðmeltan</td>
<td>to melt (of metal, by fire)</td>
<td>examinare</td>
</tr>
<tr>
<td>ðmerian</td>
<td>(of metal) to purify by fire</td>
<td></td>
</tr>
<tr>
<td>ðmered</td>
<td>(of metal) purified by fire</td>
<td>examinatum, purgatum, obrizium</td>
</tr>
</tbody>
</table>
### Appendix A

<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossed</th>
</tr>
</thead>
<tbody>
<tr>
<td>āpletod</td>
<td>plated</td>
<td>decoquere</td>
</tr>
<tr>
<td>āsēðfæn</td>
<td>to purify in the fire by seething, assay</td>
<td>fabricare</td>
</tr>
<tr>
<td>āsmiðian</td>
<td>to forge, fashion in metal</td>
<td></td>
</tr>
<tr>
<td>āsoden</td>
<td>pure</td>
<td></td>
</tr>
<tr>
<td>āstæntan</td>
<td>to set with jewels</td>
<td>lapidus ornare</td>
</tr>
<tr>
<td>āstemped</td>
<td>engraved, chased</td>
<td>celatum</td>
</tr>
<tr>
<td>āstrenged</td>
<td>malleable, ductile</td>
<td>ductilis, fusili, productilis</td>
</tr>
<tr>
<td>āsworfen</td>
<td>filed off, rubbed off, polished</td>
<td>sub expolita materia, ornata, culta</td>
</tr>
<tr>
<td>ātertān</td>
<td>with serpentine patterning (lit. ‘poison twigs’, meaning unclear)</td>
<td></td>
</tr>
<tr>
<td>ut uþringan</td>
<td>to emboss, to press out</td>
<td></td>
</tr>
<tr>
<td>āwritan</td>
<td>to draw, engrave, carve, sculpt</td>
<td>inscribere, sculpere, delineare</td>
</tr>
<tr>
<td>bēatende</td>
<td>the beating (of a hammer)</td>
<td>tundentis mallei, percutientis</td>
</tr>
<tr>
<td>begyladan</td>
<td>to gild</td>
<td>deaurato</td>
</tr>
<tr>
<td>begylde</td>
<td>gilded</td>
<td></td>
</tr>
<tr>
<td>besettan</td>
<td>to set (with jewels)</td>
<td></td>
</tr>
<tr>
<td>beslfriæn</td>
<td>to cover over with silver</td>
<td></td>
</tr>
<tr>
<td>beslfredæ</td>
<td>covered with silver</td>
<td>deargentate</td>
</tr>
<tr>
<td>besmiðian</td>
<td>to forge, fashion in metal</td>
<td></td>
</tr>
<tr>
<td>bewyrcað mid</td>
<td>to cover with (metal)</td>
<td></td>
</tr>
<tr>
<td>bræsian</td>
<td>to work in copper alloy</td>
<td>aerare</td>
</tr>
<tr>
<td>(ge)ceorfan</td>
<td>to carve, sculpt</td>
<td></td>
</tr>
<tr>
<td>fætæd</td>
<td>metal plated</td>
<td></td>
</tr>
<tr>
<td>fōlæian</td>
<td>to file</td>
<td></td>
</tr>
<tr>
<td>(ge)blæwan</td>
<td>to melt, smelt, on the fire</td>
<td>conflatilis, conflatum, inclusum</td>
</tr>
<tr>
<td>gefēgan</td>
<td>to construct, to join together</td>
<td></td>
</tr>
</tbody>
</table>

---

14 The forging of blades is outside our subject, but this is an interesting point. The phrase ‘ātertān fah’, ‘decorated with poison twigs’, occurs in *Beowulf*, line 1459, descriptive of the sword ‘Hrunting’. Hilda Ellis Davidson offered two possible explanations of this term. The first was that it referred to poisonous acids used to finish the blade, and to bringing out the pattern which was an important feature. This is correctly described as an etching process. Possible acids suggested were tannic acid, urine, acetic acid (from vinegar), fruit juice, sour beer and vitriol, all of which would do the required job. None of these, however, explain the use of ‘poison twigs’. We prefer her other main explanation, that the term is descriptive of the often herringbone-like pattern on the pattern-welded blades, which can have a twig-like appearance, while ‘poisoned’ with reference to a sword-point in the poem ‘The Battle of Maldon’ seems to imply ‘sharp and deadly’ rather than literally poisoned. H. E. Davidson, *The Sword in Anglo-Saxon England* (Oxford, 1962), pp. 28, 129–35.
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<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossed</th>
</tr>
</thead>
<tbody>
<tr>
<td>gegimmod</td>
<td>set with precious stones</td>
<td>gemmatus</td>
</tr>
<tr>
<td>(ge)gyldan</td>
<td>to gild</td>
<td></td>
</tr>
<tr>
<td>geyld</td>
<td>gilded</td>
<td>inauratum, deaurato</td>
</tr>
<tr>
<td>gehierdan</td>
<td>to harden metal</td>
<td></td>
</tr>
<tr>
<td>geondhyrdan</td>
<td>to harden metal</td>
<td>thoroughly</td>
</tr>
<tr>
<td>(ge)gōtan</td>
<td>to cast</td>
<td></td>
</tr>
<tr>
<td>geplatoed</td>
<td>plated</td>
<td>obrizum</td>
</tr>
<tr>
<td>geslegen</td>
<td>(of weapons etc.) forged</td>
<td></td>
</tr>
<tr>
<td>gesod</td>
<td>heated, melted, refined</td>
<td></td>
</tr>
<tr>
<td>geswētan</td>
<td>to weld, force together(^{15})</td>
<td></td>
</tr>
<tr>
<td>(ge)pēowan</td>
<td>to press, shape through pressure</td>
<td></td>
</tr>
<tr>
<td>gebweran</td>
<td>to strike, to forge</td>
<td></td>
</tr>
<tr>
<td>geworht</td>
<td>worked, ornamented, wrought</td>
<td></td>
</tr>
<tr>
<td>gewringan</td>
<td>to press or twist into shape</td>
<td></td>
</tr>
<tr>
<td>gimbere</td>
<td>set with precious stones</td>
<td>gemmifer, bullifer</td>
</tr>
<tr>
<td>gimmisc</td>
<td>set with precious stones</td>
<td>gemmea</td>
</tr>
<tr>
<td>goldfæted</td>
<td>gold-plated, decorated</td>
<td></td>
</tr>
<tr>
<td>ingrista</td>
<td>with goldleaf</td>
<td></td>
</tr>
<tr>
<td>goldfāg</td>
<td>ornamented with gold</td>
<td></td>
</tr>
<tr>
<td>goldfyld</td>
<td>gilded, covered with gold leaf</td>
<td></td>
</tr>
<tr>
<td>goldhladen</td>
<td>adorned with gold</td>
<td></td>
</tr>
<tr>
<td>goldbroden</td>
<td>adorned with gold</td>
<td></td>
</tr>
<tr>
<td>goldwlancl</td>
<td>brave with gold</td>
<td></td>
</tr>
<tr>
<td>goldwreken</td>
<td>inlaid/&quot;forced&quot; with gold</td>
<td>(see pp. 114–16, 213)</td>
</tr>
<tr>
<td>greft</td>
<td>a carving</td>
<td>sculptura</td>
</tr>
<tr>
<td>hēahgāRAFT</td>
<td>worked in high relief</td>
<td>anaglypha</td>
</tr>
<tr>
<td>grafan</td>
<td>to engrave, carve, sculpt</td>
<td>sculpero, caelare</td>
</tr>
<tr>
<td>gullisc</td>
<td>?gilded</td>
<td></td>
</tr>
<tr>
<td>hwettan</td>
<td>to sharpen</td>
<td></td>
</tr>
<tr>
<td>inheald</td>
<td>worked in bas-relief,</td>
<td>interrasilis</td>
</tr>
<tr>
<td>[?inlaid, deeply cut]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ge)lǣndlic</td>
<td>easily led ?(of metal)</td>
<td>ductilis</td>
</tr>
<tr>
<td>ofergyldan</td>
<td>to gild</td>
<td></td>
</tr>
<tr>
<td>ofergyld</td>
<td>gilded</td>
<td></td>
</tr>
</tbody>
</table>

