Medieval glass vessels in England AD 1200-1500 : a survey.

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Medieval Glass Vessels in England AD 1200-1500: A Survey

Volume I (of II)

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Ph.D. Thesis

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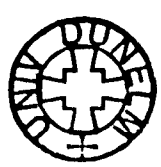

Abstract

Medieval Glass Vessels in England AD 1200-1500: A Survey

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A considerable amount of vessel glass of the period 1200 to 1500 has been excavated in England, particularly since the 1960s. This thesis conducts a survey of the vessel glass from museums and archaeology units, from over two hundred sites across England. The glass includes goblets, beakers, bowls, jugs and other decorative vessels, lamps, some liturgical vessels, flasks, urinals, distilling and other 'industrial' vessels, from England, Europe and the eastern Mediterranean. The glass was catalogued, and the functions, dates and production areas of the vessels were examined, to provide a basis for further research. Other sources of evidence used include documentary, iconographical, furnace site and scientific evidence.

The use of glass in medieval society was then examined. The sites where glass was excavated were investigated, to establish who used glass. They were found to be high-status castles, manors and palaces; monastic and other ecclesiastical sites; and affluent urban residences. Surprisingly, no glass was found to have been used on less wealthy sites.

The social situations in which glass might have been used were proposed. The use of glass vessels as 'symbols of power', suitable for 'conspicuous consumption' were examined. The reasons for the high status of the glass, which was not intrinsically valuable, and much of which is utilitarian, were considered. The forms and decoration of tablewares often emulated other highly valued metal vessels. The goblet and the medieval banquet made use of religious symbolism. Table vessels were used communally in the 13th and 14th century, but some evidence suggests that they were used individually by the 15th century. Changes in the use of glass throughout the period were outlined, showing how the quantities of each form change, from the dominance of tablewares in the 13th and 14th centuries, to that of utilitarian wares by the 15th century.

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List of Abbreviations

BL British Library

BM British Museum

MLA Department of Medieval and Later Antiquities, British Museum

NG National Gallery

All dates are AD unless otherwise indicated.

Cross-references to page numbers all refer to Volume I, unless Volume II is indicated.

See the introduction to the Appendices for an explanation of how the glass types and individual fragments are numbered (Vol II, p. 1).

Chapter 1: Introduction

The earliest known glass vessels were produced in Bronze Age Mesopotamia from at least the 2nd millenium B.C. Since then, they have been used by many civilisations, including ancient Egypt, the Roman Empire and early medieval Europe, for many different purposes. Although the later medieval period is renowned for its painted window glass, very little is known outside the specialism of glass studies about the vessels which were made at the same time and often by the same craftsmen.

This thesis surveys the glass vessels used in medieval England, examining their practical and symbolic role within medieval life. The aims of the thesis are described in further detail below, after the background to the subject has been outlined.

1.1 The development of different areas of research

The approaches used in this thesis to examine the archaeology of medieval English society through the glass vessels they used are a consequence of the evolution of many different areas of archaeology. These include the interest in medieval archaeology, the development of glass studies, scientific analyses and theoretical approaches to material culture.

1.1.1 Medieval archaeology

Medieval archaeology was not established as an independent subject in Britain until 1956, when the Society for Medieval Archaeology was founded (Clarke 1984, 9). Earlier excavations tended to concentrate on the prehistoric and Roman periods. For example, in Canterbury in the 1940s and 1950s, Sheppard Frere was most interested in the Roman layers and the layout of the Roman town. The 1990 excavation at the Longmarket, which produced some extremely interesting medieval buildings and finds including vessel glass, had previously been dug through in one corner by Sheppard Frere between 1944 and 1948 to investigate Roman levels including a mosaic pavement, but with no attention paid to the medieval layers (Rady 1991, 16). General Pitt-Rivers was an exception amongst archaeologists when, during his excavations at King John's House at Tollard Royal in 1890, he wrote:

> It is true that medieval relics have not the same importance as those of prehistoric times, in which they generally afford the only reliable evidence of time... Nevertheless, there are conditions in which they afford the only knowledge available even in medieval times, and a more thorough knowledge of them than we possess would be desirable... In fact the subject has not been much studied, and it is with the hope of promoting this

> branch of enquiry that I have had so many little objects figured, that have been found in this House, to some of which I am unable to assign any date. (Bowden 1991, 122-125)

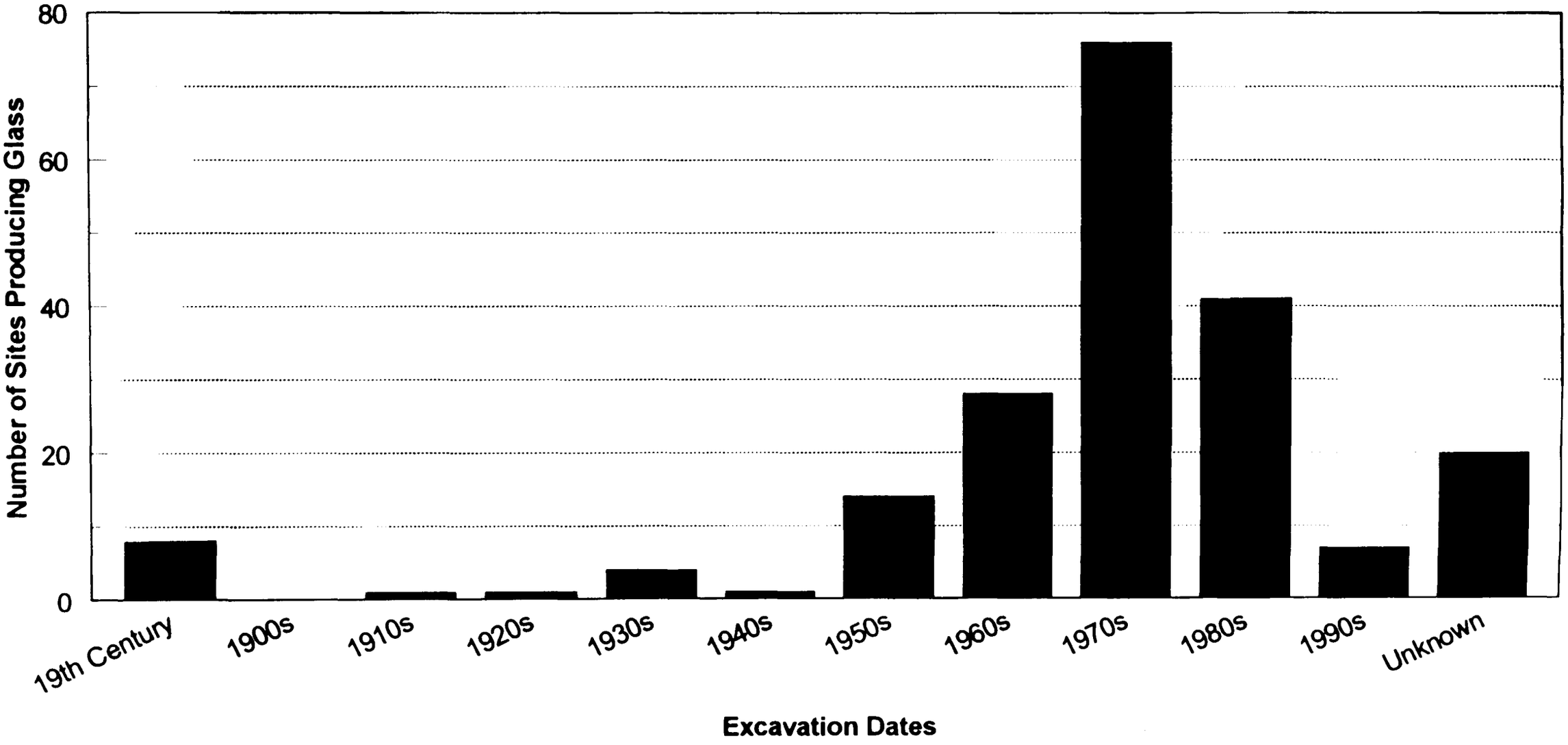
Despite some medieval excavations in the early 20th century, such as at Old Sarum in Wiltshire, it was not until 1940 that the first broad survey of medieval artefacts was published, in the *London Museum Medieval Catalogue* (1940).

The post-war period witnessed a great many more excavations in England, from the 1950s onwards, particularly during city centre renewal schemes. In 1961 the Winchester Research Unit was founded, which was to be a model for future urban archaeology units of the 1960s and 1970s. It was particularly important in its consideration of *all* archaeological periods (Schofield and Vince 1994, 2). In 1971 the 'Rescue' movement was established, to ensure the excavation of urban areas destroyed during development. Figure 1 shows the number of excavations in which medieval vessel glass has been found, during each decade. An increasing number of excavations produced medieval vessel glass from the 1950s onwards, reaching a massive peak in the 1970s. After that time, there was a sharp decline, with glass found on only about half the number of excavations in the 1980s than during the previous decade, and far fewer in the 1990s. The decrease is partly due to the number of excavations which have not yet had post-excavation work carried out, but it has been more greatly influenced by the reduction in the number of excavations since urban development has halted. It is likely that these figures reflect approximately the total number of medieval excavations in England. A similar pattern is shown in the overall number of medieval excavations per year in towns, up to 1980 (Clarke 1984, 172, Fig. 84).

Medieval archaeology has developed more slowly than other periods of study. The excavation of medieval finds occurred at a later date than finds of earlier periods, and consequently the interpretation of medieval material culture has taken longer. Until relatively recently, medieval archaeology was held back by the reliance on documentary sources, and the study of the period from a historical rather than an archaeological perspective (Austin 1990, 11-14). As a consequence, historians regarded archaeology as being of anecdotal and illustrative importance only. The publication of interpretations of medieval material culture has also been delayed by the large scale of the processing required of the abundant excavated, documentary, artistic and architectural evidence which survives.

However, there are now an increasing number of publications on the interpretation of medieval archaeology, including theoretical approaches (Austin 1990). Volumes such as the *Medieval Finds from Excavations* series from the Museum of London, and the *Salisbury Museum Medieval Catalogue* supplement the catalogues with discussions of the functions of the artefacts and their owners (see p. 11). The industries

Figure 1
Excavation Dates of Vessel Glass of AD 1200-1500 in England



which produced these artefacts have also been researched in detail (Blair and Ramsey 1991).

1.1.2 Previous study of medieval glass

The earliest documented interest in the history of ancient glass in England occurred in the 19th century. It was approached from an art-historical perspective. Most of the vessels studied were complete rather than fragmentary. Indeed, so little was known about the different forms and styles that it would have been difficult to interpret small fragments of glass. The material available was that which was found by workmen during building, or sold on the art market. There was usually no record of where the glass had been found, the material found associated with it, or the date of the deposit from which it came. Very little medieval vessel glass existed in museum collections.

The earliest books on ancient glass were produced in the second half of the 19th century. In 1871 the catalogue of glass collected by Felix Slade (now in the British Museum) was compiled under A.W. Franks, with an introduction by Alexander Nesbitt. The catalogue demonstrates the lack of existing medieval glass at that date. The section entitled 'Glass in Western Europe AD 1000-1300' simply reads:

> No glass vessels bearing distinct proofs of having been made in Western Europe and belonging to this period are known to exist; the two cameos, and the few fragments from ancient windows, described below, exhibit, however, the texture of the glass of the period, as well as some of the tints which were then manufactured. (Nesbitt 1871, 67)

The later medieval glass in the catalogue consisted of Venetian gilt and enamelled cristallo. James Fowler's *The Process of Decay of Glass* of 1879, despite being extremely detailed, included only window glass, but no vessel glass from medieval Europe.

Nesbitt was aware that glass was made in England in the medieval period, but he was under the impression that it was 'chiefly for use in windows', believing that '(s)ufficient skill to produce articles of such elegance as to fit them for the tables of the rich was probably wanting..' (1878, 121-122). Even today there is no conclusive evidence that luxury glass tablewares were manufactured in England, but the possibility remains open and it is now certain that they were made in continental Europe. Nesbitt, however, believed that 'Vessels of glass of European fabrication although doubtless made and used for certain purposes, especially perhaps for medical uses, do not seem to have been in general use, nor were they so decorated as to make them objects of luxury, and accordingly they are rarely noticed in inventories' (Nesbitt 1878, 64). *Old English*

Glasses (Hartshorne 1897) was the first major work on the evolution of glass in England, but it lacked evidence from the medieval period.

The first half of the 20th century continued the art-historical tradition of glass studies, with few publications on medieval glass until 1929. One notable book was *Glass* (Dillon 1907) which included some perceptive comments on medieval glass. Dillon observed that beakers of Type B21 were 'quite of a Venetian type, thin and absolutely white, although disfigured by the black specks so characteristic of early Venetian glass' (ibid., 179). This view was abandoned by Lamm in 1929/30 (below), who was followed by scholars such as Honey (1946, 46-7), and not returned to until after the Second World War, although there is now almost conclusive evidence that these beakers were made in Venice.

Of great importance in medieval glass studies was the publication of the German scholar Carl Lamm's doctoral thesis *Mittelalterliche Gläser und Steinschnittarbeiten aus dem Nahen Osten* (Lamm 1929/30). These two volumes contained a monumental survey of glass and rock-crystal objects excavated in the Near East, with parallels from museums and private collections across Europe. They consisted of a detailed catalogue and drawings, as well as a compilation of documentary references to glassmaking in the Near East, and to Near Eastern glass from inventories and other documents in Europe. Lamm constructed a typology of the glass types, dividing them into four styles, attributed to four centres which have documentary references to glassmaking, including Damascus, Raqqa, and Aleppo in Syria, and Fustat in Egypt (see pp. 27-8). These groupings were based largely on historical events, since there were very few archaeological finds of glass in the Near East at the time. For example, the 'Aleppo' style glass was classified as that which had a strong Mesopotamian and Persian influence, as a consequence of glass-painters fleeing from Mongol attacks in the east, to Aleppo (Lamm 1941, 62-3). Lamm does not always specify the reason for his identification of glass styles with particular centres, as is the case with 'Raqqa' glass. His attributions to these workshops are no longer generally accepted. One of the most dramatic changes from Lamm's theories concerns the class of vessels which he called 'Syro-Frankish'. He observed the similarity between the design of the enamelled decoration on Islamic beakers, and beakers of Type B21, for which there is now strong evidence of their production in Venice. Both had an enamelled inscription band below the rim of the glass, mounted horsemen and heraldic elements, but the 'Syro-Frankish' beakers had western motifs. Lamm therefore suggested that they were:

> made by Europeans in their Syrian possessions, perhaps chiefly in order to be exported to the Occident, though it is dangerous to interpret in this way the circumstance that no examples of this type of glassware have so far been found in Syria. (Lamm 1941, 77)

There is now documentary evidence from Venice and Murano between c. 1280 and 1350 of painters of glass vessels of this type. Some are named in the documents and in inscriptions on the beakers, such as 'Aldrevandini' whose name appears on a vessel of this type in the British Museum, after whom this group is sometimes referred (B21; see Vol II, p. 26). Despite the abandonment of Lamm's interpretations of the glass, these two volumes remain the most comprehensive reference work for glass from the Near East.

In the decade following Lamm's work, a greater range of publications appeared on the history of glass. *English Glass* (Thorpe 1935) discussed the Roman and Anglo-Saxon glass found in England for the first time. This book also contained the first tangible examples of medieval vessels found in England, including lamps, urinals and phials (ibid., 83-86). Thorpe concluded that there was still no evidence for any 'domestic-and-fancy' (tableware or decorated) vessels until the 15th century in France and Germany, and Venice (ibid., 80-81). Other publications included *Wealden Glass* (Winbolt 1933), which was the culmination of many years of research of the glassmaking industry in the Surrey/Sussex Weald (see p. 24). In the same year *Die deutschen Gläser des Mittelalters* surveyed many western European glasses, balancing the emphasis from Lamm's Near Eastern glasses (Rademacher 1933). Another region of medieval glassmaking was revealed in 1940 when Gladys Davidson published the glass from her excavations in Corinth, which was thought to demonstrate a Byzantine glass industry of the 11th to 12th centuries, an earlier date than the production of comparable glass tableware in western Europe in the 13th to 14th centuries. It was therefore assumed that European glassmaking was influenced or even brought to the West by Byzantine glassmakers. The results of these excavations have now been re-assessed and re-dated to the 13th to 14th centuries, and it now is believed that the Byzantine glassworks were founded by Italians (Whitehouse 1991a).

After the war, a handbook of the glass in the South Kensington Museum was published by W.B. Honey in 1946. This was the first general survey of the history of glass in English since Dillon's book of 1907. The view that 'European glass hardly recovered before the 15th century' persisted (Honey 1946, 35). It was known that glass was made in Europe throughout the medieval period, including England from the 13th century, but the products were described as 'crude' (ibid., 35), including 'drinking glasses, lamps, and bottles of greenish metal' (ibid., 95). Honey was also aware that glass vessels were made in Venice by the 13th century, and were exported to Europe by the 14th century, but '(n)o glasses datable to a period before the latter part of the 15th century have, however, been certainly identified, though specimens are sometimes depicted in contemporary paintings' (ibid., 55).

The 1950s saw the beginning of changes in the way that glass vessels were studied. In 1957, Clara Isings published *Roman Glass from Dated Finds*, heralding the study of glass from dated contexts rather than relying on their artistic style. *La Verrerie en France de l'Epoque Gallo-Romaine à Nos Jours* (Barrelet 1953) was a comprehensive study of all periods of glass in France. Two articles with discoveries of medieval glass vessels as their subjects were published in journals in England. These discussed an enamelled bowl from Cheapside (Cook 1958), and various bottles and urinals from London (Noël Hume 1957), both dated by their associated pottery. Accompanying the increasing information available from excavations, the Corning Museum of Glass, New York, was founded in 1951, and the first volume of the *Journal of Glass Studies* was published in 1959.

Specialist glass reports from archaeological excavation reports became more common in the 1960s, and included details of the archaeological deposit in which they were found, although there was relatively little discussion of the glass. These included reports by Dorothy Charlesworth from Tynemouth Priory (Charlesworth 1967) and King John's Hunting Lodge at Writtle (Charlesworth 1969), by Donald Harden from Seacourt in Oxfordshire (Harden 1961-2), Northolt Manor (Harden 1961) and Knaresborough Castle (Harden 1966), and by Robert Charleston from Winchester (Charleston 1964).

The 1970s saw a large number of substantial excavation reports on medieval glass of the 'modern' era. The glass report from excavations in Southampton was the first major glass report in England, discussing a wide range of medieval types (Charleston 1975a). The two great scholars of medieval glass during this 'modern' period were Donald Harden and Robert Charleston. Both also worked on other periods of glass, and other artefacts. Harden was an archaeologist and studied pre-medieval glass. Charleston was a curator at the Victoria and Albert Museum and had an expertise in post-medieval glass. Both men were pioneers in the study of medieval glass. Harden, who began work in this area slightly earlier, was the first to establish a provisional chronology and discuss the different types of medieval glass. In 1972 he included late medieval glass in an article on the post-Roman glass found in England, and in 1975 he published a paper on the medieval table-glass found across Europe. In 1977 he gave a paper on medieval glass to the Society for Medieval Archaeology, in which he commented that when he surveyed early medieval glass in 1956, 'it would not have been useful to attempt a similar account of their successors up to 1500, since the available examples, except during the last half-century or so of that period, were rare and fragmentary', but the period now had 'many new discoveries' (Harden 1978, 1). Charleston continued the research, and wrote the majority of the glass reports emerging from the post-war boom. He added his observations on the uses and the social classes who used vessel glass, and made an effort 'to touch on those more mundane types of glass...windows, bottles and mirrors' (Charleston 1984a, xxx). As almost the sole

experts in medieval vessel glass, both men had the advantage of having nearly all the new discoveries of what was recognised as medieval glass referred to them, and were able to build up a database.

During the 1980s the vessel glass excavated continued to be collated to produce a chronological survey of medieval glass. There was some attempt to consider the glass in its social context. Charleston in the introduction of *English Glass and the Glass Used in England* in 1984, aimed to 'give a more balanced survey, not only in the space allocated to different periods, but in the attempt to show glass in its domestic context without sacrificing the historical and morphological aspects of the subject' (Charleston 1984a, xxvii). The consideration of the social situations in which artefacts were used has become increasingly important in archaeology.

There is no doubt that the vessel glass recovered during the urban excavations of the post-war period revolutionised the study of medieval glass. The 1968 exhibition *Masterpieces of Glass* at the British Museum demonstrated the earlier art-historical approach to glass. All of the glass for that exhibition was taken from the collections of the British Museum, but did not include any of the newly excavated fragments from Britain. Since the number of exhibits were limited, the approach chosen was not to present a chronological survey, but 'to "highlight" the excellence of the best, to underline the imperfections of the poorer, and to convey clearly the five main ways by which the glass-maker sought to alter the appearance and the character of his glass-ware' (Tait 1968, 127). These approaches reflected the connoisseur's 'art-historical' interest in the beauty of the glass, rather than the information which the glass gave about the society which used it. All of the vessels were complete. Many had no find-spot recorded, while those that did had little detail, for example 'Found in building a railway near Bingerbrück, Rhenish Prussia' (ibid., 134). The medieval glass shown included only a late 15th century Rhenish green glass beaker and bottle, Venetian gilt and enamelled vessels of the late 15th century, and the 'Aldrevandini' enamelled beaker of c. 1260-90 which had no recorded find-spot (ibid., 134, 151-154).