\(^{15}\) The modE word ‘sweat’ is used by modern precious metal workers in connection with a particular soldering process, in which one surface of the two pieces of metal to be joined is covered with a thin layer of molten solder. Once cool, the two pieces are fitted together, and the whole re-heated until the solder re-melts, or ‘sweats’.

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### Appendix A

<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ofergylden</td>
<td>gilded</td>
<td></td>
</tr>
<tr>
<td>oferseolfran</td>
<td>to cover over with silver</td>
<td></td>
</tr>
<tr>
<td>oferseolfrad</td>
<td>plated with silver</td>
<td>deargentate</td>
</tr>
<tr>
<td>onašlagen</td>
<td>(of metal) beaten, ductile, malleable</td>
<td>ductilis</td>
</tr>
<tr>
<td>(ge)pilian</td>
<td>to pound in a mortar</td>
<td></td>
</tr>
<tr>
<td>(ge)portian</td>
<td>to pound in a mortar</td>
<td>contundere</td>
</tr>
<tr>
<td>(ge)punian</td>
<td>to pound in a mortar</td>
<td></td>
</tr>
<tr>
<td>(ge)sclerpan</td>
<td>to sharpen</td>
<td>acuere</td>
</tr>
<tr>
<td>seolforhammen</td>
<td>plated with silver</td>
<td></td>
</tr>
<tr>
<td>sincfet</td>
<td>setting for gems</td>
<td></td>
</tr>
<tr>
<td>(ge)slean</td>
<td>to strike (a coin), forge (a weapon)</td>
<td></td>
</tr>
<tr>
<td>(ge)smilpian</td>
<td>to forge, fashion in metal</td>
<td>cudere, fabricare</td>
</tr>
<tr>
<td>stēnan</td>
<td>to set with jewels</td>
<td></td>
</tr>
<tr>
<td>stempan</td>
<td>to stamp, to pound</td>
<td></td>
</tr>
<tr>
<td>sweorfan</td>
<td>to rub, file</td>
<td>limere</td>
</tr>
<tr>
<td>sworfen</td>
<td>filed, rubbed</td>
<td></td>
</tr>
<tr>
<td>þweran</td>
<td>to stir or beat together, in poetry, to forge</td>
<td></td>
</tr>
<tr>
<td>wriðan</td>
<td>to draw, engrave, inscribe</td>
<td></td>
</tr>
<tr>
<td>writian</td>
<td>to draw, engrave, inscribe</td>
<td></td>
</tr>
<tr>
<td>wyrmfāh</td>
<td>with serpentine patterning</td>
<td></td>
</tr>
<tr>
<td>wyrmhīw</td>
<td>with serpentine patterning</td>
<td></td>
</tr>
<tr>
<td>wyrmfic</td>
<td>with serpentine patterning</td>
<td></td>
</tr>
</tbody>
</table>

### METALWORKERS

<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ambhìtsmiþ</td>
<td>official, skilled smith</td>
<td></td>
</tr>
<tr>
<td>ārgēotere</td>
<td>a caster (pourer), in copper alloy</td>
<td>aerarius</td>
</tr>
<tr>
<td>ārsmiþ</td>
<td>a worker in copper alloy</td>
<td>faber, aerarius</td>
</tr>
<tr>
<td>fyrbeta</td>
<td>one who looks after a fire</td>
<td>focarius</td>
</tr>
<tr>
<td>gēotere</td>
<td>smelter or founder</td>
<td>fusor, flator</td>
</tr>
<tr>
<td>gimwyrhta</td>
<td>jeweller</td>
<td></td>
</tr>
</tbody>
</table>

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The Anglo-Saxon vocabulary of metalworking

<table>
<thead>
<tr>
<th>OE</th>
<th>modE</th>
<th>Latin glossed</th>
</tr>
</thead>
<tbody>
<tr>
<td>goldsmiþ</td>
<td>goldsmith</td>
<td>aurifex</td>
</tr>
<tr>
<td>graþere</td>
<td>an engraver, carver</td>
<td>sculptor, celator</td>
</tr>
<tr>
<td>Írens improving</td>
<td>iron smith</td>
<td>ferrarius</td>
</tr>
<tr>
<td>Isensimþ</td>
<td>iron smith</td>
<td>ferrarius</td>
</tr>
<tr>
<td>ðsetþnwyrhtæ</td>
<td>iron smith</td>
<td>ferrarius</td>
</tr>
<tr>
<td>lēadgota</td>
<td>smelter, founder, worker in lead</td>
<td></td>
</tr>
<tr>
<td>mestlingsmith</td>
<td>worker in copper alloy</td>
<td>aerarius</td>
</tr>
<tr>
<td>pþlere</td>
<td>one who pounds a mortar</td>
<td>pilarius</td>
</tr>
<tr>
<td>seolþormþ</td>
<td>silversmith</td>
<td>argentarius</td>
</tr>
<tr>
<td>sleeþywrhtæ</td>
<td>metalworker (hammer worker, probably a blacksmith)</td>
<td>malleator</td>
</tr>
<tr>
<td>smiþ</td>
<td>smith</td>
<td>ferrarius</td>
</tr>
<tr>
<td>smipþcraft</td>
<td>skill of the smith</td>
<td></td>
</tr>
<tr>
<td>smipþcraþtæ</td>
<td>a skilled craftsman in metal</td>
<td></td>
</tr>
<tr>
<td>wundormþ</td>
<td>a wondrously gifted smith</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B: Select Catalogue

The catalogue is intended only as a guide to the principal museum and exhibition catalogues in which the objects have been included; or main reference of an object if it has never been catalogued.


1. Aberford, W. Yorkshire
Finger ring, D. 2.6cm
Gold, niello
Ninth century
London, British Museum, Dept of Medieval and Modern Europe, AF 458

2. Abingdon, Oxfordshire
Sword, L. 31.5cm, max. W. 12.4cm
Iron, silver, niello
Late ninth–early tenth century
Oxford, Ashmolean Museum, 1890.41
Backhouse, Turner and Webster, *Golden Age*, no. 14, p. 34

3. Abingdon (Milton North Field), Oxfordshire (pl. 28)
Composite disc-brooch, D. 7.4cm
Gold, silver, copper alloy, garnet, white material
Late sixth–early seventh century
Oxford, Ashmolean Museum, 1836.59

4. Abingdon (Milton North Field), Oxfordshire
Composite disc-brooch, D. 7.8cm
Gold, silver, copper alloy, garnet, white material
Late sixth – early seventh century
London, Victoria and Albert Museum, reference no. M109 = 1939; British Museum No. 1852, 2–13, 1
Avent, *Anglo-Saxon Garnet Inlaid Disc and Composite Brooches*, no. 183

5. Abingdon, Oxfordshire (pl. 16)
Pair of saucer brooches, D. each 4cm
Gilt copper alloy
Fifth–sixth century
Oxford Ashmolean Museum 1909.499
[i–ii]

6. ‘Alfred Jewel’, North Petherton, Somerset (pl. VIIIa)
Mount, L. 6.2cm
Gold, rock crystal, enamel
Late ninth century
Oxford, Ashmolean Museum, 1836.371
Hinton, *A Catalogue of the Anglo-Saxon...*
Select catalogue

Ornamental Metalwork – 700–1100,
o no. 23, pp. 29–48; Backhouse, Turner
and Webster, *Golden Age of Anglo-Saxon
Art*, no. 13, pp. 33–4; Webster and
Backhouse, *Making of England*, no. 260,
pp. 282–3

7. Alfriston, Sussex
Quoit brooch, D. c. 4cm
Silver
Fifth century
Lewes, Barbican House Museum
G. B. Brown, *Arts in Early England*, VI, i,
p. 303, pl. XLIx, 2; S. Suzuki, The Quoit
Brooch Style and Anglo-Saxon Settlement
(Woodbridge, 2000), pp. 157–8

8. Alton, Hampshire (pl. 27)
Buckle, L. 9.8cm
Silver gilt, gold, garnet, niello
Seventh century
Alton, Curtis Museum (Alton, grave 16,
o no. 2, ACM 1967.114.1)
Evison, *An Anglo-Saxon Cemetery at
Alton, Hampshire*, pp. 51–2

9. Beckley, Oxfordshire
Sword pommel, W. 10cm, H. 6.0cm
Silver
Late eighth century
London British Museum, Department of
Medieval and Modern Europe 1994, 4–7, 1
Unpublished

10. Bifrons, Kent
Mount, L. 3.5cm, W. 2.5cm
Gilt copper alloy
Sixth–seventh century
Maidstone Museum
Unpublished

11. Bischofshofen, Pongau (Salzburger
Raum), Austria (‘Rupertus Cross’)
Standing cross, H. 158cm, W. 94cm
Copper alloy, polychrome glass, maple
Second half eighth century
Salzburg Diocesan Museum

Webster and Backhouse, *Making of
England*, no. 133, pp. 170–2

12. Bologna, Italy
Finger ring, D. 3.4cm
Gold, niello
First third ninth century
Bologna, Museo Civico Medievale, 2016
Webster and Backhouse, *Making of
England*, no. 201, pp. 236–7

13. Boss Hall, Ipswich, Suffolk
Composite disc-brooch, D. 7cm
Gold, silver, copper alloy, garnet,
white material
Late seventh century
Ipswich Co-operative Society
Webster and Backhouse, *Making of
England*, no. 33a, pp. 51–3

14. Brussels, Belgium
Standing cross, H. 54.9cm, max.
W. 27.7cm
Silver, parcel gilt, oak
Early eleventh century
Cathedral of SS Michael and Gudule,
Brussels, Belgium
Backhouse, Turner and Webster, *Golden
Age*, no. 75, pp. 90–2; Okasha, *Hand-list,*
no. 17, pp. 57–8

15. Canterbury, Old Westgate Farm,
Kent
Pendant, D. 4cm
Gold, garnet, shell (?)
Early seventh century
Canterbury City Museums inv.
o no. CANCM:CB/R2 78 456
Webster and Backhouse, *Making of
England*, no. 10, p. 26

16. Canterbury, Kent
Disc-brooch, D. 7.9cm
Silver
Mid tenth century
Oxford, Ashmolean Museum, 1951.131
Hinton, *Catalogue of the Anglo-Saxon
Ornamental Metalwork 700–1100 in the*
Appendix B

Department of Antiquities, Ashmolean Museum, no. 6, pp. 13–15; Okasha Hand-list, no. 19, pp. 58–9

17. Canterbury, Kent
Portable sundial, L. 6.1cm, W. 1.6cm Gold, silver, niello
Tenth century
Canterbury Cathedral Treasury, Kent Backhouse, Turner and Webster, Golden Age of Anglo-Saxon Art, no. 77, p. 94; Okasha Hand-list, no. 20, p. 5