In the same year, a contrasting exhibition of glass was shown at the Guildhall Museum. This contained fragmentary vessel glass from excavations in London, and included as much information about the archaeological contexts as was available (Charleston J, 1968). It included a large number of vessels of the period 1200 to 1500, which now form the core of the collection of medieval glass in the Museum of London.

A very different picture of medieval glass vessels was presented in two major exhibitions of the 1980s. *Phoenix aus Sand und Asche*, shown in Bonn and Basle in 1988, incorporated a wide range of excavated vessels from all over Europe (Baumgartner and Krueger 1988), and *A travers le verre* shown in Rouen in 1989, comprised comparable glass from France (Foy and Sennequier 1989). They included fragments and glass that has corroded to an opaque and crumbly state. They discussed

the archaeological evidence from production sites. The Rouen exhibition examined the uses of the vessels, including an essay on the liturgical uses and significance of glass in churches and monasteries (Comte 1989; Foy and Sennequier 1989, 357-8). These two exhibitions were a revelation, highlighting an area of medieval artefacts about which very little was previously known.

Since 1940 the development of archaeological science has escalated. Antiquarians had performed scientific experiments on ancient glass from an early date. Duhamel is said to have 'discovered' the difference between potash and soda glass in 1736 (Fowler 1879, 39). In 1879 Sir James Fowler advocated the use of scientific techniques in *The Process of Decay of Glass*, in which analyses were undertaken by C W Bingley to determine the chemical constituents of glass from excavations near Rome (Fowler 1879, 66). Fowler recognised that decay was not due entirely to age. Within the medieval period he classified traditions by their quality, distinguishing 'Gothic' (N. Europe 6th-16th Centuries) as 'Bad quality and granular decay', and 'Medieval' (Venetian, Byzantine and Eastern 6th-16th Centuries) as 'Good quality and filmy decay' (ibid., 14). However, the north European medieval glass he studied included only window glass.

Scientific analyses continued on a small scale in the first half of the 20th century, although the fragments often had no context or date. The Society of Glass Technology was set up in 1916, and the journal *Archaeometry* was founded in 1958. In the last thirty years the excavation and conservation of more glass, and advances in scientific instrumentation and techniques, have enabled the development of a greater number of applications of scientific analysis in archaeology. Many different types of glass have now been characterised, although there are currently limits on the accuracy with which the attribution of glass to particular workshops can be made. A recent breakthrough made as a consequence of scientific analysis by Gerhard Eggert of the Rheinisches Landesmuseum, Bonn, was the discovery of a new compositional group of green and yellow medieval vessels which contained up to 84% of lead (Krueger 1987; Baumgartner and Krueger 1988; see p. 19). Until then it had been thought that lead was not used to any great extent in glass vessels before the 17th century. A number of these vessels have now been recognised in England (see pp. 116-7). The contribution of scientific analyses to current studies of medieval glass is discussed in Chapter 2.

The medieval glass industry in England has been researched since the end of the 19th century. The Surrey/Sussex Weald has been the most intensively researched region up to the present day, which has over-emphasized its importance in relation to other areas of England. The earliest investigations were carried out in the parish of Chiddingfold in Surrey, where the Rev. T.S. Cooper lived from 1875 to 1918 (Kenyon 1967, 5-7). Cooper's *History of Chiddingfold* contained an appendix on glass, including references to glass makers from parish records and deeds, and field-names

(Cooper, unpublished). Four glass furnace sites were investigated by his family while he was an invalid. His daughter, Mrs Halahan, continued the research after his death and found another furnace site at Fromes Copse. Further study was carried out by Winbolt, extended into other parishes around Chiddingfold, and *Wealden Glass* was published in 1933 (ibid., 10). Approximately twenty-eight medieval and post-medieval furnace sites were included (ibid., 5). Kenyon continued the investigation, and in 1967 he published *The Glass Industry of the Weald*, which included forty-two sites and additional documentary and excavated evidence. He researched the industry in greater detail, such as the technical aspects of glassmaking, and added furnace sites from other areas of Britain. In 1965 Wood published his excavations at the 14th century glass furnace site of Blunden's Wood. Another survey of the glass and iron industries in the Weald is currently taking place under the direction of David Crossley. However, only one additional site has been found so far (pers. comm. David Crossley), which attests to the thoroughness of the research of Kenyon and those before him.

Excavations have also been conducted on glass furnace sites in many areas of continental Europe, which have changed the traditional view of the restriction of the manufacture of 'fine' glassware to Italy. In 1980 Charleston assumed that 'fine glassware - in the sense of decolourized 'metal' or elaborate decoration - found in England in the medieval period is almost certainly of foreign (Venetian) origin' (Charleston 1980a, 65). In his 1984 *English Glass* he still believed 13th and 14th century colourless glass to come from Italy (Charleston 1984a, 19-24). The pre-eminence attributed to Venice and Italy was partly a consequence of its later renowned reputation for glassmaking, and the documents of the medieval industry which were preserved by the Venetian state. It is only during the last decade that it has been acknowledged that similar fine glass was made in other European areas, such as southern France and southern Germany (see pp. 29-30).

Recent large exhibitions have produced catalogues of the medieval glass from Germany and other parts of Europe (Baumgartner and Krueger 1988), France (Foy and Sennequier 1989), Italy (Mentasti, Dorigato, Gasparetto and Toninato 1982), and the Low Countries (Henkes 1994). However, this highlights the absence of a complete and representative survey of the glass that has been excavated in England, as finds specialists such as Stephen Moorhouse have commented: 'No synthesis of medieval English glass forms from excavation has yet appeared, except in a series of specialist papers in excavations reports' (Moorhouse 1993, 137). While these reports describe many of the different styles of glass which have been found, up until quite recently, they do not show how the different forms and styles are represented in quantity, and in their distribution across England. Moorhouse is left with the impression that 'most common of all is the high quality imported glass from various centres in Italy and northern Europe..' while '..the locally made glass is less well represented, mainly because its

composition does not allow it to survive as well as the imported material' (ibid., 137). In fact, as this thesis shows, local forest glass is far more common in the quantity of vessels found, while the numbers of imported vessels are limited (see pp. 137-8). However, previous reports emphasize the imported vessels since they are generally decorated and of more interest to the glass specialist. The local forms have fewer individual styles, and since they are not decorated, they are of limited interest, which has led to a false impression of the proportion of different vessels which have been found in England. It is hoped that this thesis will redress the balance.

1.1.3 Theoretical approaches to artefact studies

In most artefact categories, chronologies of the basic forms and styles have now been established, and there is no longer a necessity to concentrate on ascribing dates and areas of production to finds, although this is an essential first step. It has been noted that archaeology in the 19th and first half of the 20th century used artefacts to look at culture history and art history. Current theoretical approaches to archaeology stress the importance of considering material culture in its social context. The first way in which this can be achieved is by placing the objects into their perspective in everyday life, explaining how they were used, and who used them. Museum audiences as well as archaeologists do not necessarily know precisely what a urinal, for example, was used for. A glass urinal was not a chamber-pot as the modern word suggests, but was used for uroscopy, the practice of medical diagnosis through the examination of the colour and consistency of the urine. The knowledge of its function transforms the glass urinal from a badly weathered and unattractive vessel to an illustration of routine medical practice in the middle ages.

Current artefact studies attempt to integrate finds more closely into the study of the archaeology of everyday life in medieval England, by discussing the functions of artefacts and the situations in which they were used. For example, in *Knives and Scabbards*, the first volume of the 'Medieval Finds from London' series, a chapter is devoted to the use of knives, shears, scissors and scabbards, using pictorial and documentary references. This discussion opens by placing them in their perspective in everyday life as 'the possessions of the common man. They were implements carried about the person for use as and when the need occurred. Only towards the end of our period can any specialisation be seen with the development of the table knife' (Cowgill, de Neergaard and Griffiths 1987, 51). Other finds catalogues divide the artefacts by function, and only secondly by material, such as Sue Margeson's *Norwich Households* (1993), and Martin Biddle's *Object and Economy in Medieval Winchester* (1990). For example, the Winchester volume includes a section on lighting, which includes metal, stone and pottery candlesticks and lamps, and a discussion of the development of domestic lighting in medieval and post-medieval Winchester (Barclay and Biddle 1990,

983-991). It is unfortunate that glass hanging lamps remain separate with other glass in 'Vessels', since changes and preferences in the methods of lighting cannot be fully understood unless all forms of lighting are considered. Similar analytical approaches are also employed in art-history, such as in the *Making and Meaning* series of exhibitions at the National Gallery, where major works are explored for 'their meaning and how and why they were made' (exhibition guide to the Wilton Diptych, 1993).

The New Archaeology of the 1960s and 1970s questioned the meaning of material culture, rather than using it merely as an illustrative record of the past or of the history of art, or to define specific cultures. This enhanced the importance of artefacts in archaeology. Exponents of New or Processual Archaeology, such as Binford, proposed that material culture was a direct reflection of past societies, and that it was possible to correlate material culture with scientific laws about human nature (Hodder 1986, 2-3). However, the Post-Processual movement, of which Hodder was a major player, challenged these theories. Although it was still acknowledged that material culture was meaningfully constituted, it was realised that it was influenced by unpredictable factors in the behaviour of the original society, as well as depositional and post-depositional biases. Individuals were acknowledged to have choices, and social relations were believed to be maintained or changed by the manipulation of material culture (ibid., 2-8). New interpretations of material culture were sought, as Hodder taught: 'there is more to culture than functions and activities. Behind functioning and doing there is a structure and a content which has to be partly understood in its own terms, with its own logic and coherence' (Hodder 1982, 4).

It is acknowledged that material culture conveys important messages about the society that made and used it. Prown summarises the way in which artefacts reflect society:

> The underlying premise (of material culture study) is that objects made or modified by man reflect, consciously or unconsciously, directly or indirectly, the beliefs of the individuals who made, commissioned, purchased, or used them and, by extension, the beliefs of the larger society to which they belonged. (1982, 19)

A number of different concepts have been borrowed by archaeologists from other philosophical disciplines to consider the cultural meaning of material culture in different societies. These include 'structuration', first developed by Giddens (e.g. 1984). This considers how society creates the material world around itself, in a way which embodies the symbolic codes and values of that society. However, these meaningful structures are not static, but can be altered (Shanks and Tilley 1987, 128-129). For example, the design and layout of a building and the artefacts inside it are symbols of

the values of that society, conveying non-verbal codes about appropriate behaviour, and any changes in the material evidence are therefore indications of a purposeful change in behaviour. Bourdieu's *habitus* works in a similar way, being the view of the material world as 'the durably installed generative principle of regulated improvisations...(an) immanent inner law...laid down inside each agent by his earliest upbringing' (Bourdieu 1977, 78, 81). This creates 'the mind born of the world of objects' (ibid., 91). De Saussure and Barthes developed the idea of the *langue* as the individual character of a society, which it has chosen itself, and expresses through its material culture and other socially understood unspoken rules (Pearce 1992, 26).

As well as expressing the values of a society, material culture can be used actively to maintain or alter social relationships. The interaction between people and objects can produce change in attitudes. Hodder's ethnographic study of the Lozi in Africa demonstrated how the elite maintained power by manipulating material symbols to legitimize their authority, and symbolised their relationship with their subjects by awarding specific gifts (Hodder 1982, 119-122). Material culture is commonly used as a symbol of power or status. The evidence for 'socio-technic' aspects of glass vessels, the social rather than purely practical function (Deetz 1977), is discussed in greater detail in Chapter 5.

In the context of medieval glass tableware, the vessels act as status symbols, by which individuals exert and maintain their power, and they are chosen for that purpose. The symbolism of the glass is set within the 'habitus' of the medieval dining hall, which is structured to convey social messages. The layout of the hall has parallels with the layout of the medieval church, and the goblet form has parallels with the metal chalice, both for reasons of power and subordination, which is discussed in Chapter 5 (see pp. 146-7). The symbolism and parallels between the medieval church and dining hall have recently been discussed (Graves 1995).

Another concept relevant to the high-status nature of medieval glass vessels is 'conspicuous consumption'. This was first outlined by Veblen in 1899 in his study of the late 19th century American leisure class, but it has also been applied by himself and others to medieval society (Veblen 1899). It expresses the visible spending of superfluous wealth as a status symbol. The more wasteful the expenditure, the more impressive it is believed to be to the rest of society. Glass tableware is a good medium for conspicuous consumption since the vessels are imported, exotically decorated, fragile and expensive (see pp. 148-50).

Changes in the use of artefacts may reflect changes in the attitudes of a society. A shift in the use of vessels from communal to individual at the table can be seen in medieval society. A similar situation can be demonstrated in New England in the 18th century. The causes of the change are not clear, but theories may be examined by

comparing the situation with similar changes in material culture in other periods (see p. 156).

This thesis does not adopt any particular theoretical standpoint. It considers the evidence in the hope that patterns concerning society's behaviour and values are reflected in the glass and its distribution, while being objectively aware that these patterns may be influenced by pre- and post-depositional factors.

1.2 The thesis

The essence of this thesis can be divided into two parts. The main premise is that medieval glass vessels can provide information about the material culture of medieval society in England between 1200 and 1500. However, this potential has not yet been realised through research. Excavations in England, especially from the 1960s onwards, have produced many fragments of glass vessels dating from this period, which have not yet been collectively surveyed. A survey and synthesis of the vessel glass is required in order to provide a framework for further study.

Following the collection of this data, the thesis investigates what vessel glass can contribute to the study of the life of society in medieval England. Questions that are asked include: who were the consumers of the glass, and what types of sites was it used on? In what social or private situations was it used? What was the social status of the glass, what value did it have, and why? The practical functions of the glass are investigated, as well as the 'socio-technic' functions, those functions which have a social rather than a practical purpose. For example, were glass vessels used to maintain or alter the social status of their owners? Changes in all of these areas between 1200 and 1500 are analysed, to reflect the changing nature of medieval society.

The initial task of the research was to survey as much of the vessel glass of AD 1200 to 1500 excavated in England as possible, to provide a full and representative picture. The forms of glass provide evidence of the activities that took place in medieval England, including drinking and eating, decoration, liturgy, lighting, medical practices, distillation and alchemy. The decoration and production area of the glass may be relevant to its cost, and to how much the glass was valued above its practical function. The types of sites on which the glass was found indicate who the consumers were. The area of the site may be able to demonstrate the activities that were carried out in that zone, and consequently suggest the circumstances or setting in which the glass was used. Other sources were used to amplify the information, including documentary, iconographical and glass furnace site evidence. The methodology used is described in further detail below.

1.3 Data collection and methodology

The initial research consisted of a comprehensive survey of as much of the vessel glass as possible excavated from England, which was conducted across the whole country, with no conscious biases. Published evidence was examined first, which included checking every relevant available journal, book and excavation report for vessel glass. A large quantity of the glass included in this thesis is unpublished. This was sought by writing to archaeology units, museums and Sites and Monuments Records Officers in every county. However, there were discrepancies in the response from different areas. For example, some museums were not consciously aware of any glass, and intended to check their stores more closely as soon as it was possible, but due to their workload, they have not yet been able to do this. The reorganisation of various museum stores meant that they were not able to examine their material for possible medieval glass, and documentation of the glass has not yet been possible. However, the overwhelming response was extremely helpful.

The information available from glass in museum collections varies according to to the date of its acquisition. For vessels acquired in the 19th or first half of the 20th century, there is often a lack of detail about the archaeological context, and sometimes even about the site where the glass was found. For example, a number of vessels from the Victoria and Albert Museum were recorded in the Accessions Book in 1956 as 'probably excavated in London'. Vessels in the Museum of London which have no information about where they are from are assumed to come from London, since the museum, in theory, contains collections from Greater London only.

While this lack of site and context information is not ideal for the study of artefacts in their social context in the 1990s, these museum collections are nevertheless extremely important in having preserved the glass at all, which may have otherwise been destroyed. Glass vessels with no context are valuable in providing information about the range of forms and styles of glass. In addition, collections preserve vessels which have never reached the archaeological context, but which have passed through the centuries in the systemic context as collectors' items. Very little would be known about Venetian-style Renaissance glass were it not for vessels from collections. An insignificant amount of fragmentary Renaissance glass has been excavated in England. Collections such as those in the British Museum contain a large number of vessels, and show a far greater repertoire than is found among the excavated examples. Another advantage of museum collections is that they are generally accessible and geared to providing information for the independent researcher. Documentation is likely to be as complete as will ever be possible.

Glass from recent excavations is housed by archaeological units. Information about the excavated site and the archaeological contexts are usually still in the process of being researched, after which the glass is often deposited in a local museum. The

glass is not always available for examination, and the archaeology unit does not always yet know what glass has been found. When the information is available, it can provide the maximum possible evidence, subject to the preservation on the site. It is detailed enough to permit the examination of the dating evidence in combination with associated finds. It can also describe the character of the site and the nature of the deposit in which the glass was found, to speculate on where on the site and in what context it may have been used. However, much of this detailed information is not usually available until all the specialist reports have been written. Examination of the use of glass within a site is therefore only usually possible after publication.

A series of research visits were made to archaeology units and museums to record details of unpublished glass, and some published glass was also examined for more detailed descriptions. Due to limited time and finances, it was not possible to visit every museum to check through their glass boxes in the hope of finding medieval glass, unless there was already some indication that they might have some. Medieval glass was occasionally found stored and labelled with earlier or later glass.

Small fragments of weathered utilitarian vessels were regarded with as much importance as well preserved decorated tablewares. Some glass forms are almost identical in appearance in the medieval and post-medieval periods, particularly utilitarian glass flasks and urinals. When these forms were found, but had no stratigraphic information, they were not included in the catalogue, since they could equally well have been medieval or post-medieval. A great number of undiagnostic potash fragments were discovered. These are noted at the end of the catalogue if they are the only evidence for the use of glass on a site. However, if other potash glass forms have been included in the catalogue from that site, the undiagnostic fragments are not included, since they provide no further information. Although it is very unlikely that every fragment of vessel glass excavated in England has been traced, and not all of the glass was available for examination, it is estimated that a large and representative percentage is included in this thesis.

A catalogue has been compiled of all the glass surveyed. This includes a full description of the glass, with drawings of as many of the different types as possible. Any details known about the context in which the glass was found are listed, including dating evidence. In many cases not all of this information was available. The date of excavation has been given in order that some judgement may be given to each individual site, as to whether the glass assemblage is likely to include everything excavated. Older excavations may have discarded, or not successfully conserved, the more unattractive or weathered potash glass. The catalogue entry also includes where the glass is currently housed, and whether it has been published.

A typology has been constructed from the catalogue. This divides the glass into classes (stemmed goblets, beakers, bowls etc.) which, in general, accord with the

function of the vessels. The classes have been subdivided into types, according to the style of manufacture and decoration. Each type is therefore believed to contain vessels made in the same glassmaking tradition, if not the same area or even glasshouse. The date, distribution, close parallels and likely origin of each type are discussed. Research for parallels which may suggest where the glass originated has been carried out from archaeological reports and museum catalogues in England, continental Europe, and a limited number from the Near East. Research visits were made to Toulon, Aix-en-Provence and Lattes, near Montpellier, in southern France to examine the substantial collections of vessel glass fragments recovered from 13th and 14th century glass furnace sites at Planier, La Seube, Cadrix and Rougiers. Glass from furnace sites in the Surrey/Sussex Weald were also examined, to establish the evidence for the glass forms that were made there before 1500. The catalogue and type-series are both located in the Appendices, with a concordance of the glass found at each site.

Chapter 2 provides a guide to the different categories of evidence that are available, and the information which they can contribute to this thesis. These include the nature of the glass itself, and the manner in which it decays. This is essential to understand the significance of the seemingly small amount of glass that has survived. The iconographical, documentary, and furnace site evidence are evaluated, and the potential applications of scientific analyses are considered.

Chapter 3 discusses each form of glass vessel. This includes an evaluation of the functions of the form, as well as the dates in which it was in use, the range of styles, and the areas in which the types may have been manufactured. Any difficulties associated with the identification or classification of each form are noted.

Chapter 4 investigates who the consumers of medieval glass vessels were, and in which establishments the glass was used. This was assessed by examining the statistics for the types of site where the glass had been found. The functions represented on these different sites are considered by looking at the range of vessel forms from each type of site. Everyday life amongst different groups is therefore illustrated through their use of glass vessels, supplemented by documentary evidence. Geographical patterns in the use of glass are also considered.