18. Canterbury, Kent
Censer cover, H. 11.8cm Copper alloy, silver, niello
Mid tenth century
London, British Museum, Dept of Medieval and Modern Europe, 1927, 11–18, 1
Wilson, Anglo-Saxon Ornamental Metalwork 700–1100, no. 9, pp. 22–4; Backhouse, Turner and Webster, Golden Age of Anglo-Saxon Art, no. 73, p. 89

19. Cluny Museum, Paris
Portable altar, L. 26.1cm, W. 13.8cm Porphyry, silver, niello
Second quarter eleventh century
Paris, Musée de Cluny, CL 11.459
Backhouse, Turner and Webster, Golden Age of Anglo-Saxon Art, no. 76, p. 92

20. Cowlow, Buxton, Derbyshire
Pair of pins connected by a chain, H. of each pin 5.5cm Gold, garnet
Seventh century
Sheffield City Museum, J.93–703 (H 35)

21. Crundale, Kent (pls. 17, 18)
Buckle, L. 15.2cm Gold, silver, garnet
Mid seventh century
London, British Museum, Dept of Medieval and Modern Europe 1893, 6–1, 204

Webster and Backhouse, Making of England, no. 6, pp. 24–5

22. Durham (Cuthbert cross), Co.
Durham (pls. IIIa,b and fig. 25)
Cross pendant, H. 6cm gold, garnet, glass, shell
Second half seventh century
Durham Cathedral Treasury Webster and Backhouse, Making of England, no. 98, pp. 133–4

23. Eccles, Kent
Buckle, L. 6.9cm Copper alloy
Mid seventh century
Private Collection
Webster and Backhouse, Making of England, no. 7, p. 25

24. Exeter
Sword pommel guard, L. 8.4cm Copper alloy
Ninth–eleventh century
London, British Museum, Dept of Medieval and Modern Europe, 1875, 6–17, 15
Wilson, Anglo-Saxon Ornamental Metalwork 700–1100 in the British Museum, no. 17, pp. 130–1; Okasha, Hand-list, no. 37, pp. 70–1

25. Faversham, Kent
Pendant, D. 3.7cm Gold, garnet
Seventh century
London, British Museum, Dept of Medieval and Modern Europe 1895, 1145.70
Webster and Backhouse, Making of England, no. 9, p. 26

26. Faversham, Kent
Plated disc-brooch, D. 4.5cm Gold, silver gilt, garnets, blue glass Garnet cloisonné, cast, beaded wire
Early seventh century
London, British Museum, Dept of Medieval and Modern Europe 1895, 1030.70

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Select catalogue

Avent, *Anglo-Saxon Garnet Inlaid Disc and Composite Brooches*, no. 145

27. **Faversham, Kent**
Plated disc-brooch, D. 4.3cm
Gold, silver gilt, garnet, blue glass
Early seventh century
London, British Museum, Dept of Medieval and Modern Europe 1895, 3–20, 4
Avent, *Anglo-Saxon Garnet Inlaid Disc and Composite Brooches*, no. 147

28. **Faversham, Kent (pl. 7)**
Composite disc-brooch, D. 6.3cm
Gold, garnet, blue glass
Early seventh century
London, British Museum, Dept of Medieval and Modern Europe 10.28, 70
Avent, *Anglo-Saxon Garnet Inlaid Disc and Composite Brooches*, no. 180

29. **Faversham, Kent (pl. IVa)**
Composite disc-brooch, D. 8.2cm
Gold, silver, garnet
First half seventh century
Cambridge, Fitzwilliam Museum, Frank McLean Bequest 1904, acc. no. Dalton 4 (formerly in the Kennard collection)
Avent, *Anglo-Saxon Garnet Inlaid Disc and Composite Brooches*, no. 181

30. **Faversham, Kent**
Strap-end, L. 7cm, W. 2.2cm
Silver gilt, garnet
Sixth century
London, British Museum, Dept of Medieval and Modern Europe, 1895,1162–70
Battiscombe, *Relics*, pl. XVII, 4

31. **Faversham, Kent**
Buckle,
Silver gilt, garnet
Seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1895,1098–70
Unpublished

32. **Faversham, Kent**
Mount, L. 4.3cm, W. 3.0cm
Gold, silver, garnet
London, British Museum, Dept of Medieval and Modern Europe, 1895,1096–70
Unpublished

33. **Flixborough, Lincolnshire**
Pin with linked chain, L. of pin 14.3cm, D. of head 1.42cm, L. of chain 14.3cm
Copper alloy
Eighth century
Scunthorpe Museums, site code FLX 89 4157

34. **Forsbrook, Staffordshire**
Coin pendant, D. 2.8cm
Gold, garnet
Seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1879, 7–14, 1
R. A. Smith, *A Guide to the Anglo-Saxon and Foreign Teutonic Antiquities in the Department of British and Medieval Antiquities* (London, 1923), pl. IV, 2

35. ‘Fuller brooch’ (no provenance) (pl. 14)
Disc-brooch, D. 11.4cm
Silver, niello
Late ninth century
London, British Museum, Dept of Medieval and Modern Europe, 1952, 4–4, 1
Backhouse, Turner and Webster, *Golden Age of Anglo-Saxon Art*, no. 11, pp. 30–1;
Webster and Backhouse, *Making of England*, no. 257, pp. 280–1

36. **Great Saxham, Suffolk**
Disc, D. 1.7cm
Copper alloy, enamel

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Appendix B

Tenth century
Bury St Edmunds, Moyse’s Hall
Museum

37. Guilston, Kent (pl. 15)
Plated disc-brooch, D. 4.5cm
Gold, gilded silver, garnet, blue and white enamel
Early seventh century
Oxford, Ashmolean Museum, 1836, 216
MacGregor and Bolick, Ashmolean Museum, Oxford. A Summary Catalogue of the Anglo-Saxon Collections (Non-Ferrous Metals), no. 7.1

38. Guilston, Kent (pl. VIta)
Composite disc-brooch, D. 5.0cm
Gold, silver, garnet
First half seventh century
City of Liverpool Museums and Art Galleries, Mayer Collection, M.6006
Avent, Anglo-Saxon Garnet Inlaid Disc and Composite Brooches, no. 175

39. Harford Farm, Caistor-by-Norwich, Norfolk
Composite disc-brooch, D. 7.0cm
Gold, garnet
C. 610–650
Norwich Castle Museum

40. Hexham, Northumberland
Chalice, max. H. 6.7cm
Copper alloy

Eleventh century?
Hexham Abbey

41. Holderness (Burton Pidsea), Humberside
Pendant cross, L. 5.5cm, W. 5cm
Gold, garnet
Seventh century
Oxford, Ashmolean Museum

42. Hurbuck, Co. Durham
Scramasax, L. 71.3cm
Iron, copper alloy
Ninth–tenth century
London, British Museum, Dept of Medieval and Modern Europe 1912, 7–23, 2
Wilson, Anglo-Saxon Ornamental Metalwork 700–1100 in the British Museum, no. 22, pp. 135–6

43. Ixworth, Suffolk (fig. 25)
Cross pendant, max. D. 4.5cm
Gold, garnet, white material
Mid seventh century

44. Kingston Down, Kent (pls. Ib and 13)
Composite disc-brooch, D. 8.55cm
Gold, garnet, blue glass

1 Formerly spelled Gilton. See chapter 4.
Select catalogue

First half seventh century
City of Liverpool Museums and Art
Galleries, Mayer Collection, M. 6226
Avent, Anglo-Saxon Garnet Inlaid Disc
and Composite Brooches, no. 179;
Webster and Backhouse, The Making of
England, no. 32a, pp. 50–1

45. Kingston Down, Kent (pl. IVc)
Plated disc-brooch, D. 5.0cm
Gold, gilded silver, ?garnet, red, blue
and white ?glass
Early seventh century
City of Liverpool Museums and Art
Galleries, Mayer Collection, M. 6244
Avent, Anglo-Saxon Garnet Inlaid Disc
and Composite Brooches, no. 166

46. Kirkoswald, Cumbria
Trefoil mount, max. L. 9.0cm
Silver
Ninth century – before 855
London, British Museum, Dept of
Medieval and Modern Europe, O. A. 21
Wilson, Anglo-Saxon Ornamental
Metalwork 700–1100 in the British
Museum, no. 28, pp. 139–40

47. Lancashire (Manchester)
Finger ring
Gold, niello
Ninth century
London, British Museum, Dept of
Medieval and Modern Europe, O. A. 21
Sl. 64, Ring catalogue no. 181
Wilson, Anglo-Saxon Ornamental
Metalwork 700–1100 in the British
Museum, no. 30, p. 141; Okasha, Hand-
list, no. 66, p. 89

48. Laverstock, Wiltshire
Finger ring
Gold, niello
Ninth century – before 858
London, British Museum, Dept of
Medieval and Modern Europe, 1829,
11–14, 1
Wilson, Anglo-Saxon Ornamental
Metalwork 700–1100 in the British
Museum, no. 43, pp. 151–2

49. Leighton Buzzard, Bedfordshire
Composite disc-brooch, D. 5.4cm
Gold, copper alloy
First half seventh century
Luton Museum and Art Gallery
Avent, Anglo-Saxon Garnet Inlaid Disc
and Composite Brooches, no. 176

50. London (Battersea)
Seax, L. 81.1cm
Iron, silver, copper alloy (copper and
brass)
Late ninth century
London, British Museum, Dept of
Medieval and Modern Europe 1857,
6–23, 1
Wilson, Anglo-Saxon Ornamental
Metalwork 700–1100 in the British
Museum, no. 36, pp. 144–6; Backhouse,
Turner and Webster, Golden Age of
Anglo-Saxon Art, no. 94, pp. 101–2

51. London (Honey Lane Market)
Seax, L. 32.7cm
Iron, copper alloy
Ninth–tenth century
London, British Museum, Dept of
Medieval and Modern Europe 1856, 7–1,
1413
Wilson, Anglo-Saxon Ornamental
Metalwork 700–1100 in the British
Museum, no. 43, pp. 151–2

52. London (London Bridge)
Censer cover, H. 8.8cm
Copper alloy
Tenth century
London, British Museum, Dept of
Medieval and Modern Europe 1837,
3–28, 1
Wilson, Anglo-Saxon Ornamental
Metalwork 700–1100 in the British
Museum, no. 44, pp. 151–2

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Appendix B

53. London (from the bed of the Thames?)
Seax, L. 32.2cm
Iron, copper alloy (copper and brass)
Tenth century
London, British Museum, Dept of Medieval and Modern Europe 1859, 1–22, 12
Wilson, Anglo-Saxon Ormamental Metalwork 700–1100 in the British Museum, no. 50

54. London (Southwark, Surrey)
Seax, L. 26.6cm
Iron, silver
Ninth century
London, British Museum, Dept of Medieval and Modern Europe, 1935, 5–10, 1
Wilson, Anglo-Saxon Ormamental Metalwork 700–1100 in the British Museum, no. 81, p. 73

55. Lympne, Kent
Purse mount, L. 13cm
Copper alloy, glass
Sixth century
Maidstone Museum

56. Lympne, Kent (pl. Vc)
Pair of square-headed brooches, L. 10cm
Silver gilt, gold, garnet
Sixth century
Maidstone Museum
Warhurst, ‘A Jutish Cemetery at Lympne’, p. 30 and pl. XII, 1a and b

57. Milton, nr Sittingbourne, Kent (pl. IVb)
Pendant, L. 4cm
Gold, garnet, millefiori
Seventh century
Maidstone Museum

58. Minster Lovell, Oxfordshire
Mount, L. 3.1cm, max. D. 2.3cm
Gold, enamel
Second half ninth century
Oxford, Ashmolean Museum, 1869.20

59. Mortain (Manche), France
Casket, L. 13.5cm, W. 5.0cm, H. 11.5cm
Copper alloy, beechwood
Eightth century
Mortain Collegiate Church of S. Evroult Okasha, Hand-List, no. 93, p. 102;
Webster and Backhouse, Making of England, no. 137, pp. 175–6

60. Ormside, Cumbria (pl. Ila and b)
Bowl, D. 13.8cm
Silver, copper alloy, blue glass
Second half eighth century
Webster and Backhouse, Making of England, no. 134, p. 173