Chapter 5 interprets the context and status of glass in medieval society. Documentary and pictorial evidence is used to suggest why glass was so highly valued in medieval England, despite its relatively low intrinsic value. The forms and decoration of the glass are discussed, to consider the symbolic aspects of the vessels which give them a meaning beyond their practical function. The glass is compared to vessels of other materials in order to appreciate its relative significance and social value.

The thesis concludes with a summary of the results of the research, and an assessment of its contribution to glass studies and archaeology. Suggestions for further research are proposed.

Chapter 2: The Sources of Evidence Available and their Potential

In order to assess the results of this thesis, it is essential to appreciate the evidence that is available, and its potential, problems and biases. To appreciate why so little medieval glass survives compared to that which was originally in use, it is necessary to understand the composition of glass, and how and why it deteriorates. An outline of current knowledge of glass production in different regions is given. The limitations of the production evidence contributing to the questions posed in this thesis are also discussed. The potential of documentary and iconographical sources is summarised. Finally, the applications of scientific analysis are discussed.

2.1 The composition and deterioration of medieval glass vessels

2.1.1 The composition of medieval glass

Glass is composed of a basic mixture of silica, an alkali and a smaller amount of calcium oxide (lime), at approximate proportions of 75%, 15% and 10%. The silica provides the main matrix of the glass. The alkali acts as a flux and brings the melting temperature of the silica down from 1720°C (Newton and Davison 1989, 4). Soda and potash glass can be worked at temperatures which are more realistically achievable in a medieval furnace of around 1000°C or more, and lead glass can be worked at around 750°C. The lime acts as a stabiliser and prevents the glass from being water soluble. These ingredients can be found in a number of raw materials. Different glassmaking areas and traditions use different raw materials according to what is available. Smaller quantities of other oxides can be added to improve the quality of the glass, and to add or neutralise colour. Other constituents which are revealed in the scientific analysis of glass are not added intentionally, but are present in the raw materials.

The silica component (SiO_2) is usually found in sand. However, alternatives include quartz pebbles from river beds, such as those from the Ticino River which were used from the 14th century onwards by some glassmakers in north Italy (Jacoby 1993, 73). Lime (CaO) may have been included as an integral component of the potash or soda alkali, or added on purpose in some cases (Mortimer 1991, 3). It was previously thought by glass researchers that lime was not added as a separate component until the 18th century, when the St Gobain glass factory in France used purified soda instead of soda ash, and realised that a stabilising ingredient was necessary which they found in lime (Kenyon 1967, 36). However, there are indications that some medieval glassmakers added lime separately. White stone and marble, which contain lime rather than silica, are referred to as glass ingredients in Florentine archives of c. 1400 (Jacoby 1993, 73). It is probable that the purity of some silica ingredients, such as the Ticino pebbles, made it necessary to add lime separately, which is otherwise found amongst the

'impurities' in sand. In other areas, the lime appears to have been present in the sand. Theophilus in his 12th century treatise *De diversis artibus* recommends a mixture of sand and ash in the recipe for potash glass, but no reference is made to any separate ingredient that may contain lime (Hawthorne and Stanley Smith 1963, 52). Little if any lime is present in high-lead glass.

The most variable component of glass is the alkali flux, which characterises the different traditions of glassmaking in medieval Europe and the Mediterranean. There are three broad traditions, although these are more geographically mixed than previously thought. The first is soda glass, which uses sodium oxide (Na_2O). This can be found in mineral natron, saltpetre, or marine plants and seaweeds such as salicornia, also known as glasswort or barilla. This type of glass is made in the Near East, and Mediterranean areas of Europe, such as Italy, southern France, Spain, and possibly southern Germany and Switzerland (see pp. 27-30).

The second type of glass is potash glass, which uses potassium oxide (K_2O) as the alkali. This can be found in inland plant ashes, such as fern, beech, and types of oak and borage (Jacoby 1993, 68). Wood ash (*waldglas*) is more common in continental Europe east of the Rhine, and Alsace, while continental areas to the west of the Rhine, except Alsace, preferred fern ash (*verre de fougère*) (Henkes 1994, 16). Potash glass is known to be made in England, north-west Europe, and on a smaller scale in Italy (see p. 27). In the Surrey/Sussex Weald there is evidence that wood ash was used, including beech and possibly oak (Kenyon 1967, 45-49).

The third type is high-lead glass, first identified in 1987 (see p. 9). Before that date, lead glass which had been excavated was believed to be soda glass (see p. 49). The forty-seven European samples which have since been analysed contain between 54.4% and 84.0% of lead oxide, with an average of 69.9% (PbO)(Wedepohl, Krueger and Hartmann 1995, 76). Vessel fragments have been found concentrated in a band from England across the Low Countries to Germany. There is no evidence from furnace sites which would show the area of production, but the distribution of finds suggests that their origin was somewhere in north-west Europe (see pp. 30-32).

In analyses carried out on a range of medieval glass of c. 1250 to 1450 from London, the proportions of the alkalis measured between 10.2-14.2% of sodium oxide in soda glass, and 9.6-13.3% of potassium oxide in potash glass (Mortimer 1991, Table 2). Analyses have been carried out on four lead glass vessels from England, and the lead oxide content ranges from 64.8-74.8% (ibid., Table 4; Wedepohl, Krueger and Hartmann 1995, 75, Table 1). All three glass types also contain small amounts of sodium oxide or potassium oxide even when this is not their major alkali. Of the potash alkalis, fern ash contains more soda and fewer impurities than wood ash (Henkes 1994, 16).

Both soda glass and potash glass can be either colourless or greenish in appearance. The green or blue-green colour is caused by impurities in the raw materials, most commonly by iron oxide from the sand. As little as 0.5% of iron oxide can create a green glass (Charleston 1991, 238). Certain sources are more pure than others, such as quartz pebbles and sand from northern Italy and the Near East. In practice, soda glass is more often colourless or has a slight greenish tint, while potash glass is usually green. However, the colour is not caused by the alkalis themselves, and it is dangerous to attempt to classify the different types on the basis of their colour, as analyses have proved (see p. 42). For this reason, the glass types are classified here by their general colour, to avoid assuming whether they are made of soda or potash glass.

Colour is also affected by other ingredients in the glass. Manganese oxide is often added to neutralise the green effect of the iron oxide. If too much is added, it causes a pale purple or greyish colour in the glass. Manganese oxide can also be affected by solarization in the finished glass product, which can be seen in 19th century house windows which have acquired a purple tint while in situ (Newton and Davison 1989, 153). An example of manganese colouring can be seen in the beaker from Great Tower Street (GB89), which has a pale purple tint. It is not certain whether this colour was intentional. It is possible that it was a result of an excess of manganese decolourant in the recipe, which occurred at the time of production. It may alternatively have been caused by solarization of the manganese after the glass was produced, possibly as a result of having been displayed in sunlight (pers. comm. Ian Freestone). Other colouring agents used in medieval glass include cobalt or copper oxide which produce blue, and copper or iron oxide can produce opaque red in a reducing atmosphere (Mortimer 1991, 10). Amber may be produced by the addition of iron and manganese and a particular state of oxidation in the furnace (Newton and Davison 1989, 8). Opaque white glass is achieved by the use of tin in the medieval period (Mortimer 1991, 9).

High-lead glass is generally easy to recognise. It is highly refractive, heavy, and usually brightly coloured. Lead glass found in continental Europe is coloured either bright yellow, green, colourless with a slight yellow tint, opaque red or black. However, in England, all but one of the vessels are yellow, with green or blue used only for the decoration. One beaker base is opaque red (GB20). A few fragments from Winchester, which are almost colourless with a greenish or yellow tint, are thought to be high-lead glass although this has not yet been scientifically proven. The yellow colour may either be a consequence of the lead itself, or it may be caused by a mixture of lead and antimony (Wedepohl, Krueger and Hartmann 1995, 74). Some forms of lead oxide are yellow, such as massicot (Mortimer 1991, 7). The green or green-blue colour is achieved by adding copper oxide, a blue pigment which appears green when mixed with the yellow lead glass (Wedepohl, Krueger and Hartmann 1995, 74). Some applied trails

are blue or blue-green, and this is probably a consequence of adding a greater quantity of copper oxide. In potash and soda glass, opaque red colouring is achieved by adding copper and firing the glass in a reducing atmosphere. If the molten opaque red glass comes into contact with any oxygen, the red cuprous oxide crystals will dissolve (Brill and Cahill 1988, 18). It is not certain whether the opaque red colouring in lead glass was produced by the same method, since there is a danger that lead glass will turn to metallic lead in a reducing atmosphere (Bayley 1990, 269). However, analyses of red opaque glasses from the 9th century BC onwards in the Near East show that they contain significant quantities of both lead oxide and cuprous oxide (Brill and Cahill 1988, 19-21), so it must have been possible to provide the necessary conditions for both lead and cuprous oxide crystals.

2.1.2 The deterioration of medieval glass

Medieval glass is notorious for the poor condition in which it survives, if it survives at all. The two major factors affecting decay are the composition of the glass, and its burial environment. In medieval glass the composition is a greater factor. Glass from other periods, such as Roman glass, survives far better in the same environments. The different types of medieval glass also have different degrees of decay in the same burial conditions. Nevertheless, some environments can delay or quicken the rate of decomposition.

Potash glass decays the most seriously. This begins with small beige pits on the surface. Gradually, the surface layers turn opaque brown and crumbly, and this weathering eventually permeates the entire volume of the glass. This weathering is often described as 'enamel-like', and the fragment may not be recognised as being glass by the untrained archaeologist. Beyond this stage, the glass literally crumbles away, and many vessels will have disappeared into the soil matrix, never to be recognised by the archaeologist. Soda glass is more durable than potash glass, although it eventually suffers the same fate, but at a slower rate. The initial weathering on soda glass may form as a flaky iridescent layer. The reasons for this decay lie in the chemical make-up of the types of glass.

When glass reacts with water, there is an exchange between the alkali ions in the glass, which leach out, and the hydrogen ions (protons) and other molecules in the water, which replace them. The water ions are smaller than the alkali ions, and the volume of the glass is therefore depleted when the alkali ions are replaced by the smaller water ions. Potassium ions are larger than sodium ions, and thus the volume of potash glass is depleted more seriously when the leaching occurs compared with soda glass, accelerating collapse (Newton and Davison 1989, 136). The durability of the glass can also be affected by the silica content, decreasing when less silica is present, since the silica forms the durable matrix of the glass. The amount of silica is generally smaller in

potash glass, while the potassium ions which leach out are larger. In soda glass, there is a higher proportion of silica, which stablises the matrix of the glass to a higher degree than in potash glass, while the alkali ions which leach out are smaller.

The addition of lime, at up to 10%, acts as a stabiliser and improves chemical durability by strengthening the surface bonds of the glass. However, if the lime content exceeds 15%, the weathering resistance of medieval glass is reduced and it may disintegrate if it becomes damp (Newton and Davison 1989, 143; Hurst Vose 1980, 113). In the analyses of the London glasses, soda glass contained between 6 and 13.5% of lime, while potash glass contained between 10.3 and 17.2% (Mortimer 1991, Table 2). This may be one of the reasons why some potash glasses are so unstable.

Since water is the environmental factor which causes the greatest decay in glass, it is perhaps surprising that some of the best preserved medieval glass is found in waterlogged cesspits or waterfront deposits. The reason for this must be that the glass is preserved in anaerobic conditions and has not ever dried out. The water which has replaced the alkali in the glass matrix, although smaller in volume, remains in the glass and therefore prevents total collapse. The greatest risk of collapse is after excavation, when the glass begins to dry. For this reason, the glass should be kept moist, or the water gradually replaced with a medium such as Carbowax to stabilise the structure of the glass matrix.

Post-medieval potash glass has a higher percentage of silica, and a lower percentage of alkali. This makes the rate of decay slower. Although the glass has more than 15% of lime, this does not appear to affect the stability of the glass. Higher temperatures were required to melt the glass due to the low alkali content, and this may have made the glass more durable (Kenyon 1967, 39-41).

2.2 Glass production sites

The most reliable method of assigning different glass forms and styles to areas of production is to find fragments of those glass types at production sites. However, there are three major problems with using evidence from furnace sites. These are the discovery of the sites, their dating, and the assessment of the products that were made there.

Of the glasshouse sites discovered in the Weald, half were found by following up place names related to glassmaking. Even during intensive field survey to follow up these clues, the furnace sites have been elusive. The furnace site at Glass Hey Field at Bickerstaffe in Sussex was only discovered after finding a piece of glazed crucible when surveying the area for the third time (Hurst Vose 1980, 156). Crucibles with glass on them are the only conclusive evidence for glassmaking. Fragments of furnace structure with glass on them may be found, but these may be confused with other vitreous slags which come from iron or brick works or other industrial sites. Fragments of broken

glass may have been used on any type of site, or have been scattered as rubbish. In the medieval period, glass fragments found in a rural context are more likely to come from a production site, since glass was rarely used on rural domestic sites, other than manor houses or castles (see p. 143). On the other hand, it is very unlikely that the small fragments of glass found during field survey could be identified as medieval from their appearance alone. Less surface evidence is likely to be found in a woodland area, where many furnaces are situated near their fuel source, but the covered furnace may form a mound, and it has the advantage of being less disturbed by ploughing beneath the surface. The furnace sites which are discovered by following up place name evidence are those which were likely to have been the largest or established for the longest period. Furnaces of short duration are less likely to be discovered. These may include the temporary furnaces of peripatetic glassblowers who moved to where fuel was available (Kenyon 1967, 15-16).

Not all glasshouses were recorded in medieval documents. The 16th century glasshouses excavated at Rosedale and Hutton in Yorkshire have no surviving documentary evidence beyond a reference to a glassmaker in the Lastingham parish records in 1593 (Crossley and Aberg 1972, 107). These difficulties in locating glass production sites exist in all countries. No high-lead glass furnace sites have yet been discovered.

After the glass furnace is found, it is not easy to date the period of its use. Archaeomagnetic dating of the furnace itself has been very successful, but this provides the last date that the furnace was used, rather than the duration of its use. There is a lack of intercutting stratigraphic evidence, particularly in England where most furnace sites were in rural locations, and the site will only have been occupied for one phase. There are few if any datable finds. Most glass forms made on English furnace sites remain identical in shape from the 13th to early 16th century, such as the flask/urinal, so finds cannot be dated. This is less of a problem in continental Europe and the eastern Mediterranean where more characteristic and datable tablewares were made.

The lack of finds in the Surrey/Sussex Weald is described by Kenyon as typically producing 'little except a few crucible and glass fragments and a surviving burnt patch' (Kenyon 1967, 2-3). This makes it difficult to resolve whether vessel glass, window glass, or both, was made at the furnace. Glass waste would have been re-used in the next batch of glass. On moving to a different glasshouse, the remaining waste from that site may have been taken for re-use. It has already been shown how badly potash glass deteriorates in the damp soils that are present at furnace sites. When fragmentary glass is found it usually too small to be diagnostic in form or date.

It is possible that some of the glass found on furnace sites was not produced there, but was cullet taken there for re-cycling. There is evidence of this practice in other areas of Europe and the Near East (see pp. 44 and 144).

In Kenyon's survey of forty-two glasshouse sites in the Weald, only six sites (and Blunden's Wood which was published separately) produced 'vessel scraps of any interest', three of which are dated to before 1550, but these scraps were extremely fragmentary and 'cannot now be identified' (Kenyon 1967, 89).

2.2.1 Glass production sites in England

All of the evidence for glass production in England is for potash glass. Research into medieval furnace sites has been concentrated in the Surrey/Sussex Weald, where forty-three sites are now known (pers. comm. David Crossley). These are divided into two categories: 'Early', (c. 1330-c. 1550), and 'Late', (c. 1567-1618). Thirteen are thought to be 'Early' (Kenyon 1967, 147), a few are 'Transitional', which is probably after 1500, and some others are not dated. Research in this area was first undertaken by Cooper, followed by Winbolt. The classic work was written by Kenyon in 1967. A new survey has been taking place since 1991, in which one new site has been discovered. The earliest evidence for glassmaking in the Weald consists of documentary evidence of names of possible glassmakers. In c. 1240 there was a grant of twenty acres of land in 'Chidingefalde' to Lawrence Vitrearius (Kenyon 1967, 26). The Latin 'vitrearius' and its French equivalent 'verrer' or 'verrir' can mean either glazier or glassmaker. Names do not necessarily correlate with occupations at this date, although in this case, it is thought likely that Lawrence Vitrearius was a glassmaker, since the land was in Chiddingfold which was the centre of Wealden glassmaking. Another deed of 1300 recorded the rent of land on the Chiddingfold-Dunsfold border for a yearly charge of 6d. to William son of William le Verir (ibid., 26). The first conclusive documentary evidence for glassmaking in the Weald, were six entries in the Exchequer K.R. Rolls in 1351 covering the purchase of English-made 'white' (colourless) glass from Chiddingfold or 'the Weald' for the royal chapels of St Stephen's, Westminster, and St. George's, Windsor (ibid., 27-28)

Another problem with the evidence from England is that we do not know how many of the glasshouses produced vessel glass as well as window glass. Vessel glass was referred to in a deed of 1380, in which Joan the wife of John Schurtere of Chudyngfolde granted half a glasshouse in the parish of Keuredeforde (Kirdford) to John Glasewryth (Kenyon 1967, 31). Vessel glass has been excavated on other sites in the Weald.

The archaeological evidence in the Weald provides conclusive evidence of glass production at an earlier date than the documentary sources. The glass furnace excavated at Blunden's Wood was archaeomagnetically dated to c. 1330 (Wood 1965). In addition, potash utilitarian glass vessels were in use in England from the 13th century, including a hanging lamp from Winchester (GE3), and a flask/urinal from Lincoln (GF1).

Although research has been concentrated in the Weald, it is clear that glass was also made in other areas of England. Between 1284 and 1309 the Abbey of the Vale Royal made glass in Delamere forest in Cheshire. In 1349 John de Brampton was ordered to buy glass in Shropshire and Staffordshire for St Stephen's Chapel (Kenyon 1967, 25). The excavation of a glassmaking site at Little Birches in Wolseley, Staffordshire, revealed a furnace dated to the 14th century by archaeomagnetic dating and pottery evidence (Mortimer 1993, 1). There are other documentary references probably connected with glassmaking in Staffordshire, including 'le Glaslone' (glass lane) in a charter of 1289 at Bromley Hurst near Abbots Bromley, a field called 'Glasshouse Field' in 1416, and the names Glaseman and Glasman in 1333 and later (Charleston 1991, 255).

There is further evidence from Inglewood Forest in Cumbria. Pipe Rolls record the rental of a property called 'Le Glashous' in the 14th and 15th centuries to tenants including John Vitriarius in 1317, under the title 'the farm of dead wood', and to have dead wood at will (Parker 1909, 35). This wood would no doubt have been used to provide fuel or the alkali ashes required in glassmaking.

Other possible areas include Colchester where Robert le Verrer and Matthew le Verrer are recorded in 1295 and 1300, Robert having goods including 'biletts pret. xviiid', wood billets which may again have been used in glassmaking (Charleston 1991, 256). A field in the north-east industrial area of the town was known as Glaswhryteslond (pers. comm. John Cotter). In the 15th century Salisbury Cathedral had its own 'glashous', and the fact that large amounts of sand were purchased for it suggests that it made glass rather than merely installed glass windows (Kenyon 1967, 25).

Products excavated from English glasshouse sites include green glass hanging lamps, flasks and urinals with wide and narrow rims, convex and kicked bases. Flasks are either undecorated, or have optic-blown wrythen ribbing. It is not certain whether any tablewares, such as potash jugs, decorative flasks, or beakers, were made at medieval English furnaces, though there is evidence that beakers were made from the 16th century onwards. Opaque red glass is another mystery. It was made in other areas of Europe, in potash, soda and lead glass. It may also have been made in small quantities in England. A crucible containing 'ruby glass' was found at Chaleshurst in the Weald, although this dated to after 1550. Late vessel glass was also found, 'having ruby glass applied on as opaque decoration' (Kenyon 1967, 161), so it is not entirely clear whether this glass was what is now referred to as opaque red glass, or whether it was the ruby glass used for flashing red windows.

2.2.2 Other European areas producing potash glass

Evidence for potash glass production in northern Europe is provided in the treatise *De diversis artibus* by an author calling himself Theophilus. This treatise is dated to the early 12th century. It has been speculated that Theophilus may be the German monk Roger of Helmarshausen, a figure known to have been involved in metalworking in c. 1100 (Hawthorne and Stanley Smith 1963, xv). The treatise contains three books on painting, glass and metalwork. The first chapter of Book Two provides instructions for making potash glass:

> If you have the intention of making glass, first cut many beechwood logs and dry them out. Then burn them all together in a clean place and carefully collect the ashes, taking care that you do not mix any earth or stones with them. After this build a furnace of stones and clay, fifteen feet long and ten feet wide, in this way. (ibid., 49, Book II, Chapter I)

Potash glasshouses are known in the Rhine-Meuse areas of Germany and northern France. In the Argonne region to the west of the Meuse at least fourteen glasshouses of between the 13th and 15th centuries have been found, by survey, excavation and from documentary evidence (Foy and Sennequier 1989, 67-69). Excavations at Pérupt, a 13th century glasshouse, produced a range of potash tablewares and coloured window glass (ibid., 70). In the north-west of France, production sites are attested in Upper Normandy, five dating to the 14th and four dating to the 15th century. These concentrated on producing window glass (ibid., 70-72). German glasshouses include those in the Spessart region, where excavations have produced different vessel forms including flasks and beakers, and the moulds into which optic-blown patterned vessels were blown (Baumgartner and Krueger 1988, 28-30). Similar finds have been excavated from the glasshouse of Nassachtal in Baden-Württemberg (ibid., 35), Niestetal in Hessen (ibid., 39), and the south-west region of the Black Forest (ibid., 37-8).