61. Oxford (Brasenose College)
Disc, D. 6.4cm
Gilt copper alloy, enamel
Tenth century
Oxford, Ashmolean Museum 1887.3072
Hinton, A Catalogue of the Anglo-Saxon Ormamental Metalwork – 700–1100, no. 27, pp. 51–3; Backhouse, Turner and Webster, Golden Age of Anglo-Saxon Art, no. 91, p. 100

62. Oxford (St Martin’s Church, Carfax)
Disc, D. 4.8–5.0cm
Copper alloy, enamel
Select catalogue

Eleventh century
Hinton, Catalogue of the Anglo-Saxon Ornamental Metalwork 700–1100 in the Department of Antiquities, Ashmolean Museum, no. 28, pp. 53–4

63. Pershore, Worcestershire (pl. 8)
Censer cover, H. 9.7cm
Tenth century
London, British Museum, Dept of Medieval and Modern Europe, 1960, 7–1, 1
Wilson, Anglo-Saxon Ornamental Metalwork 700–1100 in the British Museum, no. 55, pp. 157–8; Backhouse, Turner and Webster, Golden Age of Anglo-Saxon Art, no. 74, p. 90; Okasha, Hand-list, no. 100, p. 106

64. Ripon, Yorkshire
Roundel, D. 2.9cm
Gold, silver, garnet, amber, white material
Late seventh – early eighth century
Ripon Cathedral

65. Sarre, Kent
Composite disc-brooch, D. 6.8cm
Gold, silver, gilt copper alloy, garnet
Early seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1860, 10–24, 1
Avent, Anglo-Saxon Garnet Inlaid Disc and Composite Brooches, no. 177; Webster and Backhouse, Making of England, no. 31a, pp. 48–50

66. Sarre, Kent (Amherst Brooch)
Composite disc-brooch, D. 6.2cm
Gold, silver, garnet, yellow and green glass, white material

Early seventh century
Avent, Anglo-Saxon Garnet Inlaid Disc and Composite Brooches, no. 178; MacGregor and Bolick, Ashmolean Museum, Oxford. A Summary Catalogue of the Anglo-Saxon Collections (Non-ferrous Metals), 8.4

67. Sarre, Kent
Necklace, D. of millefiori pendant 2.9cm
Gold, glass, amethyst, millefiori
Early seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1860, 10–24, 2
Webster and Backhouse, Making of England, no. 31b, pp. 48–50

68. Sarre, Kent (pl. 19)
Buckle, L. 7.5cm
Silver gilt, gold, cloisonné
Seventh century
Maidstone Museum
Sarre grave 68, KAS 503
Unpublished

69. Sevington (1–8), Wiltshire
(1) Strap-end, L. 4.0cm
Copper alloy
(2) Blank for strap-end, L. 4.9cm
Copper alloy
(3) Blank for strap-end, L. 4.5cm
Silver
(4) Blank for strap-end, L. 4.2cm
Silver
(5) Blank for strap-end, L. 3.5cm
Copper alloy
(6) Ingot with split end and curved sides, L. 2.9cm
Copper alloy
(7) Blank for strap-end, L. 3.2cm
Copper alloy
(8) Fragment of the split end of a blank for strap-end, L. 2.0cm
Silver
Ninth century, before 850
London, British Museum, Dept of
Appendix B

Medieval and Modern Europe, 1888, 7–19, 163–70

70. Sittingbourne, Kent (pl. IIIc)
Seax, L. 32.2cm
Iron, silver, copper alloy (copper and brass), niello
Early tenth century
London, British Museum, Dept of Medieval and Modern Europe, 1881, 6–23, 1

71. ‘Strickland Brooch’ (no recorded provenance)
Disc-brooch, D. 11.2cm
Silver, gold
Mid ninth century
London, British Museum, Dept of Medieval and Modern Europe, 1949, 7–2, 1

72. Sutton, Isle of Ely, Cambridgeshire
Disc-brooch, D. 16.4cm
Silver
First half eleventh century
London, British Museum, Dept of Medieval and Modern Europe, 1951, 11–11, 1

73. Sutton Hoo, Suffolk
Shoulder clasps, L. 12.7cm
Gold, garnet, millefiori, blue glass
First quarter seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1939, 10–10, 4,5

74. Sutton Hoo, Suffolk (pl. 10)
Belt-buckle, L. 13.2cm
Gold
First quarter seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1939, 10–10, 1
Webster and Backhouse, *Making of England*, no. 15, p. 31

75. Sutton Hoo, Suffolk
Plaques from purse lid, overall L. 19cm, W. 8.3cm
Gold, garnet, millefiori
First quarter seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1939, 10–10, 2,3

76. Sutton Hoo, Suffolk (pl. 26)
Mount from ‘wand’, L. 7.5cm
Gold
First quarter seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1939, 10–10, 31
Bruce-Mitford, *The Sutton Hoo Ship Burial*, II, pp. 400–1

77. Sutton Hoo, Suffolk
Four harness mounts, each L. 5cm
Gold, garnet
First quarter seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1939, 10–10, 6–9

78. Sutton Hoo, Suffolk
Dragon and bird mounts from
Select catalogue

shield, Dragon: 22.5cm × 3.7cm; bird: 22cm × 14cm
Gilt copper alloy
First quarter seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1939, 10–10
Bruce-Mitford, The Sutton Hoo Ship Burial, II, pp. 55–66

79. Taplow, Buckinghamshire (pl. Ia)
Buckle, L. 10cm
Gold, garnet, glass
c. 600
London, British Museum, Dept of Medieval and Modern Europe, 1883, 1214–1
Campbell, The Anglo-Saxons, pl. 39

Trewiddle (1–2), Cornwall
80. (1) Chalice, H. 12.6cm
Silver
81. (2) Scourage, L. 56.5cm
Silver
Ninth century, before 875
London, British Museum, Dept of Medieval and Modern Europe, 1880, 4–10, 1–4
Wilson, Anglo-Saxon Ornamental Metalwork 700–1100, nos. 90, 91, pp. 179–81; Webster and Backhouse, Making of England, nos. 246a, b, pp. 270–72

82. Whitby Abbey, East Yorkshire
(3) Openwork mount, D. 9.0cm
Gilt copper alloy
Eighth century
London, British Museum, Dept of Medieval and Modern Europe, Strickland Loan, W. 29
Wilson, Anglo-Saxon Ornamental Metalwork 700–1100, no. 107, pp. 192–3; Webster and Backhouse, Making of England, no. 107a, pp. 141–2