Less evidence is available from Bohemia. One glasshouse has been excavated at Moldava, which produced colourless and blue as well as green glass (Baumgartner and Krueger 1988, 34). Distinctive glass forms found at sites in Czechoslovakia, such as Prague and Plzen, are not found in neighbouring Germany, and these may indicate local Bohemian glass styles. They include a tall narrow drinking flute form with small applied prunts (Whitehouse 1991b, 56). An illustration of a Bohemian forest glasshouse can be found in the manuscript of Sir John Mandeville's Travels in the British Library, dating to c. 1420 (BL, Add. 24189, fol. 16).

The distinctions between areas producing potash and soda glass are not absolutely clear cut. Some Italian glasshouses imported soda ashes from the Near East, Catalonia and Provence, while others used local plant ashes. In Tuscany, fern ashes rich in potash were particularly popular (Jacoby 1993, 68-9). It is quite possible that other areas in Europe may have imported soda ashes for glass production. Plants containing soda may also have been available as an alternative to plants containing potash. In England, sea plants containing soda ashes collected from the Yorkshire coast have been used in experiments looking at the chemical compositions of the raw materials of glass (Sanderson and Hunter 1981). Similarly, areas which traditionally used soda ashes may also have had potash as an alternative.

2.2.3 Areas producing soda glass

Soda glass was generally made in regions around the Mediterranean in the late medieval period. These include Syria and Egypt, where artistic activity and trade flourished under the rule of the Mamluk sultans (1250-1517). There is a notable amount of documentary evidence to indicate some of the areas in which glass was produced in Syria and Egypt (Lamm 1929/30, Vol.1). Earlier this century Carl Lamm classified Near Eastern gilt and enamelled glass into four different production groups, attributed to Raqqa, Fustat, Aleppo and Damascus. These attributions were based largely on known historical events, since there were few archaeological finds at the time in Syria, and are generally no longer accepted (see pp. 5-6).

Glass was certainly made in Aleppo. Early 13th century documentary evidence recounts how glassmakers from Armanaz near Tyre, settled near Aleppo, where they took their blown glass to be enamelled. In 1339-40 the Persian geographer al-Mustaufi declared that 'the best glass-founders are those of Aleppo. The glass bottles from here are perfectly transparent and very famous' (Lamm 1941, 62-3).

Damascus has many 14th century references to the production of gilt and enamelled glass. Symon Simeonis, who began his pilgrimage to the Holy Land in 1325, describes how 'the most admirably ornamented glass is made at Damascus in great quantities' (Lamm 1941, 67). Gilt and enamelled ornamental Oriental glass came to be known as 'glass in the manner of Damascus' (ibid., 68). The 1379 inventory of Charles V of France lists many glass vessels described as decorated 'à la façon de Damas' (Lamm 1929/30, 494).

There is no literary evidence that glass vessels were produced at Raqqa, but Lamm believed that there were 'strong reasons to assume a large group of enamelled and gilt glass to have been made at this place', without stating what these reasons were (Lamm 1941, 59). Many glass fragments have been found at Raqqa and Hama. Glass furnaces of an earlier Islamic date of around the 8th and 9th centuries have recently been excavated at Raqqa (pers. comm. Julian Henderson).

Glass furnaces also existed at Fustat in Egypt. To this group, Lamm attributed a glass style which was only found in Egypt, which had enamelled but no gilt decoration, with thick red contours and Mamluk inscriptions and coats of arms (Lamm 1941, 60-61). He believed that most Islamic gilt and enamelled glass was made in Syria rather than Egypt. However, this glass is also found in great quantities at Fustat, and large numbers of gilt and enamelled mosque lamps were donated to mosques in Cairo (Pinder-Wilson 1991, 131). It therefore seems unlikely that all of this fragile glass was imported from Syria, when the glassmakers could have worked in Egypt themselves. The capital of the Mamluk Empire was in Cairo, where there would have been many patrons for local glass. In fact, most of the glass fragments which Lamm classified as Syrian, such as 'Aleppo large-figure' and 'Damascus small-figure' were found mainly in Egypt, particularly at Fustat. Recent excavations in Egypt and the Sudan have produced fragments with 'a remarkable unity' which were probably made in Egypt (Wenzel 1985, 100). These excavations also had an absence of glass types which are known from museum collections and excavations in Syria, which strengthens the supposition that most of the glass found in Egypt was also made in Egypt (ibid., 100). Other Syrian centres are attested as having produced glass, including the Jewish glasshouses at Tyre and Antioch, recorded by Benjamin von Tudela in 1167 (Lamm 1929/30, 491).

Egypt and Syria should be regarded as of equal importance in the manufacture of glass as far as England is concerned. It is rarely possible to distinguish whether glass was made in Syria rather than Egypt. Of the glass found in England, the beaker from Abingdon (GB59) has Mamluk iconography and is therefore more likely to have been made in Egypt, but the other Islamic vessels could be made in either area.

Glass was also manufactured in the Byzantine Empire, but there is little evidence to suggest where the production sites were, or the character of the vessels produced. Theophilus in *De diversis artibus* in the early 12th century describes techniques used by 'the Greeks' to make vessels coloured by the addition of ancient mosaic tesserae. To decorate these they:

> Tak(e) milled gold (and similarly silver), like that which is used in books, they mix it with water and with it make circles and in them figures, animals, or birds, in varied work, and coat them with the very clear glass about which we spoke above. Then they take pieces of the white, red, and green glasses which are used in enamel work, and individually grind them carefully with water on a porphyry stone. With these they paint little flowers, scrollwork, or any other tiny things they want, in varied work between the circles and the scrollwork and a border around the rim. (Hawthorne and Smith 1963, 60, Book II, Chapter 14)

Small cylindrical bottles of blue or manganese glass, with gilt and enamel decoration (Type D23), resemble this description very closely. A large number have been found at Paphos in Cyprus, dating to the late 12th or early 13th century. However, it is not certain exactly where they were produced, but somewhere in the Byzantine Empire is likely. Glass vessels of a similar gilt and enamelled style were looted from Constantinople by the Crusaders in 1204, such as a bowl from St Mark's Treasury in Venice, which is dated to the 10th or 11th century (British Museum 1984, 180-3, No. 21). Although this style appears to be Byzantine, it is not certain whether there is any characteristically Byzantine glass between the 13th and 15th centuries. A glasshouse was excavated in Corinth, which dates to the 13th to 14th centuries, but this is likely to have been founded by Italian glassmakers (Whitehouse 1991a). The products found there are very similar to glass made in Italy and southern France. It is unfortunate that some of the major excavations in Constantinople lack material dating between the 13th and 15th centuries, such as those at the Great Palace and Saraçhane (Hayes 1992, xi).

In Italy, soda glass was made in northern and central areas, including Venice, Murano, Bologna, Padua, Altare, Monte Lecco, San Gimignano, Pisa, Gambassi, Genoa, Sasella, Orvieto and Ravenna. There is direct documentary evidence from Venice and Murano for the manufacture of beakers of Type B21 (Vol II, p. 26). Factories were rarer in the south, but include those at Naples (Whitehouse 1981, 165-166). They are also found in Sicily, at Palermo, Cefalà Diana and Catania (ibid., Nepoti 1991). Soda ash was imported to Venice from Spain, Provence and the Near East (Jacoby 1993, 67-68).

Italian glassmakers from Venice and other parts of northern Italy are recorded as having worked in Dubrovnik on the Adriatic coast (Whitehouse 1991a, 56). Glasshouses are recorded in charters of the 14th century in Hungary. Archaeological finds indicate that there was local glass production there at least as early as the early 14th century, including a broken crucible with glass adhering to it from Buda (Holl-Gyürky 1986, 70-71). It is not known whether these glasshouses produced soda or potash glass.

In southern France, a list of approximately forty-two glass production sites of the 13th and 14th centuries has been compiled from documentary references, survey and excavation, which are concentrated in Provence and Languedoc (Foy and Sennequier 1989, 74-83). Amongst those excavated are forest glasshouses at La Seube (Lambert 1972), Cadrix, Planier, Rougiers, and two urban workshops in the same area of Avignon, the parish of Saint-Pierre (Foy and Sennequier 1989, 74-6). At least thirty-eight glass furnaces are known to have been in operation in the 15th century (ibid., 86).

In Spain, glass is known to have been made from the 12th century onwards. The earliest evidence consists of an agreement between the abbot and prior of Poblet monastery near Tarragona in Catalonia, with a glassmaker in the 12th century

(Frothingham 1963, 20). This referred to sheet glass rather than vessels. There are further documentary references to glassmakers from the early 14th century onwards in Barcelona, Palma in Majorca, Perpignan, Collioure, Elne and Palau in the Roussillon area of northern Catalonia, Tarragona, Valencia, San Feliú de Guixols, Guisando in Avila, Castilla, Murcia, and Moorish and Jewish glassblowers in Burgos in southern Spain (ibid., 20-26). However, very little is known about the products. There are some references which suggest that their enamelled glass was made to imitate Islamic vessels. In 1387 in Tortosa the city council directed Domingo Valls to buy a glass lamp of Damascus manufacture, or an imitation, presumably Spanish. Preliminary excavations at San Feliú de Guixols uncovered a 14th century glass furnace and fragments painted in enamel, with stylistic similarities to both Islamic and Catalan designs (ibid., 23). Glassware from Catalonia is listed in 15th century inventories, describing Venetian-style glass of blue, purple, tawny yellow and colourless, as well as some imitating chalcedony and some 'painted with divers colours'. Fifteenth century forms include vases, covered jars for sweets, salt dishes mounted in silver, decanters and high-stemmed goblets (ibid., 27).

Surviving examples of Spanish glass are extremely rare, making it impossible to confirm whether any styles found in England could have been made in Spain. Noël Hume proposed that a flask from London (GD59) may be Spanish, without stating his reasons (see Vol II, p. 45). Some similar glass depicted in Spanish 14th century paintings, by artists including Ferrer Bassa, Jaume and Pere Serra, and Llius Borrassà, may also be Spanish (Frothingham 1963, 27). A Last Supper scene by Jaume Serra shows two glass flasks with long narrow necks and bulbous bodies, with a wide ribbed band around the neck, similar to fragments found in France (Foy and Sennequier 1989, 245-6, No. 232). It is possible that this was a Catalan style, although it may simply have been an import that was popular in Spain.

It has also been suggested that soda glass may have been produced in southern Germany and Switzerland (Baumgartner and Krueger 1988, 180, 182, 186-7, 220; Whitehouse 1991b, 53-55).

2.2.4 Areas producing high-lead glass

The production area of high-lead glass vessels remains uncertain. Finds are concentrated in a band from Britain across the Low Countries to Germany. A few are found further afield, such as at Poggio Imperiale in Tuscany, and Kalmar in Sweden. It is therefore thought that they were produced somewhere in north-west Europe. No furnace sites have yet been confirmed to have produced high-lead glass. One site which may provide a link is the 13th century forest glasshouse at Bramwald in Germany. Lead glazes and a stamp for shaping 'berry' prunts, which are found on lead and potash glass

vessels, were excavated, but there is no evidence for the production of high-lead glass (Baumgartner and Krueger 1988, 27).

Lead isotope analyses may be able to distinguish where the lead used in the glass originated. Specific sources of lead have different proportions of the three radiogenic isotopes of lead relative to the unradiogenic isotope 204 Pb, depending on their geological age. Results would show the area of the source of the lead, rather than the area where the lead glass was produced. However, lead was commonly mined throughout medieval Europe (Homer 1991, 57), and it seems likely that the glassmakers would have used a relatively local source. Problems may occur if lead from two different sources is of a similar age, or if recycled scraps of lead have been used. The results are compared with isotope determinations of lead of known provenance. Four fragments of glass excavated in Braunschweig, Lübeck and Neuss in Germany have been analysed, and were found to contain lead from the Harz Mountains, northern Eifel and Bavarian Forest in Germany (Wedepohl, Krueger and Hartmann 1995, 68). However, lead glass may have been produced in more than one area, so further analyses are needed for more conclusive evidence. Three of the four German fragments were found in areas close to their lead source, which suggests that lead glass was produced, in Germany at least, in areas close to where it was sold. Although the full range of colours and forms of lead glass represented in continental Europe have not yet been found in England, it remains possible that some types of lead glass may have been produced in England.

The 10th century treatise *De coloribus et artibus Romanorum* by Eraclius contains a chapter entitled 'How glass is made of lead, and how it is coloured'. It is thought to have been added to the original text in the late 12th century, possibly in France (Merrifield 1967, 216; Chapter VIII). This refers to vessel production:

> Take good and shining lead, and put it in a new jar, and burn it in the fire until it is reduced to powder. Then take it away from the fire to cool. Afterwards take sand and mix with that powder, but so that two parts may be of lead and the third of sand, and put it into an earthern vase... But if you wish to make it appear green, take brass filings, and put as much as you think proper into the lead glass; and then, if you wish to make any vase, do so with the iron tube.

Although this recipe is from an earlier date than the lead glass vessels described in this thesis, it may be a direct predecessor. It is estimated that the composition described would produce similar constituents to those found in 13th and 14th century vessels (Bayley 1990, 268; Eggert 1990, 1248). Another treatise, of the 12th century, *De*

diversis artibus by Theophilus, describes how to make lead glass finger rings (Bk. II, Ch. 31; Hawthorne and Stanley-Smith 1963, 73). A missing chapter was entitled 'The Pigments That Are Made From Copper, Lead and Salt' (ibid., 58). There is no reference to making vessels of lead glass, but it is possible that this was also contained in a missing chapter.

A greater amount of research has been carried out on high-lead glass objects dating between the 9th and 13th centuries, which are found in Europe, including Britain. These finds included finger rings, bangles, beads, gaming counters, mosaic tesserae and jewellery inlays, with a lead content of between 60 and 80% (Mortimer 1991, 6). Examples in England have been found in Winchester, Gloucester, Hereford, Oxford, London, Lincoln and York. There is evidence of urban production from Gloucester, Lincoln and York (Bayley 1990, 269). High-lead glass has also been found in Eastern Europe, including Russia. Objects and vessels have been excavated from 11th to 13th century contexts in a glass workshop in Kievo-Pecherskaya-Lavra (Kiev), and the town of Vyshgorod, both in southern Russia (Besborodov 1957, 180). A cylindrical vessel of green glass with two applied trails from the Kiev workshop contained c. 64% lead. Colourless or pale yellow glass vessel fragments from Kiev and Vyshgorod had lower percentages of lead, between 20 and 30% (ibid., 180). It has yet to be proven whether the 13th or early 14th century north-west European high-lead glass vessels were a direct continuation of objects produced in Britain, or the vessels produced in Russia.

Vessels and objects of high-lead glass also occur at earlier dates and in different geographical regions. The earliest known examples come from ancient Mesopotamia and the Far East (Charleston 1960). In the early medieval period, lead glass vessels from the eastern Mediterranean include those from the Byzantine or Islamic Serçe Limani shipwreck off the Turkish coast of c. 1025 (Barnes et al. 1986, 6-8).

2.3 The documentary evidence

A wealth of surviving medieval European documentary sources are available. This section outlines the sources which provide evidence relevant to this thesis, concerning the production, trade and use of glass vessels. Although it has not been possible to make a comprehensive survey of all published and unpublished sources within the scope of this study, a wide range of published sources and studies have been consulted.

The documentary evidence for glass production has already been outlined (see pp. 24-32). Treatises describe glass recipes and the techniques used to make vessels, the most relevant and detailed of which is *De diversis artibus* (see p. 26). References to glassmakers may be found in rental agreements or in parish records which sometimes contain surnames connected with glass, even though these cannot always be assumed to

indicate the occupation of the named person. A number of purchases of glass from glassmakers or general areas are recorded in accounts, particularly the purchase of window glass in royal building accounts. Place-names may gives clues as to the location of glasshouses. Documentary references have been extremely valuable in providing clues leading to the location of glasshouse sites.

A limited amount of information is available concerning the trade and marketing of glass vessels. Because glass was produced on such a small scale compared to goods such as wine or wool, the trade of glass, including its raw materials, has been largely ignored by economic historians. Maps of Europe which show the goods traded from specific areas very rarely refer to glass, and when they do it is to only glass from Venice. Sources of the raw materials used in Venice and north Italy have recently been studied in Italian archives by David Jacoby (1993).

Customs Accounts survive from many English ports, which may be examined to establish the origins, the port of entry, and the date of glass vessels imported into England, as well as the scale of this trade and the price of glass. Detailed customs accounts were drawn up at the end of each year and taken to the Exchequer to be checked by auditors. In Hull 'enrolled accounts' run almost unbroken from 1275. However, they need careful interpretation. Until 1453 only the most valuable taxed commodities were listed, including wool, hides, cloth and wine. Some commodities continued to be exempt from tax, such as personal effects of seamen and passengers and the King's goods, although in theory still listed (Childs 1986, vii-xiii).

The descriptions of goods are not specific, and the weights and measures cited are often vague or unknown. On August 22nd 1463, Adrianus Johnson had amongst his cargo on the 'Jacob de Midelburg':

> '1 maunde (basket) cum drynkyng glasses'
> '1 roundlette (small cask) cum haberdaysh et glasses'
> (Childs 1986, 62-3)

In this case it is specified that the glasses are drinking glasses. In many other cases, the reference is merely to 'glass' or 'vitri'. This could be window glass, vessel glass, raw glass ingredients, or other glass products such as mirrors or linen smoothers. It is possible that other products were stored in glass containers, and that these were recorded in accounts under the contents rather than the container. This is an acknowledged problem in pottery studies (Orton, Tyers and Vince 1993, 199). However, there is no evidence that glass vessels were used in this way, or were sufficiently cheap to be regarded merely as containers in the medieval period. In the 16th and 17th centuries there are still examples of the separate sale of contents and containers probably made of glass. The Household Books of Lord William Howard record that he 'payde for a pint of

inke and a bottell then', and the Lambeth Churchwarden's Account lists 'a quarter of a pint of oyle for the coachman and a bottle' (Godfrey 1975, 227).

The Customs Accounts do not describe the style of the drinking glasses, or where they came from. The boat was registered at Midelburgh (Middelburg in Holland), but boats travelled around the coasts of Europe buying and selling goods at a number of different ports, so this is no indication of the origin of the products carried. The Jacob of Midelburg and other boats that docked on the same day carried a considerable amount of Spanish wine. This may indicate that they had sailed from Spain, but goods were also exchanged at ports outside their country of origin, so the wine could have been collected anywhere. If they had been to Spain, goods may have been collected on the journey back. Glass imported to Hull may have even been collected in another English port. There is therefore no indication of the area of production of the glass vessels on the 'Jacob'.

The quantities of glass vessels listed are uncertain, since it is not known how many glasses were contained in a 'basket', even if it was a standard number. Conflicting quantities are given for some medieval capacity measurements, such as a 'wawe' (Childs 1986, 257). Tax was calculated as a lump sum for each merchant. Adrianus Johnson was carrying other goods in addition to glass. The total tax value was £10. However, it is not possible to separate the values of the individual commodities. This would still not indicate the value of the goods, since valuations were not made at the current market value (ibid., xxv). An estimation of the values may be possible with the more frequent commodities which were carried on their own, such as wool, but not with glass which was usually part of a mixed cargo. Tax rates varied according to nationality, and Hansard merchants were granted special rates and privileges (ibid., xii).

The most important contribution of customs accounts for the study of vessel glass in England, is in showing us that glass was being imported into a number of different ports in England, by both native and alien merchants. There are occasional references from other sources concerning the trade of glass. In 1399 Richard II allowed Venetian merchants to sell glass at a Thames quayside (Tait 1991b, 149). What happened to the glass after it reached the port remains a mystery. More research is required to investigate who purchased the glass, and how this purchase was made, whether it was direct from the port, from a shop or fair, or by personal commission. This is important in assessing why only the upper classes of society used glass, and whether there were social restrictions on who could buy it (see p. 145).

Brokage books provide details of some aspects of inland trade. They record the petty custom on goods entering and leaving the town and the brokage toll charged for arranging the hire of carters (Stevens and Olding 1985). A number of people were exempt from the tolls. At the Bargate in Southampton, burgesses of Southampton, freemen of London and some religious houses paid nothing, and not all transactions

were recorded (ibid., ix-x). The Brokage Books from 1477-8 and 1527-8 from Southampton have been published. No glass is recorded in 1477-8, despite the excavation of late 15th century glass in Southampton. In 1527-8 a number of 'cases of glass' are listed, but no further detail is provided about the glass (ibid., 131, 172-5). The entries record the name of the merchant and the recipient, which is valuable for studying the pattern of trade of glass in the 16th century.

Rare references to the prices of glass vessels in inventories are referred to in Chapter 5 (see p. 144). The only good indications of prices are from utilitarian glass vessels in the 15th century. We have no evidence for the prices of imported tablewares, or any vessel glass from the 13th or 14th centuries.

Probate inventories are a rich source of evidence from the 16th century onwards, comprising of lists of all furniture and furnishings including food, made by prisers after a death (Brears 1972). Probate courts passed judgement on the accuracy of these inventories before granting the administration of the estate to executors. They would only have applied to the more wealthy section of society. Probate inventories list the contents of each room, and show in which room glass was kept, and the other items with which it was associated, revealing the contemporary attitudes and social regard of vessel glass. Medieval inventories are much more scarce and selective, and no useful information about vessel glass has been found other than the Nottingham inventory (see pp. 83 and 144).

Noble households kept their own accounts, a few of which have survived (Mertes 1988). The purchase of goods was divided between different accounts. The kitchen account bought tableware, but there would also have been a wardrobe account, dealing with items of value such as ornaments, spices, and other luxury items, which may have included glass. Some may have been acquired separately by the nobility, or presented as gifts, which would not have been recorded. Religious houses had similar accounts. The Infirmarer's Account at Abingdon Abbey in 1334-5 records the payment of 10d. for an unspecified number of glass vessels (Moorhouse 1993, 137). In 1457-8 at St Mary's Abbey at Fountains the bursar records the payment of 4d. for an unspecified number of urinals, but these may have been made of glass or pottery (Fowler 1918, 50). These references are of limited use, since they rarely refer to the form of vessels, or their function. The scarcity of glass in monastic and noble accounts is misleading, since excavation shows that glass was relatively common. Excavated glass is also far more informative concerning the form and style of the glass and its function.

The functions of glass and the circumstances in which it was used are described in a number of different documentary sources. Books of etiquette, such as *John Russell's Boke of Nurture* (Furnivall 1868), provide educational instructions on the

social manners employed in noble households. These sources are used in Chapter 5, where the way in which glass was used and its social importance at the table is examined (see pp. 146-156). They do not always specify the material of which the drinking vessel was made, but they provide information about matters such as how many people shared a vessel.

Medieval literature can provide glimpses into how medieval glass was used. Chaucer provides evidence of the use of reliquaries made of glass. In the 'General Prologue' to *The Canterbury Tales*, the Pardoner 'in a glas he hadde pigges bones' (line 700; Benson (ed.)1987, 34). The Pardoner states in his Prologue:

> Thanne shewe I forth my long cristal stones, (glass)
> Ycrammed ful of cloutes and of bones -
> Relikes been they - (line 347-9; Benson (ed.) 1987, 194)

This is valuable evidence, since the only possible archaeological evidence we have in England for glass reliquaries are a gilded fragment from the Cathedral Precincts in Canterbury (GH1), and a painted blue fragment from Weoley Castle (GH2), which are both extremely tentative. Glass reliquaries are found more frequently in other countries (see pp. 57-58).

Chaucer mentions glass distilling equipment twice in the Canon's Yeoman's Tale (see p. 88). Again, this is an important addition to the archaeological evidence since there are no excavated distilling vessels which can confidently be dated earlier than the 15th century. *The Canterbury Tales* were written in the second half of the 14th century. Possible fragments of distilling vessels from the 13th or 14th centuries are extremely fragmentary, and may come from different glass forms or similar forms used for different functions.

Vernacular recipes are another extremely important source of the practical function of glass vessels. These describe the ingredients for medical, herbal, alchemical and colour pigment recipes, the methods of preparation, and the vessels used. Glass vessels are frequently referred to, and in some recipes they are sketched to make the form absolutely clear. These recipes have shown that vessels which were previously assumed to have limited functions, such as urinals, are actually used for an extremely wide range of purposes (see p. 82; Moorhouse 1993).

Documentary sources are therefore extremely useful in certain areas connected with the study of medieval glass vessels, although they are limited in number. The most valuable evidence provides information about the production of glass, and the organisation of glasshouses. The use of glass in its social context, and its function, is provided by etiquette books, recipes and literature. Only fragmentary information is available concerning the trade, purchase, ownership and prices of glass. In these areas

archaeology must be relied upon to show the sources of the glass, by whom they were used, and their social value.

2.4 The iconographical evidence

Glass vessels can be found on a small scale in a variety of iconographical representations from medieval Europe. These sources include manuscript miniatures, which most commonly consist of religious works, histories and practical treatises. Paintings include religious and secular art. Both are usually datable by their style or the calligraphy in the manuscripts, and some may be signed or dated by the artist. These illustrations provide useful evidence relating to the dating and function of glass vessels. One difficulty with using these sources is that the substance of vessels is not always clear. The shine on metal can sometimes misleadingly suggest that it is glass. In Crivelli's *Annunciation with St. Emidius* of 1486 (National Gallery, NG 739) a flask on the shelf has a shine which makes it uncertain whether it is made of colourless glass or metal (Dunkerton et al. 1991, 344-5). Earlier manuscript illustrations, such as the 11th century Utrecht Psalter, show vessels in outline only, so the materials represented are not known. In any case, the Utrecht Psalter was derived from earlier models, so it is not helpful in assessing the vessels which may have been in use in the 11th century. There are some rare representations of glass vessels in stone sculpture. A 14th century scene from the *Life of the Virgin* from a church column in Carema in northern Italy depicts prunted beakers of an identical form to 14th century excavated examples (Gasparetto 1979, 87, Fig. 22). These vessels are undoubtedly made of glass since the form is (almost[1]) unique to glass. In other cases, the material of the vessel is not known. In a sculpture from the west front of Amiens Cathedral, a Wise Virgin holds a hanging lamp, and this lamp has been accepted as being made of glass (Thorpe 1935, Pl. XIVd.). However, the same form is found in pottery, and it could have been made of either material. Pottery is more likely, since the Wise Virgin holds the lamp in her hand, and a glass lamp would presumably be too hot to hold.

Consideration must be taken of anachronism in pictorial sources. Manuscript miniatures were often copied by monks from manuscripts of earlier dates or different areas. They may give a misleading impression of contemporary practices in the country where the manuscript was produced. For example, 11th century English calendars showing the labours of the months often show ploughing as a January labour, rather than a spring or autumn occupation as it actually was. These illustrations were probably copied from south European models (Basing 1990, 15). However, the problem of accuracy is less evident from the 13th century onwards. While Gothic illustrations may lack a three-dimensional perspective, and religious symbolism plays a large part in

[1]One example of a silver prunted beaker of the 14th century is known from the Rhineland (Baumgartner and Krueger 1988, 201-2, No. 179).

paintings, individual details including vessel forms appear to be accurate. If a vessel is drawn in sufficient detail to establish that it was made of glass, it is highly probable that the glass form was familiar to the artist. There is a high degree of correlation between excavated glass vessels, and the accuracy of types which are depicted by painters and illustrators (see p. 155).

Pictorial sources may occasionally have later additions. A Last Supper scene originally painted in the 13th century has glass vessels which are of a 15th century style, and these were indeed added in the 15th century (Foy and Sennequier 1989, Pl. XXII, No. 298).

Iconography has been valuable in providing dating evidence for some glass types, and was particularly useful before extensive stratigraphic evidence was available from excavations. Examples of attributing dates to glass types with the help of illustrations include the dating of green glass stemmed goblets with finned decoration around the bowl (Type A1) to the 14th century. Illustrations of this goblet type from the 14th century include a French *Last Supper* scene (Foy and Sennequier 1989, IX, No. 165), and over thirty pictures in the *Lives of St Louis* (Harden 1975, 39). Bohemian paintings and drawings have been studied, and show vessels clearly made of glass, for which there were no excavated examples at that time. They also depict glass vessels which closely resemble excavated vessels, providing supplementary dating evidence for them (Hejdová 1975). Iconography from Italy shows depictions of glass vessels which are strikingly similar to excavated parallels of similar dates (Stiaffini 1991; Ciappi 1991).

There are a few medieval illustrations of glass furnaces, such as the Bohemian glass house in *Sir John Mandeville's Travels*, dating to c. 1420, which is reproduced in numerous general surveys on medieval glass (e.g. Baumgartner and Krueger 1988, 22). This shows the furnace being stoked, glass being blown, a few vessels in the annealing chamber, and some packed in a barrel. Wood is stacked ready for use, and sand is being collected from the legendary 'Pit of Memnon' in the background[2]. The vessels shown include prunted beakers and handled jugs, confirming the production of these types in Bohemia in the 15th century.

Illustrations can expand our knowledge of the functions for which glass vessels were used. While the beaker is known to be used as a drinking vessel, iconography reveals instances of its use as a flower vase. Examples include a colourless beaker holding three roses in Crivelli's *The Virgin and Child with Saints Francis and Sebastian*, of 1491 (National Gallery, NG 807). When objects are painted in religious art, care must be taken to avoid confusing the realistic likelihood of their presence in a particular setting with their symbolic significance. For instance, in *The Virgin and Child with Saints* the scene is full of symbols, including a snail on the floor and fruit on

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2 The Pit of Memnon was said to have an inexhaustible supply of sand (Krása 1983, Pl. 27).

the canopy of the throne on which the Virgin sits. The snail is a symbol of the Virgin as it was thought that snails reproduced asexually. The fruit symbolises Christ as the fruit of the Virgin's womb. The glass beaker beside the Virgin may be particularly associated with her virginity, as a symbol of purity. In medieval liturgies of the Virgin she is often likened to a clear vase (pers. comm. Nicholas Penny). Another painting by Crivelli, the *Immaculate Conception*, depicts a similar colourless beaker in use as a vase, and holding a lily. This is another of the Virgin's symbols. However, it is unlikely that the beaker would have been painted in use as a receptacle for flowers if this function was unknown. There are also other illustrations which confirm the use of a glass beaker as a flower vase from the medieval and post-medieval period. A miniature from a Book of Hours by the Master of Mary of Burgundy dating to 1485-90 shows a colourless beaker with mould-blown ribs in use as a vase (Harden 1975, 42-3, Fig. 22). A very similar beaker with a pincered base-ring is painted in the *Portinari Altarpiece* of 1468-76 (Sheppard 1991, 61). A painting of c. 1610 by Jan Breughel de Oude shows a prunted beaker containing flowers (Rijksmuseum Amsterdam).

Another alternative function for a glass vessel is suggested in a 12th century wallpainting. This shows a glass vessel of the 'flask/urinal' form being used as a consecration vessel (see p. 83). A 15th century Last Supper scene suggests a possible function for the small bowls on the table which may be made of glass (Foy and Sennequier 1989, Pl. XXII, No. 298).

Illustrations from medical and alchemical treatises and other documents often show how many types of utilitarian glass vessels were used. There are many illustrations of doctors practising uroscopy by holding up and examining a glass urinal. One treatise shows the different colours of urine displayed in a row of glass urinals, with their prognostications (see p. 79). Distilling vessels of glass are shown in use in alchemists' laboratories, in manuscripts such as Thomas Norton's *Ordinal of Alchemy* of c. 1490. As well as showing the alembic, cucurbit and receiver which are familiar from more recent periods, a number of glass vessels of unfamiliar shapes are also shown. These include the 'pelican', shown on the right hand side of the picture, a variant on the alembic form in which the distillate returns through the tube into the cucurbit to be re-distilled (BL, Add. 10302, fol.37). A furnace on the left hand side shows alembics stacked on top of each other. This apparatus suggests a function for the fragments from Pontefract Priory believed to be vents (Type G11). Similar vents would be required in the roof of an alembic if it was stacked in this way, to allow vapour to rise to the next alembic (see p. 91). Vessels similar to cucurbits with lids are shown around the furnace in another illustration from the treatise (BL, Add. 10302, fol.1; Basing 1990, 120, Fig. 66). These additional vessels provide suggestions for the forms which some of the unidentified fragments from the large distilling deposit at Pontefract Priory may have come.

Visual sources can be used to look at glass in a wider perspective, for instance the role of glass as one of many materials used as tableware. Chapter 5 explores the arrangement of vessels on the table, and whether drinking vessels were used individually or communally (see pp. 152-6). The contrast between the vessels used by the rich and poor may be shown. An illustration of *Sobriety, Gluttony, Dives and Lazarus* shows the contrast most dramatically (BL, Add. Ms. 24642, fol.10v). Gluttony wears coarse peasants' clothes and drinks from a rounded bowl, with no other drinking vessels present. Lazarus holds an empty bowl, accompanied by a scraggy dog. Dives dines in the company of others, who each have their own goblet and attendant, with musicians playing, and even a dog eats a fish from a bowl on the table. This implies that bowls were used as drinking vessels by the poor, while the rich used goblets.

As with all sources of evidence, pictorial representations show only particular aspects of medieval glass. They are particularly useful since they show specific glass forms and types, with their functions and social contexts. Only a selection of medieval glass types are suitable for depiction, since many such as gilt and enamelled vessels would have been too complex to draw on such as small scale. Iconography therefore is not fully representative, but is a valuable supplement in the dating and interpretation of medieval glass.

2.5 Scientific analysis

Scientific analysis can be employed in glass studies to characterise the constituents of the glass. For the purpose of this thesis, the results are used to answer specific questions about medieval society, rather than to simply provide technical details.

One of the primary uses of scientific analysis is to identify the compositional type of the glass from its alkali. This identifies the tradition and general geographical areas in which the glass may have been made, contributing to our knowledge of the commercial links of glass workshops in Europe. The extent to which these ideals can be achieved through scientific analysis, and the problems inherent in the application of the analytical techniques to medieval glass are discussed here.

Three of the currently most common methods of analysis are described below.

X-ray Fluorescence (XRF)

This method measures the energy levels of different elements in the glass by bombarding them with X-rays. These X-rays displace a specific number of electrons from the elements' atomic nuclei, which are replaced by electrons from the outer shells. The energy released in this process is emitted as fluorescence X-rays, of which each element has a specific wavelength. These wavelengths are measured and interpreted using reference materials of a known composition. The advantages of this technique are

that it is fast and accurate, it can be carried out on complete archaeological objects, and it is non-destructive, and consequently has been called the 'curator's dream instrument' (Bowman 1991, 186). Unfortunately, in the case of medieval glass it is usually a destructive process. A sample has to be prepared from the centre of the glass in order to ensure that it is representative, since the glass nearly always has some surface weathering which has undergone chemical changes. Preliminary preparation is therefore time-consuming. Analyses published before about 1980 are found to have discrepancies because preparation was not rigorous enough. Although this technique can detect about eighty elements, it can only reliably measure those with an atomic number of twelve or above. It is now possible to detect sodium, which is on the borderline having an atomic weight of eleven, but reliability is poor. This and the inability to detect silicon are serious disadvantages for the analysis of glass, since they are major constituents. Consequently, it is not always possible to make the important distinction between soda and potash glass, because there is always some potash present in soda glass. The results are qualitative rather than quantitative, showing which elements are present, but not their relative percentages.

When sodium can be detected more reliably, this technique will be useful for a rapid preliminary analysis of the type of glass. It is effective in determining the nature of opacifiers and colourants from minor or trace elements. It has been used on medieval glass from London, but with far less success than SEM (see p. 42) which was used on the same group of glass (Mortimer 1991).

Inductively Coupled Plasma Spectroscopy (ICPS)

A solution of the glass sample is injected into a stream of argon forming an aerosol, and energised to a plasma flame at a temperature of 6000K. The excited atoms undergo a transition to lower electronic states, the excess energy is dispersed as a quanta of ultra-violet light, and the wavelength specific to each element is measured by a photomultiplier (Bowman 1991, 183). The sample required is larger than that used for XRF, and it is destroyed. ICPS is consequently not suitable for rare fragments of medieval glass. It a is rapid and sensitive technique, and covers a greater range of elements than XRF. Since it is so precise, great care must to be taken to avoid contamination by impurities, and problems can occur with surface corrosion. Multivariate statistics are needed to sort the results, which show the quantities of the elements. It is particularly useful for determining the general type of glass from the major and minor elements, with the additional information of the minor and trace elements available to determine the colouring.

This is a recently developed technique, and consequently very expensive at present. Although it has only been used on a limited amount of glass so far, it has great potential. It has been used successfully on early 17th century glassworking debris from

Broad Street, London, where the great quantity of glass means larger samples can be consumed (pers. comm. Mortimer). It has also been used to analyse trace elements in high-lead glass (Wedepohl et. al. 1995, 74 and 77, Table 3). As greater quantities of medieval glass are found, it may become possible to justify destroying some tablewares in analysis. Enough functional forest glass wares have already been found to justify the destruction of samples.

Scanning Electron Microscopy (SEM)

This technique requires small samples of glass to be set in cold-setting resin, ground and polished. A beam of electrons is focused on to the glass, which is converted into electronic signals when it hits the surface. The elemental compositions displayed by SEM are measured with an energy dispersive X-ray attachment (EDAX) or with an electron microprobe attachment. An average is taken of different areas from the surface of the samples, from which a quantitative result can be obtained. Again, corrosion of medieval glass can be a problem, and this may lead to high silica values. Soda, on the other hand, may be under-represented. It is not possible to detect some trace elements, or some elements and oxides known to occur frequently in glass, such as antimony oxide (SbO). However, for the higher elements, it is very accurate, able to detect broad glass types (soda, potash and high-lead) rather than the subtle differences distinguished by trace elements.

This method is currently the most commonly used. For example, it has been used to analyse medieval glass from London (Mortimer 1991, Tables 2 and 4), and Venetian glass vessels and the enamels which are painted on them (Freestone and Bimson 1995). It was successful in characterising the different regional compositions of French medieval glass (Barrera and Velde 1989a and b). High-lead glass has been identified using this method in conjunction with an electron microprobe attachment (Wedepohl, Krueger and Hartmann 1995, 74).

The most important application for the chemical analysis of glass is to distinguish whether the flux used in the glass is soda, potash or lead, in order to have some idea where the glass may have been made. It is not always possible to distinguish between soda and potash glass by its colour or style, although this division has been over-simplified until recently. For example, amongst beakers analysed from London were a 15th century blue-green beaker with large prunts, probably made in Germany (GB9), and a 14th century colourless beaker with a slight greenish tint and small prunts, probably made in Mediterranean Europe (GB42). It might be assumed that the blue-green beaker is potash glass, and the colourless beaker is soda glass. In fact, the former was found to be soda glass, while the latter was potash glass (Mortimer 1991, Table 2). Analysis in Germany produced astonishing results when it revealed that a group of

yellow and green glasses now known to be high-lead glass contained up to 84% lead oxide (see p. 19). The amount of lead in the glass hardly sounds possible, as modern lead glass achieves similar qualities of refraction by using only 20% to 30% lead oxide. Lead isotope analysis is planned in Germany on twenty-five high-lead glass fragments excavated from different countries, which may identify the areas in which they may have been produced (see p. 31; pers. comm. Ingeborg Krueger).

Some changes can be seen in the manufactured composition of glass through time. The amount of lime increases from the end of the medieval period (Barrera and Velde 1989b, 53). Forest glass found to have greater quantities of lime could therefore tentatively be assumed to be post-medieval rather than medieval. However, there are occasional examples of high-lime glass in the medieval period (ibid.; Mortimer 1991, 5, Table 2). Colourants and opacifiers may be specific to a particular geographical area or period. For example, tin oxide was commonly used as an opacifier in glass in Saxon and medieval Europe, while the Romans used lime-antimony and lead-antimony, and post-medieval glassmakers used lead-arsenic and calcium fluorophosphate (Mortimer 1991, 9).

Beyond characterising the chemical constituents of the glass, there are limits on the value of scientific analysis. It was initially hoped, for example by Smith in 1963 (Sanderson and Hunter 1981, 27), that detailed regional analyses may identify local idiosyncrasies in raw material and technique. An ideal result would distinguish between glass of similar appearance made in south France and north Italy, or between forest glass made in different areas in England. However, this is not possible. The composition of glass vessels produced in even the same glasshouse is likely to differ significantly. There are many factors which may lead to this inconsistency. The ingredients are unlikely to have been added as scientific measurements. Theophilus' treatise instructs the glassmaker to take 'two parts' of ashes and 'a third part' of sand (Hawthorne and Stanley Smith 1963, 52). The raw materials used may vary according to availability. For example, in the Weald, sand may have been used from several different sources, and bracken or wood ash may have been used. In north Italy, the different sources of alkali used included local plant ashes, and imported soda ashes from the Levant, Provence and Catalonia (Jacoby 1993). These sources must have varied according to availability. Verità's analyses of Venetian glass show a lack of uniformity, and this is partly attributed to different supplies of raw materials (ibid., 68).