83. Wilton, Norfolk (fig. 25)
Cross pendant, D. 4.4cm
Gold, garnet
Second quarter seventh century
London, British Museum, Dept of Medieval and Modern Europe, 1859, 5–12, 1
Webster and Backhouse, Making of England, no. 12, pp. 27–8

84. Winchester, Sussex Street
Reliquary, H. 17.5cm, W. 15cm
Copper alloy, gilding, beechwood
First half ninth century
Winchester Museums Service, Arch. 3157.80
Backhouse, Turner and Webster, Golden Age of Anglo-Saxon Art, no. 12, p. 32

85. Winchester (pl. IVb)
Head, H. 2.25cm
Silver, parcel-gilt
Late tenth or early eleventh century
Winchester, Cathedral Green, CG1051

86. Windsor, Berkshire
Sword pommel, L. 4.4cm, max.
H. 2.0cm
Silver, gold
Mid eighth century
Oxford, Ashmolean Museum, 1909.518

87. Womersley, Yorkshire
Pendant, D. 3.5cm
Gold, garnet, white material
Mid seventh century
Sheffield City Museum, J93–709 [H.261]
J. Campbell, The Anglo-Saxons, pl. 41
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88. York, Coppergate (pl. 12)
Helmet, H. 24.6cm
Iron, copper alloy (brass)
Second half eighth century
York, Castle Museum, YORCM CA665
Webster and Backhouse, *Making of England*, no. 47, pp. 60–2

89. Unknown Provenance
Crucifix reliquary, H. 18.5cm,
W. 13.65cm, Depth 1.4cm
Wood, gold sheet, walrus ivory, enamel
c. 1000

London, Victoria and Albert Museum,
Department of Metalwork, 7943.1862
Turner and Webster, *Golden Age of Anglo-Saxon Art*, no. 118, pp. 117–18

90. Unknown Provenance (pl. Va,b) and fig. 26
Brooch, max. W. 3cm
Gilt copper alloy, enamel, glass
Tenth century
Private collection
Unpublished and unprovenanced,
possibly Cambridgeshire
Bibliography


Alcock, L., *Dinas Powys: an Iron Age, Dark Age and Early Medieval Settlement in Glamorgan* (Cardiff, 1963)


Anderton, M., ed., *Anglo-Saxon Trading Centres* (Glasgow, 1999)


Bibliography

Bayley, J., *Non-ferrous Metalworking from Coppergate*, Archaeology of York 17/7 (York, 1992)
Bibliography


Bimson, M., ‘Coloured Glass and Millefiori in the Sutton Hoo Grave Deposit’, *The Sutton Hoo Ship Burial, III, Late Roman and Byzantine Silver, Drinking Vessels and Other Containers, Textiles, the Lyre, Pottery Bottle and Other Items* (London, 1983), pp. 924–44


Bibliography


Brown, M. P., “In the Beginning was the Word”: Books and Faith in the Age of Bede (Jarrow Lecture, 2000)


Bruce-Mitford, R. L. S., The Sutton Hoo Ship-Burial, I. Excavation, Background, the Ship and Inventory (London, 1975)


Bruce-Mitford, R. L. S., The Sutton Hoo Ship Burial, III. Late Roman and Byzantine Silver, Hanging Bowls, Drinking Vessels and Other Containers, Textiles, the Lyre, Pottery Bottle and Other Items (London, 1983)


Burnam, J. M., A Classical Technology Edited from Codex Lucensis 490 (Boston, 1920)


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Bibliography

Carver, M.O. H., ‘Contemporary Artefacts Illustrated in Late Saxon Manuscripts’, Archaeologia 108 (1986), pp. 117–45
Davidson, D. C., Spectacles, Lorgnettes and Monocles (Aylesbury, no date)
Derolez, R., Runica Manuscripta: the English Tradition (Brugge, 1954)
De Wald, E. T., ed., The Stuttgart Psalter (Princeton, 1930)
De Wald, E. T., The Illustrations of the Utrecht Psalter (Princeton, 1933)
Bibliography


Dodwell, C. R. and P. Clemoes, *The Old English Illustrated Hexateuch*, EEMF 18 (Copenhagen, 1974)


Eames, P., ‘Documentary Evidence Concerning the Character and Use of Domestic Furnishings in England in the Fourteenth and Fifteenth Centuries’, *Furniture History* 7 (1971), pp. 41–57


East, K., ‘A Lead Model and a Lost Sword, both with Gripping Beast Decoration’, *Medieval Archaeol* 30 (1986), pp. 1–7


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Bibliography

Faussett, B., Inventorium Sepulchrale, ed. C. Roach Smith (London, 1856)
FitzPatrick, M. C., Lactanti De Ave Phoenice. With Introduction, Text, Translation and Commentary (Philadelphia, 1933)
Geijer, A., Birka III. Die Textilfunde aus den Grabern (Uppsala, 1938)
Gelling, M., Signposts to the Past: Place-Names and the History of England (Chichester, 2nd ed., 1988)
Godden, M., Ælfric’s Catholic Homilies, the Second Series: Text, EETS SS 5 (1979)
Goscelin, Historia translationis S. Augustini Episcopi, PL CLV, cols. 13–46
Grierson, P. and M. Blackburn, Medieval European Coinage, I. The Early Middle Ages (5th–10th centuries) (Cambridge, 1986)
Guillaume de Poitiers, Histoire de Guillaume le Conquérant, ed. R. Foreville (Paris, 1952)
Harvey, P. D. A., ‘Non-agrarian Activities in Twelfth-Century English Estate
Bibliography

Haseloff, G., Email im Frühen Mittelalter: Frühchristliche Kunst von der Spätantike bis zu den Karolingern (Marburg, 1990)
Hawthorne, J. G. and C. S. Smith, Theophilus, on Divers Arts (New York, 1979; first published Chicago, 1963)
Hedfors, H., ed. and trans., Compositiones ad tingenda musiva . . . (Uppsala, 1932)
Hill, P., Whithorn and St Ninian: the Excavation of a Monastic Town 1984–91 (Stroud, 1997)
Hines, J., A New Corpus of Anglo-Saxon Great Square-headed Brooches (Woodbridge, 1997)
Hinton, D. A., A Smith in Lindsey: the Anglo-Saxon Grave at Tattershall Thorpe,
Bibliography