The raw materials themselves vary in composition. Sanderson and Hunter analysed oak and beech ashes taken from different areas of the Weald. Although the manganese correlated with each site, the alkali content was so variable that it was not even possible to distinguish between whether the ashes were oak or beech (1981). In another experiment, they collected seaweed containing the soda natron from different points along the Yorkshire coast. The ashes varied greatly even from the same point

(ibid., 27-30). Brill and Bezborodov have independently shown that plant ashes vary within the same plant (Henderson 1988, 77). It would have been impossible for glassmakers to produce glass of exactly the same composition even if they wished to.

Another factor confusing the composition of glass is the use of cullet. Broken glass is re-used to reduce the melting temperature required for glass production, and save on raw materials. Cullet, in the form of broken glass vessels or blocks of raw glass, is known to have been imported from the Near East to Venice. In 1277 a treaty between the Doge of Venice and the Prince of Antioch arranged for broken glass to be delivered to Venice (Tait 1991b, 149). Raw glass varied in composition in a similar way to alkalis. Broken vessel fragments of glass from different origins would have been even more inconsistent, and may have produced a new batch of glass containing mixed alkalis. Theophilus refers to the production of coloured glass by melting down ancient coloured mosaic and vessels (Hawthorne and Stanley Smith 1963, 59). It has been suggested that the 9th century glassmakers of San Vincenzo in Italy used Roman glass as cullet, since the analysis of the 9th century glass found it to be a 'degenerate Roman type' (Hodges 1991, 76).

English glassmakers would certainly have re-used broken glass from previous batches. These would have consisted of similar raw materials. It is not certain whether broken vessels were collected from other areas, which would give rise to a more diverse composition. There is no evidence at present that this practice occurred in England, but it is possible (see p. 144).

Analyses of 'Aldrevandini' type enamelled glass demonstrate how glass compositions do not always correlate within the same style. For example, the beaker from Restormel Castle is enamelled on one side only (B20), while the beakers and goblet bowl from Foster Lane and Cheapside House in London are enamelled on both sides (B21; A14). The Foster Lane fragments are extremely similar in their composition, indicating that they are likely to have come from the same workshop and possibly even the same glass batch. However, the composition of the Cheapside House glass corresponds with the Restormel glass, not with the Foster Lane glass. All belong broadly to the group which have low soda, and high lime and silica. However, the Foster Lane fragments all have slightly lower soda and higher silica than the Restormel and Cheapside glass which have slightly higher soda and lower lime (Freestone and Bimson 1995). The anomalies between the two groups may be a result of different raw materials, workshops, or date. It is possible that the vessels were enamelled in a different workshop from where they were made. Late 13th and 14th century documents refer to 'painters of beakers'. If this is the case, the results are interesting. However, it remains hypothetical since we are unable to confirm this. Analysis of the enamels on these Venetian beakers shows that they are very similar in composition to Islamic

enamels. This may be the result of the Venetians importing their raw materials for enamels from the Near East (ibid.).

Medieval glass compositions are therefore extremely complex and variable. It is possible that there is even more variation in glass types made in particular areas than we are aware of. It is now clear that northern Italy produced both potash and soda glass. Although all the identified furnace sites in England are likely to have made only potash glass, it is not impossible that there were also small workshops which made soda glass using imported materials. It is hoped that lead isotope analyses will show us whether lead glass vessels could have been produced in England. Although scientific analysis is an extremely useful tool for identifying glass types by their alkali content, and challenging assumptions, it does not necessarily pinpoint the cultural area where the glass was made. Glass types appear too similar to distinguish different workshops by macroscopic examination, and the composition is too variable to do this by microscopic scientific analysis.

These different sources of evidence show many different aspects of medieval glass, including its production, distribution and use in medieval society. Although they all have their own particular strengths and weaknesses, they build up a more representative picture when used together. While this thesis is based on the archaeological evidence, the use of other sources enable the thesis to discuss the production and trade of glass, its distribution within society, its practical function, the social situations in which it would have been used, the value of glass to medieval society, and how all these aspects change between 1200 and 1500.

Chapter 3: A Survey of Medieval Glass Forms Found in England

This chapter consists of a discussion of the different glass forms of AD 1200 to 1500 found in England, broadly classified into eight sections, and their functions. The vessel glass from England includes an impressive range of the glass forms and styles manufactured in the rest of Europe and the Near East. The evolution of each form is outlined, with an overview of the variety of styles and their periods of production. The functions of each form are discussed, comparing the archaeological evidence with the documentary and iconographical sources.

Each class is subdivided into types which are described with references to parallels and possible production areas in Appendix 1. The complete catalogue and drawings are included in Appendix 2.

3.1: Stemmed Glasses: Goblets or Chalices

Robert Charleston reminds us that in glass studies 'it was long thought that stemmed drinking-glasses were an invention of Renaissance Venice, earlier glasses being in the form of tumblers' (1984a, 19). Although medieval examples lay dormant in museum collections in the late 19th and first half of the 20th century, they did not have secure dating evidence, and many had no record of where they were found. The solid stem and flared base of a colourless glass goblet from Nicholas Lane, London, now dated by style to the 13th to 14th century, was originally documented in the Museum of London as a fragment of the 17th century (A17.2; pers. comm. John Clark).

The term 'goblet' is intended as morphological rather than functional. However, the word has connotations of secular wine-drinking, even though the same form was also used for chalices (see pp. 50-51). The more objective term 'stemmed glass' may be preferable when referring to vessels which could have been used as goblets of chalices. However, there is no conclusive evidence that any of the stemmed glasses found in England were used as chalices, so individual stemmed vessels are referred to as goblets throughout this thesis. Nevertheless, the possibility that some may have served as chalices must be noted, and the class is given the generic term 'stemmed glasses'. 'Goblet' is also ambiguous in a European context, as the French term for beakers is *'gobletes'* (Foy and Sennequier 1989, 222), and the Italians refer to some types of stemmed goblets as *'bicchieri'* (Mentasti et al. 1982, 59).

England possesses an extensive range of the stemmed glass types manufactured throughout medieval Europe which includes potash, high-lead and soda glass. However, there is no evidence for the production of stemmed glasses in England. Nearly all of the different types of goblets exhibited in the recent glass exhibitions in Bonn/Basle and Rouen (Baumgartner and Krueger 1988; Foy and Sennequier 1989), are represented in England. One exception is the mould-blown mesh-patterned goblet, of which there is only one example from England, and even that displays differences (GA18). However, most of the glasses of this type were found in Metz, and the number concentrated in Metz perhaps give a misleading impression of their geographical frequency in Europe (Baumgartner and Krueger 1988, 250-9, Nos. 258-283). Some stemmed glass types are almost unique in England, such as the high-lead glass vessel with a solid decorated stem (A7). The colourless stemmed goblet with alternate blue and colourless trails from the Longmarket, Canterbury, is unique in having a stem (A12). Beakers of the same decorative style are found in Europe, but even these have a surprisingly high occurrence in London. Parallels are not yet known for the goblets from Clarendon Palace (A3) and Kings Langley (A15). The two colourless blue-trailed lids, and other possible green and opaque white glass goblet lid fragments from London

are unique examples of medieval glass lids in use before the 15th century in Europe (A17-19).

Although it is not known precisely when the manufacture of stemmed glasses of potash, soda and lead glass originated, they were certainly all in production by the late 13th century and continued to be made in the 14th century, the period in which they are found in their greatest quantities. There are no stemmed glasses which can be specifically dated to the later 14th and first half of the 15th century. There appears to have been a general change in the preference of drinking glasses, from stemmed goblets in the 13th and 14th centuries, to beakers in the 15th century. It is not entirely clear when this change occurred. The late 14th to mid-15th century is notoriously problematic for dating artefacts closely. This is partly caused by the increased rate of destruction suffered by later medieval urban layers, which are more vulnerable to post-medieval buildings with deep cellars and foundations. It is also partly a consequence of a reduced build-up of stratigraphic layers in this period, due to the re-use of stone-footings of buildings (Vince 1985, 64-8).

So although archaeological deposits cannot be closely dated, styles recognised as 14th century may have continued into the 15th century. Another possibility is that the styles generally recognised as late 15th century Renaissance vessels may have been in production earlier in the 15th century. A Venetian-style gilt and enamelled lidded goblet from Deblín in Bohemia, of a style which would usually be dated to the mid or late 15th century, has an inscription with a date of 1415 on the underside of the bowl (Tait 1979, 36, No. 23). This suggests that similar types could be dated earlier than they have been.

Few stemmed glasses of the 15th century have been identified in England (A16). Those that are known are highly decorated *façon de Venise* vessels, characterised by gilt or enamel decoration, in colourless or deeply coloured glass. They represent a completely different glass style from the 13th and 14th century. Their rarity and high degree of decoration suggests that they were perceived and used differently. Beakers were the most common drinking glasses of the 15th century. No green potash or high-lead glass stemmed glasses appear to post-date the 14th century.

The most common 13th to 14th century stemmed glass found in England is the mould-blown potash type, with prominent fins around the bowl (A1). Variations include those with solid or hollow, and plain or decorated stems. One example from London has blue rings hanging from the fins (GA14), a decorative feature inspired by Syrian glass beakers and goblets of the 8th to 13th centuries. Near Eastern drinkers apparently shook the rings which rang against the glass to attract attendants' attention when they wanted a refill (Atil 1981, 143). A similar type has prominent ribbing rather than fins around the bowl (A2). These are also the most widespread stemmed glass types in France, where they are characteristic of both consumption and production sites

(Foy and Sennequier 1989, 199-213). Furnace sites with evidence for the production of these types include Pérupt in the Argonne (ibid., 70). Potash glass was also made in Haute-Normandie, although there is no evidence of the products made there.

Green stemmed glasses with finned bowls feature in a number of 14th century French manuscript illustrations. Published examples include Last Supper scenes showing four green glasses in the 14th century Bible of Pierre Comestor (Foy and Sennequier 1989, No. 165, Pl. IX, Bibliothèque de la Faculté de Médecine de Montpellier) and one green glass in the Missale Tolonense of 1325-50 (ibid., 395). Four green glasses are shown in an early 14th century Life of St Louis (Harden 1975, 39, Fig. 11, Bibl. Nat. Paris), and two colourless examples are included in a Wedding Feast at Cana of 1393 (ibid., Fig. 12, Bibl. Nat., Paris).

In England, ribbed and finned green glass goblets are concentrated along the southern coast, at Southampton, Exeter, Poole, Glottenham (Sussex), Ludgershall (Wiltshire), and London, with one example from Kirkstall Abbey in Yorkshire. Other potash glass types decorated with trailing and mould-blown trailing have been found at Clarendon Palace near Salisbury, and Winchester (A3-4). Further north, potash goblets are also known from Dublin and Waterford in Ireland (pers. comm. Edward Bourke), and Rattray Burgh in Aberdeenshire (Graves 1993).

Colourless goblets with blue-trailed decoration are also well represented in England (A8-13 and 17). The goblet found in 1991 in the Longmarket, Canterbury has already been referred to (see p. 47). A large number of blue-trailed goblets of various styles have been excavated in London, suggesting that the trade of glass of this style was concentrated there. These types are found more widely across Britain than the potash stemmed glasses. Further examples have been excavated in Nottingham, Boston, Hull, Beverley, all on the east coast, and Exeter and Southampton on the south coast. The significance of the distribution is discussed in Chapter 4 (see pp. 116-9). Another colourless type is represented by a fragment probably from a stemmed vessel (A14), painted with enamel decoration similar to the enamelled beakers which are thought to have been made in Venice (B20-21).

High-lead glass is perhaps the most interesting compositional type of glass, partly because it was not recognised that it was produced in medieval western Europe, until the late 1980s (see p. 9). Donald Harden and Robert Charleston both believed that the lead glass goblets from Old Sarum and Knaresborough were made in c. 1400 or the early 15th century from soda glass (Harden 1975, 39; Charleston 1984, 24). This appeared to be an acceptable theory at the time, since the bright colours and hollow stems with mould-blown ribbing on some of the high-lead glass vessels were comparable to 15th century Venetian-style goblets, which also included coloured vessels with hollow ribbed stems (e.g. Tait 1979, Pl. 2-5). A good selection of these northern European stemmed glasses have been found in England. The distribution pattern of lead

stemmed glasses in England is wide, with fragments from Knaresborough and Old Sarum castles, Bedford, Southampton, Lincoln, York, Durham and London (see pp. 116-7). These were not simply products traded in the local catchment area by the merchants on arrival in ports, as much of the potash glass seems to be, but higher class objects which travelled long distances to reach specific customers or which customers travelled far to purchase. This pattern is comparable to the enamelled beakers of types B20 and B21, some of which appear to have been commissioned by specific customers, and are found on geographically diverse sites across England and Europe. It is not certain up when the production of high-lead glass vessels ended. They are sometimes found in 14th or 15th century contexts, but these are likely to be residual, since they were valuable vessels which may have been passed down the generations.

In 1966 Harden described the lead stemmed glasses from Knaresborough and Old Sarum castles as 'chalices', partly because very few stemmed glasses had been excavated by that date, and these vessels were consequently regarded as particularly rare medieval artefacts, which may have had a symbolic value (Harden 1966, 607). It is now accepted that stemmed glasses were in common use as secular goblets. However, consideration must be given to whether any of the stemmed glasses found in England might have been used as chalices. It is very difficult to distinguish between the two functions from the archaeological contexts in which the glass was found. No English examples have been found in specifically liturgical contexts from which they could be identified as chalices, such as in a tomb, or bricked up in a church, or in association with a paten. Most of the stemmed glasses from this survey were found in rubbish pits with other domestic and kitchen waste, implying that they were purely domestic.

A 14th century glass chalice and paten were found in a stone tomb in the Church of St Genest, Nevers, France, in 1832 (Foy and Sennequier 1989, 359, No. 401, Pl. VIII). The chalice was made in a style also used for stemmed glasses which have been found in domestic contexts, such as the stem of a goblet from Toulouse (ibid., 216, No. 168) or the high-lead glass vessel from Nicholas Lane in London (A7). Other glass chalices include an example from a 12th to 13th century tomb in Liège (Baumgartner and Krueger 1988, 239, No. 230), and a 14th or early 15th century style chalice and paten, conserved in the Cloisters Museum, New York (Foy and Sennequier 1989, 359). There were religious bans on the use of glass for chalices, as documented in the Congress of Reims of 813, and on other occasions up to the 14th century (Thorpe 1949, 79). Practices were not banned unless they had taken place. Other documents permitted the use of glass chalices. A letter written by Aelfric to Archbishop Wulfstan in 1006 instructed that chalices should be made of a fusible material, gold or silver, glass or tin, not of horn or wood (Whitelock, Brett and Brooks 1981, 292, No. 46, v. 161-2). However, there is no further evidence for glass chalices in England after this date, although they were certainly used in France in the 14th century.

The association between chalices and goblets is explored further in Chapter 5 (see pp. 146-7 and 152). The secular goblet appears to emulate the chalice in form, and in the way that it was used communally and for drinking wine. For example, a single stemmed glass is depicted in a Last Supper scene in front of Christ (Foy and Sennequier 1989, 395), suggesting its use as a communal vessel. There are also two finned beakers on the table suggesting that the goblet was no ordinary drinking vessel, but had a special importance. Whether consciously or subconsciously connected with the Eucharist, stemmed glasses seem to symbolise the power and authority of the host.

Most of the published pictorial evidence in which stemmed glassses are seen is from France, and we should not assume that they had the same significance to society in other parts of Europe. The glasses depicted are the ribbed/finned potash type, and it may be that they had more importance in France because they were made there, and thus were of greater importance to French society. It is also in France that archaeological evidence for chalices has been found (see p. 50).

There are very few documentary references to the use of goblets or chalices, and the rare examples do not always specify the material they are made from or whether they were stemmed or not. A Venetian sumptuary decree of 1299 forbids wedding gifts 'except "pladenate" or goblets' (Newett 1902, 261). Whatever material these goblets were made of, medieval documentary and pictorial references imply that this form had a symbolic, perhaps ceremonial significance. One medieval glass goblet provides evidence that these vessels were used on ceremonial occasions. The Deblín lidded goblet, from a castle and village estate near Brno in Bohemia, has two diamond-engraved inscriptions on it. One, in Czech, under the foot, is translated 'Praise the Lord and drink cool wine to the health of the masters (lords) of Deblín' (Tait 1979, 36, No. 23, Pl. 2). The other, in Latin under the foot, reads 'Let everyone drink from this, in the year 1415'. Historical documents show that the castle, village and overlordship of Deblín were sold in 1415, and it is probably this occasion which is being commemorated. It may have been made in Venice for one of the Bohemian nobility to celebrate that event (ibid.). The Knaresborough Castle high-lead stemmed glass had two different rim fragments with it, which may represent a pair of ceremonial vessels, such as betrothal goblets (GA30-32). 15th and 16th century Venetian-style betrothal goblets were certainly made in glass, and enamel-painted examples depict the couple (Tait 1979, Pl. 5, Nos. 22-23).

3.2: Beakers

A beaker is defined in this thesis as a vessel whose height is greater than its rim diameter, with either a vertical, or slightly everted wall, of a suitable form for drinking from. The classification of the beaker form is similar for different periods in the history of glass and other materials. Lith and Randsborg in their study of 'Roman Glass in the West' define beakers as 'always higher than they are wide and generally considered drinking vessels' (1985, 420). Martin Millett in his study on the classification of Roman pottery also describes the beaker as 'a vessel whose height is greater than its rim diameter; and which is of suitable size and shape for drinking from', although there was a grey area in his study between the definition of beakers and jars (1979, 37). The general shape of the medieval glass beaker is uncontroversial. However, problems may occur in its identification when only a fragment of the rim, body or base survives, since many features overlap with other glass forms. In a few cases, a goblet bowl may be identical in appearance to a beaker of the same style, but with a flattened rather than a kicked base and mounted on a stem (e.g. A12 and B16 are comparable in style).

This standardisation of the classification of the beaker form is perhaps partly because we have a modern analogy to relate it to. The beaker is one of the simplest forms to make, using only one paraison of glass, which allows it only a limited amount of variation and makes its definition easier. Although the ratio of height to width includes some variation, the principal diversity of the 'beaker' is in its decoration. However, the terminology that has been used for this class is not as standard, but can cause confusion. The French term these vessels as 'gobelets' (Foy and Sennequier 1989, 222), and Harden referred to them as 'goblets', meaning drinking vessels in general (Harden 1975, 36). They have also been called simply 'cups' (Davidson 1940, 311). It should be noted that despite general agreement in the definition of the medieval beaker form, there are 12th to 13th century vessels also referred to as 'beakers' which have a rounded body and an inverted rim (Baumgartner and Krueger 1988, 107-8, Nos. 50-2). That form is classed as a 'bowl' in this thesis (C1-2), since the inverted rim changes the function of the vessel from being an open 'tableware' to a closed 'container'.

Beakers are one of the most diverse categories of medieval glass found in England. They were in use from the 13th century to the late 15th to early 16th century, and continued into the post-medieval period. Those found in England include examples manufactured in Syria and Egypt, western and Mediterranean Europe, and possibly England herself. They include gilt and enamelled Islamic glass, bright yellow and opaque red high-lead glass, and many types of European soda and potash glass with enamelled, mould-blown, blue-trailed and prunted decoration, as well as undecorated types. It would be misleading to discuss the distribution and social significance of beakers as a uniform group, as the different types must have had different social and

economic values. This contrasts with goblets which are concentrated within a much shorter period, the late 13th to mid-14th century, with a few Venetian-style examples in the later 15th century.

The earliest beakers found in medieval England are the 13th century Islamic gilt and enamelled types, including the 'Luck of Edenhall', and fragments from Abingdon and Swan Lane in London (B18-19). It is not certain when these vessels actually arrived in Britain. The 'Luck of Edenhall' was never buried, but has remained in the systemic record. It has a leather case dated to the 14th century, which has been the proposed date of its arrival in the West. The Abingdon beaker was excavated from a pit with mixed pottery of the 13th to 15th centuries, and it is not certain when it was deposited. The Swan Lane fragments are from late 13th to mid-14th century deposits. It is sometimes suggested that these and fragments of other Islamic glass vessels were brought back to England by Crusaders, but it is also possible that they were available through trade in western Europe (see Chapter 4, pp. 119-121).

The colourless enamelled beakers with scenes painted in coloured enamels of the late 13th to mid-14th centuries (B20-21) were influenced by these Islamic beakers in style and technique. Carl Lamm went as far as to suggest that they were made in Syria by Frankish glassmakers, and termed them 'Syro-Frankish' (see pp. 5-6). This remained a popular theory until it was shown from documentary evidence that they were made in Venice. Inscriptions on the beakers naming the glass-painters matched the names of the glass-painters recorded in Venice and Murano (see Vol II, p. 26). These beakers have been found, usually singly, at various high-status sites across England including Launceston and Restormel castles, Dale Abbey, the College of the Vicars Choral in York, Southampton, and Wolvesey Palace in Winchester (the residence of the Bishop). The two beakers from Launceston and Restormel are catalogued under a different type, since the techniques used for painting the glass are slightly different, and the beaker flares more widely towards the rim (B20). They are perhaps closer to the Islamic beakers which inspired them, than the more western style of B21. The most significant deposit of these beakers, however, was excavated from a goldsmith's pit in Foster Lane, London. This was situated in the main goldsmiths' quarter off Cheapside, and nearby the present Goldsmiths' Hall, a renowned trading area of the medieval City. Strong evidence that this property was owned by a goldsmith was provided by fragments of crucibles with traces of silver in them. The same pit contained at least fifty fragments of enamelled beakers, representing approximately six to eight vessels. It has been suggested that a goldsmith was working on the group, perhaps fitting the beakers with gold or silver mounts (Clark 1983, 152-3). This was a technique applied to Islamic gilt and enamelled beakers, and 12th century cut glass 'Hedwig' beakers, which were mounted in precious metals and used as reliquaries in other parts of Europe (Foy and Sennequier 1989, 191, No. 123, Pl. XII; Baumgartner and Krueger 1988, 90-95, Nos.

37-9). Alternatively, the goldsmith may have been applying gilt decoration to the designs on the surfaces of the beakers. The Islamic beakers which influenced these enamelled beakers additionally had gilded decoration, but European examples are outlined with yellow enamel lines rather than gilt. It has been suggested that the beakers from Restormel and Launceston originally had gilt applied on top of the brown outlines (Baumgartner and Krueger 1988, 155), but there is no further evidence that these European enamelled beakers were gilded. While the beakers may have been connected with the professional work of the goldsmith, the pit also contained other domestic glass, including a hanging lamp, and pottery of 1300-50, so the group could have belonged to the goldsmith. He may have purchased the glass for his own use, although goldsmiths were not necessarily prosperous (Cherry 1992, 14), or perhaps received it as a gift from one of his wealthy patrons (ibid., 67-69). A property excavated in 1991 in the Longmarket, Canterbury, is known to have been occupied by Theoric the Goldsmith in c. 1200. It is not certain whether a goldsmithing member of his family still owned the site in the late 13th century, from which date a variety of fine glass was excavated (Rady 1991, 17-18). It included a blue-trailed goblet and fragments of Islamic gilded vessels. There was some connection between goldsmiths and glass, whether it was their own wealth and lifestyle which enabled them to purchase glass, or whether they worked on the glass for their clients.

Painting colourless glass with brightly coloured enamels was an ideal way for medieval Europeans to make use of fashionable decorative designs including coats of arms and other heraldic devices, mythological and Christian scenes. This subject matter was also used on vessels of precious metal, and by using similar decorative designs glassmakers enhanced the value of their glass by making it appeal to the customers of precious metals (see pp. 146-7). For example, close similarities can be seen in the design of religious figures flanked by columns found on enamelled beakers (B21.3; Baumgartner and Krueger 1988, 133, No. 79), which are also common on Limoges enamelled metalwork, such as a casket from Cassan Priory in southern France now in the Musée Languedocien in Montpellier. The devices used in the background decoration are also comparable, such as the trefoil and heart-shaped foliage seen on many glass beakers (e.g. B21.1), paralleled in the decoration of contemporary enamelled precious metals, such as the silver lid of a Parisian cup of c. 1300 (Cherry 1991b, Pl. 36), or a late 12th century Limoges casket with a scene of courtly love (ibid., Pl. 72; BM MLA 1859.5-10.1).

At first impression, the decoration on these enamelled beakers appears to be unique for each vessel, with personal coats of arms, and inscriptions declaring the name of the craftsman, such as '*Magister Bartolameus Me Fecit*'. This implies that the beakers were commissioned from eminent craftsmen, which would require connections and wealth. However, a closer examination of the excavated examples shows that there

are a number of repeated subjects, and most of the beakers follow a similar formula, the designs being divided up by foliage or columns below an inscription band. In the Foster Lane group there are at least two identical beakers which depict haloed figures flanked by columns, both of which were made by Bartolemaus (GB67-68), and similar designs have been found elsewhere in Europe. Most beakers appear to be 'off the shelf', belonging to a series of similar designs, rather than personal commissions. However, some may have been commissioned, as they were painted with coats of arms which were probably specific to their customer. Many of the coats of arms are Germanic, including one on a Foster Lane beaker, which shows a wolf over a 'lobed object' (GB64). In nineteenth century German heraldry a comparable design of a wolf on a mountain can be found, which may refer to the name 'Wolfsberg' in the area south of Augsburg, or a pun on the name 'Wolfstein' (pers. comm. John Clark). The coat of arms on the 'Aldrevandini' beaker in the British Museum has been identified as Swabian (Tait 1979, 16). Perhaps heraldry was in general in greater use amongst the nobles of Germany, serving a function in a struggle for power at the time. It has been suggested that many characteristics of Teutonic heraldry were 'by-products of the loose political organisation of the Holy Roman Empire with its comparatively weak central monarchy and powerful local authorities' (Woodcock and Robinson 1988, 16-18). Civic arms developed in Germany from the 12th to 13th centuries, as many towns were semi-independent (ibid.). However, some of the heraldic symbols and coats of arms may not have been specific, but used as general decoration (see pp. 147-8). Some of these beakers were in the systemic record for a long period of time. Those from Launceston Castle and Wolvesey Palace were both found in contexts with 15th to 16th century pottery, by which time they would have become 'antiques' by a modern analogy, and by implication, highly valued.

Colourless glass beakers with blue trailing of the 13th to 14th centuries were made in the same areas as the goblets of that style already discussed, including southern France, Italy, and Italian workshops in other areas such as Corinth (see pp. 29-30). More examples of beakers of B16 are known in London than from any other European town. Blue-trailed colourless goblets are also extremely well represented in London, and it would not be a great surprise if it was discovered that these goblets were made in an Italian workshop in London, but there is no evidence for this at present. Another blue-trailed beaker has been excavated from Winchester (B17).

A few examples of 13th to early 14th century high-lead glass beakers have been found in England, but as in the rest of Europe, goblets of high-lead glass were more common drinking vessels (Baumgartner and Krueger 1988, 163-5, Nos. 120-6). They include a yellow beaker with yellow and blue trailing from a late 13th to early 14th century pit in Nottingham, and rim fragments with yellow trailing, probably from a beaker, from Kirkstall Abbey. Kicked bases of a size most likely to come from a beaker

have been found at Old Sarum, and two from Trig Lane in London (B7). The only example of opaque red high-lead glass from England is the base section of a beaker from Ludgershall Castle, from a 14th century pit (B8).

Prunted beakers have not been as widely found in England as elsewhere in Europe, although the various stages of their evolution from the 13th to 16th century are represented. These include six colourless beakers with small shallow prunts from various parts of England from Christchurch in Dorset to Lincoln (B13), and a similar greenish glass example from London (B4). Cruder blue-green Germanic examples with large prunts have been found in Nottingham, London and King's Langley (B5). The colourless beaker with smoothed drops from Gloucester (B14) has no close parallels, and it is possible that this is a rare example of an early stage of the prunted beaker, preceding the 13th century examples of type B13. These beakers were all imported, and made in various Mediterranean areas. It is surprising, given the large number of the 15th century green prunted beakers found in Germany, that so few are found in England.

Plain undecorated beakers of a very simple form were made in soda and potash glass in many different areas, probably including England. They have few diagnostic characteristics, and so they are difficult to attribute to a particular production area. They are found from the late 13th century and throughout the 14th century (B9). In the later 15th century green Germanic examples usually have a characteristic high thin kick (B6). Colourless squat beakers are common in 15th century Italian paintings, and a few examples have been found in London (B9). However, these undecorated beakers do not make up a particularly large percentage of medieval vessel glass, which would superficially be expected by their frequency in contemporary pictorial representations. In the 14th and 15th centuries it is this form which is most commonly found depicted in Italian paintings and miniatures, often accompanied by glass flasks with long narrow necks and pedestal bases. It is likely that this form acted as a simple idiom for glass, preferred by artists and illustrators because it was easier to draw than any of the decorated styles. These beakers may have been more familiar in Italy, but the glass styles popular in England were not necessarily the same.

Related to this undecorated form are beakers of a similar shape, but with optic-blown decoration. These are divided into examples with ribbing, and those with geometric patterns. The technique used was first to blow the glass into a mould with the decoration impressed on the inside, and then to remove it from the mould and 'free-blow' the vessel to soften the patterns. This usually results in the pattern being more dispersed towards the rim, with more clearly defined moulding towards the base. Potash glass beakers with ribbing are found from the early 14th century onwards (B1-2), and colourless glass examples with optic-blown oval decoration have been excavated from 14th century and 15th century contexts in Southampton and London (B10). In the later 15th century variations of this form were introduced, including the shaping of the

beakers in polygonal moulds which have been found in German glasshouses, shown by a ribbed example from Norwich (B3). Other optic-blown beakers had a high folded foot (B11). Many variations of mould-blown beakers are included in this survey, their differences making it difficult to order them into a neat classification, but they are all basically made by the same method and by glasshouses in all areas of Europe.

From the mid-15th century many glass vessels, including beakers, had gilt and enamel decoration. Angelo Barovier (who died in 1460) is credited with bringing the art of gilt and enamelling to great heights in the 'golden age' of Venetian glass, although his sole importance is now questioned (Tait 1979, 26). The connection between the 15th century gilt and enamel vessels, with the enamelled glasses of the late 13th to mid-14th century (B20-21) is not certain. There does not appear to be any continuity between the two, and it is not known why the use of enamel was abandoned in between. Very few 15th century examples have been excavated in England, with fragments only from London, Hull and Christchurch included in this survey (B22-23). It is possible that much of the excavated glass has been attributed to the 16th century, when this style remained popular. A large group of glass including gilt and enamelled vessels from Upper Bugle Street in Southampton has been dated to the early 16th century, although some of the styles may have been present in the late 15th century.

Although beakers were primarily made to be used as drinking vessels, other functions are attested in the medieval period. Contemporary iconography has shown the use of beakers as flower vases in the 15th century. Examples include the undecorated beaker in Crivelli's painting of 1491 *The Virgin and Child with Saints Francis and Sebastian* (National Gallery, NG 807), with similar examples in Crivelli's other paintings. A ribbed example is shown in a miniature of c. 1485-90 by the Master of Mary of Burgundy, depicting the Adoration of the Magi, from a Book of Hours (Bodleian Library, Douce 219, fol. 145v.; Harden 1975, 42-3, Fig. 22).

In Germany, a number of beakers have been found which were used as reliquaries in the medieval period. A sealed prunted beaker was found in the Church of St Maria in Brigels containing a consecration proclamation dated to October 1486, with the seal of Johannes Theodorici, Bishop of Tripoli and various pieces of fabric (Baumgartner and Krueger 1988, 337-8, No. 403). Other examples have also survived in Germany (ibid., 339-40, Nos. 405-7; 370-2, No. 458). In Germany, these beakers must therefore have been imbued with some importance and status to have been used as the receptacles of valued relics. Reliquaries were made in a range of materials, from enamelled and gilded metals such as Limoges caskets (Alexander and Binski 1987, 225, Nos. 87-8), to the cheap pewter ampullae containing 'Canterbury water' believed to be tinged with Becket's blood, and used for miraculous cures. The ampullae were hung up in churches on return from pilgrimage, so were perceived as valuable, even if they were not intrinsically so (ibid., 218-9).

In England there is no evidence that any glass beakers were used as reliquaries. There are documentary references to other glass vessels being used for this purpose, such as a glass flask containing the blood of St Thomas the Martyr which was listed among the relics of a church in Durham, and 'a glass bottle in which is contained the oil of Saint Mary of Sardenaye' recorded by the Kalendar of the Treasury of Exchequer in 1345. A small flask resembling part of an hour-glass, with 15th century parallels in Germany, was found 'in a prepared cavity' in Anstey Church, Hertfordshire and contained blood (Charleston 1984a, 35). Chaucer also refers to a glass reliquary in which the Pardoner kept 'pigges bones' (Benson (ed.) 1987, 34, General Prologue, line 700). However, the surviving evidence suggests that this tradition was much more common in Germany than elsewhere in Europe. It is possible that if it was taking place on a larger scale in England, the reliquaries would have been destroyed during the Reformation, unless they were intrinsically valuable in their own right, which glass beakers were not.

In the later 14th and 15th centuries, the archaeological and iconographical evidence demonstrates that beakers became more popular drinking vessels than goblets. Drinking vessels also changed from being shared communally to being used individually, and this is discussed in Chapter 5 (see pp. 152-6).

It is not certain whether any beakers of potash glass were made in England. Cylindrical beakers with an applied base ring have been found on at least two 'Early' glasshouse sites in the Surrey/Sussex Weald, although the definition of 'Early' goes up to c. 1550, and some could have been manufactured in the early 16th century (Kenyon 1967, 90). Nevertheless, since other English forest glass vessels were in production in the medieval period there is no reason to suppose that beakers of forest glass cannot have been made in England, even if they were considered inferior to the more highly decorated and colourless imported tablewares.

By the late 16th century glass beakers were certainly being made in England, with fragments from 'Late' Wealden sites, and the glasshouses at Hutton and Rosedale in Yorkshire where archaeomagnetic readings have dated the final furnace firings to c. 1575-1600 (Crossley and Aberg 1972). However, English forest glass beakers, although used on a large scale, were still considered second rate to cristallo 'Venetian' glass, which was also made in London from 1567. William Harrison in his *Description of England* of 1586 wrote:

> It is a world to see in these our days, wherein gold and silver most aboundeth, how that our gentility, as loathing those metals (because of the plenty) do now generally choose rather the Venice glasses, both for our wine and beer.....The poorest also will have glass if they may; but, sith the Venetian is somewhat

too dear for them, they content themselves with such as are made at home of fern and stone. (Charleston 1984a, 50; 1972, 144)

3.3: Bowls

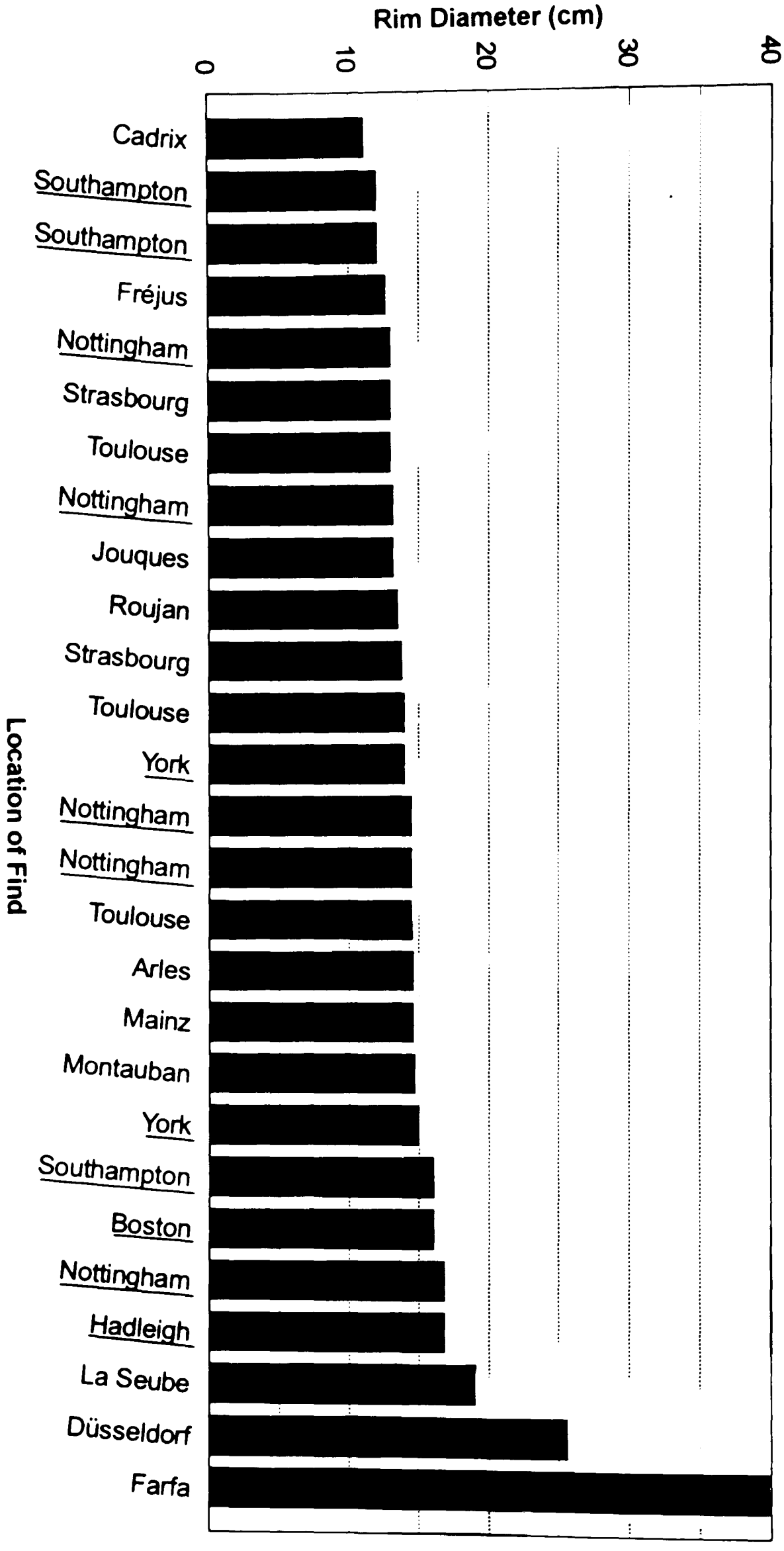
The categorisation of bowls is more problematic than other classes of medieval glass. In their study of Roman glass in the West, Lith and Randsborg describe a bowl as 'an open-shaped vessel with its diameter always greater than its height'. However, this is confused by their classification of dishes as 'open-shaped vessels which are about as high as wide or slightly wider than their height' (1985, 417 and 420). In the Southampton glass report, the same vessels are referred to both as 'small bowls' and 'cups' (Charleston 1975a, 204, Nos. 1488, 1490-5). The inconsistency in classifying the bowl form is partly due to the confusion in identifying its function. Unlike goblets and beakers, bowls have many possible different functions.

Three bowls dating to the 12th to 13th centuries are included here (C1-2). These would not be classified as bowls by Lith and Randsborg since they are not 'open' forms, but have inverted rims. However, compared to other medieval glass forms they are closer in their characteristics to bowls than to any other class. A potash glass bowl with an inverted rim from Beverley with trailing below the rim is a Germanic type. Similar vessels from Germany and France have been found in ecclesiastical and funerary contexts (Baumgartner and Krueger 1988, 108-9, Nos. 50-2; Foy and Sennequier 1989, 171-2, Nos. 98-99), and the Beverley fragment was probably originally from the Minster or Priory, although it was found in levelling deposits in another part of the town (see p. 113). Green glass trailed flasks of the 12th to 13th century (D8) are similar in their decorative style and production area to these bowls. They are also found in religious contexts. They were used as church vessels, and were sometimes buried in graves. A comparable vessel form is included under type C2, consisting of two colourless bowls with inverted rims, blue trailing and colourless prunts from a 12th to 13th century context at Drayton Bassett, and unstratified from Old Sarum. The contexts are domestic rather than religious, and they therefore appear to have had a different function from type C1, perhaps closer to 13th and 14th century bowls.

The remaining bowls of the 13th to 15th centuries have an open form, except for type C12. The bowls of the 13th and 14th centuries are the most numerous. They include colourless bowls with an S-shaped or hemispherical profile, with colourless or blue trails or prunts, or mould-blown ribbing (C3-7). Their scale varies enormously. Figure 2 shows the rim diameters of all the bowl rims from types C3-7 in England, and from those types which were included in the exhibitions of medieval glass shown in Bonn and Rouen. The smallest bowl, from Cadrix in southern France, has a rim diameter of 11.1 cm. The rim diameters of the bowls are concentrated within the range 11 cm to 16 cm, but some also increase gradually up to the size of the largest bowl from Farfa Abbey in Italy, which has a rim diameter of 39.8 cm. There is no clear division into different types on the basis of their size, which may represent different functions,

Figure 2

Rim Diameters of Glass Bowls



Key to Figure 2: Rim Diameters of Bowls

Cadrix	Cadrix (furnace site), France
Bayham	**Bayham Abbey**
Southampton	**Southampton, High Street C**
Fréjus	Fréjus, France
Nottingham	**Nottingham: Drury Hill, Weekday Cross and Bridlesmith Gate**
Strasbourg	Strasbourg, France
Toulouse	Toulouse, France
Jouques	Jouques, France
Roujan	Roujan, France
Arles	Arles, France
Mainz	Mainz, Germany
Montauban	Montauban, France
York	**College of the Vicars Choral, the Bedern, York**
Boston	**Boston Dominican Friary**
Hadleigh	**Hadleigh Castle**
La Seube	La Seube (furnace site), France
Düsseldorf	Düsseldorf Museum (findspot not known), Germany
Farfa	Farfa Abbey, Italy

The data used for this chart was taken from bowls with surviving rims from the exhibitions of medieval glass in Bonn and Rouen (Baumgartner and Krueger 1988, 282-5; Foy and Sennequier 1989, 231-7), and from England (C3 to C7). This was considered an unbiased selection, since the two catalogues chose the exhibits on the basis of their variety of form and decoration, not scale. All bowls with known rim diameters from England were selected. The bowls from England are shown in bold or underlined.

such as 'bowls' and 'cups'. This suggests that they were produced as a related functional group, although their consumers may have used them for different purposes.