Lincolnshire, The Society for Medieval Archaeology, Monograph Series 16 (Leeds, 2000)
HMSNews (the newsletter of the Historical Metallurgy Society) no. 40 (Winter 1998/1999), p. 5
Hodges, R., Dark Age Economics (London, 1982)
Hoffman, H. and P. F. Davidson, Greek Gold: Jewellery from the Age of Alexander (New York, 1965)
Hovingh, P. F., ed., Claudii Marii Victorii, Alethia, CCSL 128, pp. 115–93
Jones, M. U., ‘Metallurgical Finds from a Multi-Period Settlement at Mucking, 277
Bibliography

Kendrick, T. D., Anglo-Saxon Art to AD 900 (London, 1938)
Kendrick, T. D., Late Saxon and Viking Art (London, 1949)
C. Ross, E. G. Stanley and A. E. A. Werner, Evangelium Quattuor Codex Lindisfarinesis, 2 vols. (Olten/Lausanne, 1960)
Ker, N., Catalogue of Manuscripts Containing Anglo-Saxon (Oxford, 1957)
Keynes, S. and M. Lapidge, Alfred the Great: Asser’s Life of Alfred and Other Contemporary Sources (Harmondsworth, 1983)
Krusch, B., ed. ‘Vita Eligii episcopi Noviomagensis’, MGH Scriptorum rerum Merovingiarum, 4, Passiones Vitaeque Sanctorum (Hanover, 1902), pp. 634–761
Kuhnmuench, O. J., Early Christian Latin Poets (Chicago, 1929)
La Niece, S., ‘White Inlays in Anglo-Saxon Jewellery’, Science and Archaeology, 278
Bibliography

Latham, R. E., Dictionary of Medieval Latin from British Sources (London, 1975)
Law, V., Grammar and Grammarians of the Early Middle Ages (London and New York, 1997)
Liebmann, F., Die Gesetze der Anglesachsen, 3 vols. (Halle, 1903–16)
MacGregor, A., Bone Antler, Ivory and Horn: the Technology of Skeletal Materials since the Roman Period (Beckenham, 1984)
MacGregor, A., A. Mainman and N. S. H. Rogers, Bone, Antler, Ivory and Horn from Anglo-Scandinavian and Medieval York, Archaeology of York 17/12 (London, 1999)
Bibliography


Bibliography


Ohlgren, T. H., ed., *Anglo-Saxon Textual Illustration. Photographs of Sixteen Manuscripts with Description and Index* (Kalamazoo, 1992)


281
Bibliography


Penn, K., ed., *Excavations on the Norwich Southern Bypass. The Anglo-Saxon Cemetery at Harford Farm, Markshall, Norfolk*, E. Anglian Archaeol Rep (Gressenhall, 2000)


Rackham, H., ed. and trans., *Pliny, Natural History* (London, 1952)

Rademacher, F., *Fränkische Goldscheibenfibeln aus dem Rheinischen Landesmuseum in Bonn* (Munich, 1940)
Bibliography

Raine, J., *St Cuthbert, with an Account of the State in which his Remains were found upon the Opening of the Tomb in Durham Cathedral, in the Year 1827* (Durham, 1828)
Richards, J. C., ‘A New Manuscript of Heraclius’, *Speculum* 15 (1940), pp. 255–71
Robertson, A. J., ed., *Anglo-Saxon Charters* (Cambridge, 1939)
Rybczynski, W., *One Good Turn: a Natural History of the Screwdriver and the Screw* (New York, 2000)
Scull, C., ‘Urban Centres in pre-Viking England’, *The Anglo-Saxons from the
Bibliography

Migration Period to the Eighth Century: An Ethnographic Perspective, ed. J. Hines (Woodbridge, 1997), pp. 269–310
Sehrt, E. H. and T. Starck, Notker des Deutschen Werke, 1, 2 (Halle-Saale, 1933)
Shetelig, H., Viking Antiquities in Great Britain and Ireland, III. Norse Antiquities in Ireland, ed. J. Bøe (Oslo, 1940)
Smith, R. A., A Guide to the Anglo-Saxon and Foreign Teutonic Antiquities in the Department of British and Mediaeval Antiquities, British Museum (London,1923)
Stevenson, J., ed., Chronicon monasterii de Abingdon, 2 vols., Rolls Series (London, 1858)
Stubbs, W., ed., Memorials of St Dunstan, Rolls Series (London, 1874)
Suzuki, S., The Quoit Brooch Style and Anglo-Saxon Settlement (Woodbridge, 2000)
Swanton, M. J., ed., The Dream of the Rood (Manchester, 1970)
Thieme, B., ‘Filigranscheibenfibeln der Merowingerzeit aus Deutschland’, Bericht der Römisch-Germanischen Kommission 59 (Mainz, 1978), pp. 381–562
Thompson, R. C., On the Chemistry of the Ancient Assyrians (London, 1925)
Thompson, R. C., A Dictionary of Assyrian Chemistry and Geology (Oxford, 1936)
Thorpe, L., ed. and trans., Gregory of Tours, The History of the Franks (Harmondsworth, 1974)
Trotzig, G., Craftsmanship and Function (Stockholm, 1991)

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Bibliography


Untracht, O., *Traditional Jewellery of India* (London, 1997)


Vince, A., ed., *Pre-Viking Lindsey* (Lincoln, 1993)


Bibliography

Webster, L. and M. Brown, eds., The Transformation of the Roman World AD 400–900 (London, 1997)

Werner, J., Die Langobardischen Fibeln aus Italien (Berlin, 1950)

Whitelock, D., Anglo-Saxon Wills (Cambridge, 1930)


Whitelock, D., N. Ker and Lord Rennell, eds., The Will of Æthelfgifu (London, 1968)


Wilson, H., Silverwork and Jewellery (London, 1902, 1973)


Wolters, J., Die Granulation: Geschichte und Technik einer alten Goldschmiedekunst (Munich, 1986)

Wormald, F., English Drawings of the Tenth and Eleventh Centuries (London, 1952)


Wright, T., ed. and collated by R. P. Wücker, Anglo-Saxon and Old English Vocabularies, I (Darmstadt, 2nd ed., 1968)


Zettersten, A., ed., Waldere (Manchester, 1979)

Zupitza, J., Ælfrics Grammatik und Glossar, Sammlung Englische Denkmäler I (Berlin, 1880), p. 87

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