The function of these 13th to 14th century bowls is particularly controversial. All bowls of this date are made of colourless glass, from Mediterranean regions. No green potash glass or high-lead glass bowls have been found in England. A greenish glass bowl excavated recently in Mainz is a very rare example of a northern European bowl (Krueger 1994). This suggests a function associated with Mediterranean rather than northern European culture. The most probable use for the bowls was for table service. They may have contained Mediterranean spices, or other condiments such as salt or dried fruit. The similarity of their decoration to contemporary stemmed goblets and beakers suggests that the bowls were used to complement other tablewares. Medieval iconographical depictions of glass bowls are rare, but one example is a French panel of the Last Supper repainted in the 15th century (Foy and Sennequier 1989, No. 298, Pl. XXII). This shows two bowls, possibly made of glass, at either end of the table, with vertical ribs, a flange below the rim, and three rounded feet. The type can be compared to types C4 and C6 which have vertical ribbing. The glass beakers on the table are numerous enough to suggest individual use, but the bowls are shared by each half of the table. This supports the theory that they held condiments such as salt or spices. Danièle Foy rules out their use as containers for foodstuffs on account of their small size (ibid., 397). However, spices would have been used in limited quantities, and the smaller bowls would have been ideal for one household, while the magnificent Farfa Abbey bowl could have served a larger number or larger foodstuffs such as dried fruit or sweetmeats. In Southampton, Nottingham and York, two or more of these bowls were found in the same deposits, indicating that multiple bowls may have been used by these consumers, which could have provided enough condiments for a number of people.

It is not thought that the bowls were used as drinking vessels. Wooden drinking bowls were widespread in the medieval period, but drinking vessels of higher class materials such as ceramics, metals and glass included stemmed goblets and beakers, but no examples of bowls. Glass bowls would be impractical to drink from, and the Farfa bowl would certainly not have been possible to drink from on account of its size and its outsplayed rim. Another use for bowls at the table was as basins for hand-washing. Water was poured over the hands into the basin, and the hands would then be dried with a cloth. However, these basins needed to be large and sturdy, such as the French bronze gemellions in the British Museum (Cherry 1991b, 39, Fig. 49). Alternatively, smaller bowls of water might have stood on the table, to be used as 'fuddling cups' for swilling the fingers. However, these glass bowls are too small and fragile for this purpose.

Danièle Foy compares the profile of bowls of type C3 with the bowls of hanging lamps (E1), and suggests the possibility that they may have been used as standing oil lamps for the table (Foy and Sennequier 1989, 397). In ceramics, it has similarly been

proposed that 15th century 'lobed cups' were impractical for drinking from, and may have been used as lamps, with their wicks held in position by the lobes (Barton 1992, 249). While this is a possibility for glass bowls, it is considered more likely by the author that they were used as serving containers on the table. Open lamps containing oil would have easily spilt. The bowls were designed with a kicked base and base ring, intended to stand on a surface, so it is most unlikely that they were used as hanging lamps. The rich households in which glass bowls were used would have imported exotic spices and other foodstuffs consumed in small quantities.

The bowls of type C3 are the most common type, imported from southern France and possibly northern Italy. An examination of their distribution in England provides important evidence for the trade routes of glass in the 13th and 14th centuries. Bowls with blue trailing combined with colourless drops were all found on two sites in Nottingham, from a 13th to 14th century context. However, bowls with only blue trailing show a different pattern, having been found in large quantities in 14th century contexts at Southampton, and other southern sites. Another bowl, with a blue lens on the base, was also found in Nottingham. A research visit was made to southern France to examine the colourless glass with blue trailing excavated from four glass furnace sites. The fragments also showed a distinction between the decoration which combined blue trailing and colourless drops, which was found at the 13th century furnace site at Planier, and that which had blue trailing only, found at the three 14th century furnace sites of Rougiers, Cadrix and La Seube (see Vol II, pp. 33-4). Bases with blue lenses were also found at the 14th century sites. The dating of the two slightly different styles may suggest that the bowls were imported into eastern England, reaching Nottingham, in the 13th century, but in the 14th century this trade moved to the south, particularly Southampton. However, markets were retained on a smaller scale in the east, since a 14th century bowl with a blue lens was found in Nottingham. This trading pattern is consistent with the documentary evidence for a shift in the main trade route from east to south England from the 13th to the 14th century (see pp. 118-9).

Other less numerous bowls of the 13th and 14th centuries include hemispherical bowls with blue and colourless prunts or mould-blown ribs of types C6 and C7. An interesting blue glass bowl from York (C8), with black painted decoration of a six-pointed star within a circular border, has its closest parallels in French Gothic designs, but there is no direct evidence for where it may have been made (see Vol II, pp. 36-7). Glass with similar decorative designs has been found in Victoria Street, London (D21), and Weoley Castle near Birmingham (H1), but no glass parallels are known from the rest of Europe. Two small bowl fragments from Boston and Winchester have undiagnostic traces of gilt or enamel decoration (C9 and C10).

The remaining three fragments come from bowls of the 15th century Venetian Renaissance style, when a change in the style of glass bowls occurs. They include

highly decorated vessels with gilt and enamel, millefiori, mould-blown or deeply coloured decoration. The forms include dishes or stemmed tazzas, and small bowls meant for decoration rather than practical purposes. The fragments found in England include a colourless rim from Hull from an open bowl, possibly a stemmed tazza (C11). A millefiori vessel from London, with small pieces of coloured cane which resemble small flowers marvered onto the pale blue body, comes from a mid-14th to mid-15th century context (C12). This is interesting since it is usually stated that millefiori glass was not made until the late 15th century (see Vol II, pp. 37-8). Its inverted rim and exotic decoration make it likely that this was a decorative rather than a practical vessel. A blue mould-blown bowl from Bayham Abbey was similarly probably decorative (C13). Bowls, like other glass tablewares, decline in their quantity and range of styles in the 15th century.

3.4: Jugs, Flasks and Bottles

At least twenty-five different types are represented in this class, which combines jugs, flasks and bottles. Very broadly speaking, all the vessels here are suitable for holding and pouring liquids, which usually have a 'kicked base' enabling them to stand on a table or other flat surface. However, potash glass flasks with narrow necks, and undecorated or wrythen-ribbed bodies, which could also be included in this category, are discussed in Section 3.6 with wide-necked flasks including urinals. This is because they have more overlapping features with wide-necked flasks than with the diverse types found here.

Jugs, flasks and bottles are grouped together since it is rarely possible to discern the entire reconstruction of the vessel from excavated fragments, and their features overlap. The basic body form of these three types can be identical. It is the handle, the lip, and the capacity to seal the mouth, that differentiate them. Ivor Noël Hume also discusses these types collectively in his article 'Mediaeval Bottles from London' (1957).

Many descriptive names have been given to the types within this class, which reflect the diverse uses of containers and serving vessels. These include the flask (e.g. Charleston 1984a), decanter (Frothingham 1963), carafe (Foy and Sennequier 1989), ampulla (ibid.), costrel (Museum of London), bottle (Noël Hume 1957), pilgrim-flask (Charleston 1974), phial (Charleston 1984a), jug (ibid.), kuttrolf (Foy and Sennequier 1989), gourde (ibid.), flacon (ibid.), burette (ibid.), and sprinkler (Pinder-Wilson 1991).

This distinction, between serving and storage, is that which most scholars have used to distinguish a flask or jug from a bottle. For example, Lith and Randsborg in their study of 'Roman Glass in the West' classify flasks under Tableware, as 'Vessels with a neck, but without handles...' (1985, 424). A jug is a similar or identical form to a flask, but in addition has a handle, and does fundamentally serve the same purpose as a serving flask. Lith and Randsborg classify jugs under Tableware: 'All elaborate handled vessels with a neck are classified in the category jugs'. On the other hand, bottles are classified under Storage Vessels: 'Because of their shape, square, hexagonal, rectangular, and some cylindrical or barrel-shape handled vessels with a neck are fit for the storage and shipping of liquids' (ibid.).

A jug refers to a handled vessel used for serving liquids. Some jugs have a pouring lip, while others do not. This does not mean that they are not intended for pouring, since the handle clearly indicates that they are, but that a lip was not regarded as essential for pouring. Late medieval pottery handled jugs can also be found with and without pouring lips (e.g. Vince 1985, 47, Fig. 15). Many glass flasks serve the same function, but have no handle. Two types have a pouring lip (D6-7). Since the jugs or flasks in this category are made of bright yellow or red high-lead glass, colourless glass, or decorated green glass, they can be classed as decorative. Many would been used as

tableware, for serving wine and other liquids. Manuscript illustrations also show that flasks were sometimes drunk from directly, as can be seen in a late 14th century Italian tavern scene (BL, Add. Ms. 27,695, fol. 14; Platt 1976, 97, pl. 76). However, some flasks may have also been used for general household purposes, storage, transport of valuable liquids, or for medical purposes.

A bottle may be defined as a container intended for storing or transporting liquids, with the capacity to seal the neck. The physical characteristics clearly overlap with flasks and jugs. The only way in which a bottle can be distinguished from a flask, is by having a seal. Of the vessels in this category, only the small blue Byzantine bottles (D23), the small phials (D11), and possibly the 'pilgrim-flask' (D12) can certainly be described as 'bottles' for storing and transporting liquids, rather than flasks for pouring liquids. The seal would be made of a material other than glass, since glass on its own is not suitable as a secure seal. Very few examples of stoppers have been found. They were probably made either of an organic material such as cork or wood that does not survive, or metal that would have been re-used. A few stoppers have survived in decorative vessels that have never been buried, such as a German kuttrolf now in the Corning Museum of Glass. This was fitted with a stopper made of cork, covered with a metal mount (Baumgartner and Krueger 1988, 320-2, No. 382). However, it is not entirely certain that the stopper was made at the same time as the flask. Stephen Moorhouse's research into the documentary evidence for the uses of vessels, has disclosed a number of temporary sealants used for glass vessels during the preparation of medical and other recipes. These include 'clay and horse-dung', 'wax', and 'fresh grease' (Moorhouse 1993, 147-8, Nos. 9, 10 and 12).

One of the problems of archaeology is highlighted by the bottle stopper. If the stopper was made of a material other than glass, unless it was recognised as belonging to the glass flask in the same context on site, it would probably have been separated into its relevant material for finds processing and storage and the two elements are unlikely ever to be reconciled. Not all excavations are published or archived in a way that the glass researcher can access the other finds from that context which are related. Since it is not possible to ascertain whether the vessel was sealed or not from its form, it is rarely possible for the archaeologist to determine whether it was used for serving from, or for storing or transporting liquid.

Medieval documents reveal that, in France, glass containers of a large capacity existed, such as a 'dolium vitrium ad tenendum oleum' recorded in Provence in 1426 (Foy and Sennequier 1989, 301). This would almost certainly have been used for storage, since serving flasks beyond a certain size would not have been practical.

There was more than a purely functional difference between the vessels used for tableware, and those used for storage or transport. They were perceived differently by their consumers. Those for the table were for display, and conveyed messages about

social status and wealth. By contrast, storage or functional vessels would not be seen, so were more likely to be undecorated and less valuable. The quantities of glass flasks with decoration from England suggest that they served an important role amongst serving or tablewares of the late medieval period. The narrow-necked flasks of Types F5-6 may have been used for storage, since they were made of green glass, with either no decoration, or wrythen ribbing.

Other flasks or bottles had more specialist functions. Trailed flasks of Type D8 have been found in religious contexts in England and Germany, and may have been used as reliquaries and for other liturgical functions. The use of glass flasks as reliquaries is indicated by documentary references, described in Section 3.2 (see pp. 57-8). Type D12 has been described as a 'pilgrim-bottle', since the form, with a flat body and handles, was originally developed in other materials such as leather, for pilgrims to carry water. The glass form would not have been practical for this purpose, but examples have been found in tombs in France (see Vol II, pp. 43-4). Its association with pilgrimage may have prompted its use as a reliquary. Small phials similar to Type D11 have also been found in religious contexts in France.

Some of the smaller 'bottles' or 'phials' may have held medicines or cosmetics, the equivalent of the Roman 'unguentaria', or post-medieval apothecaries' bottles. Traces of toilet powder have been found in some Roman unguentaria (Lith and Randsborg 1985). This form therefore did not necessarily hold liquids. Small 'medicine' bottles are recorded as being imported from Venice at the end of the 14th century, but the form of these is not known (Noël Hume 1957, 107).

Stephen Moorhouse refers to monastery records which document the use of glass bottles to store the large quantities of ink used (Moorhouse 1993, 140). These would need to be of a material that was impervious to ink. In reality, it is likely that different people used the same form of vessel for different purposes, and many vessels were multi-purpose.

A form which was imported into England from Germany was the 'kuttrolf' (D13). This flask had a neck made of usually two or four tubes twisted around each other, joining an undivided body. Liquids poured more slowly from kuttrolfs, but the specific type of liquid used is not certain. A form with a similar function found in other parts of Europe was the 'burette', dating from the 12th to the 14th century (Foy and Sennequier 1989, 252-4). These vessels had a long thin spout for pouring oil and other liquids used in small quantities. However, none have been identified from English sites. 'Sprinklers' were a speciality of the Near East and the Islamic world. These had a tapering neck with a small hole at the end, so that liquid poured very slowly. They were used for perfumed water, for personal grooming, and Muslims, Christians and Jews also used them for ceremonial functions (Atil 1981, 141). Their use in London, where six have been excavated, may have been for the functions referred to by eastern

Mediterranean immigrants or visitors, or the attractive form may have been adapted for a slightly different use by Londoners.

Flasks, jugs and bottles are found through the whole period from 1200 to 1500. The styles change throughout the period, consistent with the changing decorative styles found on other glass tableware including goblets and beakers. Twelfth to 13th century types are dominated by eastern Mediterranean vessels, including Islamic gilt and enamelled flasks (D22), small blue or manganese bottles with gilt and enamel decoration (D23), and green and blue glass sprinklers (D24). There are a few examples of potash glass trailed flasks and jugs as early as the 12th to 13th century (D2.1, D8). Many of these have been found in religious contexts, at a time before glass vessels were widely used in secular England.

The 13th and 14th centuries have a greater selection of decorative types. These include high-lead glass jugs and flasks decorated with applied trailing, produced in north-west Europe in the 13th to early 14th century (D5). Green glass jugs include undecorated types, and examples with green or opaque red trailing, and are also north-west European (D1-2). Other jugs are made of opaque red or blue glass (D3-4). It is not certain whether any of these jugs were still in production in the 15th century. There are no jugs imported from Mediterranean areas, where tradition preferred glass flasks without handles. There is one example of a Mediterranean colourless glass flask with blue trailing, which has a pouring lip (D7). A probable English green glass ribbed flask also has a pouring lip but no handle (D6). Flasks or bottles of the 13th and 14th centuries include greenish glass flasks with hexagonal optic-blown decoration (D10), or a bulge in the neck (D15). Colourless Mediterranean glass flasks are found a frilled trail around the neck (D17), and early examples with blue trailing of a form with a long narrow neck, bulbous body and pedestal base (D18), which was to become more common in the 14th and 15th centuries. More exotic flasks include a greenish glass 'pilgrim flask', with a flattened body and small handles on the neck (D12), and a colourless flask body with blue medallions marvered on to the sides, painted in gilt or other pigments with a shield and heraldic birds and beasts, which may be French Gothic (D21).

There is less variety amongst flasks of the later 14th to 15th centuries, although they are more numerous. The finest are the colourless flasks with narrow necks, bulbous bodies and pedestal bases, imported from the Mediterranean, which are particularly common in Italian paintings of the 15th century. They are either undecorated, or have optic-blown ribbing or a bulge in the neck, influenced by 13th century Islamic flasks which often had external folds in the neck (D19-20). This neck fold may have originally served a practical purpose, to attach a cover or seal. It is interesting that all except one of these flasks was found in London, presumably where they were shipped in, and did not become a common fashion in England. Other flasks

of this date include a greenish neck with spiralling trails (D16), opaque red glass flasks (D14), and Germanic 'kuttrolfs' with necks created from twisted tubes (D13).

By the 15th century, although flasks were traded around Europe, there appear to be strong regional traditions in each area, with the majority of flasks made of the locally produced glass. In Italy, colourless flasks with long narrow necks and bulbous bodies, accompanied by a squat colourless beaker, are extremely common in contemporary paintings (Stiaffini 1991, 252-255). In Germany, the biconical bottle and the kuttrolf of forest glass dominate archaeological assemblages (Baumgartner and Krueger 1988, 316-325). English flasks are dominated by the undecorated and ribbed narrow-necked flasks included in class F (F5-6), with a few trailed bases included here (D9). The local character of the flasks suggests that glass flasks were no longer used as high-status tablewares as they had been in the 13th and 14th centuries. The fashionable flasks of the 15th century may have been made of other materials, such as pewter or higher value metals (see p. 140).

3.5: Lamps

With the exception of an Islamic lamp from Knaresborough Castle (E2), all the glass lamps found in medieval England are locally-made hanging lamps (E1). These are made of green potash glass, comprising a long narrow hollow stem with a rounded base, which widens at the top to form a wide bowl with a vertical or slightly everted rim. The problems in identifying lamp bowls are discussed in Appendix 1 (see Vol II, p. 53). The bases of the stems are easily recognised. These lamps were suspended by a variety of methods which are discussed below. Fragments of one hundred and seven hanging lamps have been found in archaeological deposits dating from the 13th to the 16th century, from a variety of sites across England.

It is necessary to look to other countries for the ways in which hanging lamps may have operated, although English methods may have been slightly different. In their survey of early Byzantine and later glass of lamps from the Near East, Crowfoot and Harden claim that all types 'were and are lit by means of oil floating on water' (1931, 207). Some glass lamp fragments were described as having an 'oily feel', such as those from Karanis (ibid., 197). However, none of the English lamp fragments can be described in this way, and residue analysis cannot be carried out since glass is non-porous. Research carried out on the use of glass hanging lamps in Angers in France revealed ecclesiastical documents which recorded the use of nut and olive oil for the lamps in the Church, while animal fats were probably used in domestic lamps (Comte 1989, 343). The type of oil used probably depended on what was available in each region. Materials used for wicks may have included flax, hemp, wool, or cotton (ibid.). Some of the Byzantine lamps surveyed by Crowfoot and Harden incorporated a vertical glass tube attached to the base inside the lamp to hold the wick in the centre of the oil. Again, there is no evidence for these in any of the English lamps. The Byzantine lamps in which they occur have a beaker or bowl shape, with no narrowing of the base (Crowfoot and Harden 1931, Pl. XXVIII). The narrow stem of the English hanging lamps may have been sufficient to hold the wick in position. Lamps are usually shown in manuscript illustrations as hanging by a harness of three chains, either singly, or a number of lamps in a row on a pole (Foy and Sennequier 1989, 353-5, No. 398-400). Where the position of the harness is visible, it is placed around the underside of the bowl (ibid., 354, No. 399; Matthews 1983, 151). Glass lamps of different forms found in the Near East show an alternate method of suspension. They were placed singly in a pierced metal circle, or grouped together in a polycandelon of many metal rings (Crowfoot and Harden 1931, 207).

In France, glass hanging lamps have been found placed in medieval tombs with their accessories. These include the metal chains by which the lamps hung, and the clips which secured and sometimes also regulated the height of the wick. Both were found in

the tomb of Bishop Hardouin de Bueil of Angers (died 1439) (Comte 1989, 343-4). Lamp chains have only been recognised from one site in England. Some copper alloy and iron chains were excavated from a deposit from Billingsgate Watching Brief in London, although no glass lamps were found at the site (pers. comm. Geoff Egan). This stresses the importance of looking at artefacts from the same context together, rather than dividing the different materials between separate specialists, after which it is unlikely that they will ever be reconciled. The use of experimental archaeology to establish the logistics of the use of glass lamps is advocated in Chapter 6 (see p. 162).

The source of influence and the earliest date of production of English hanging lamps is uncertain. Glass hanging lamps of a similar form are found in the eastern Mediterranean in the Byzantine period, such as those from 5th to 8th century Jerash, and 9th century Samarra (Crowfoot and Harden 1931, Pl. XXIX, Nos. 24-6, 29-30). They have been found in France as early as the 8th to 9th century at Villiers-le-Sec (Foy and Sennequier 1989, 346, No. 388), and are more common in the 12th century, for example at Rouen and Angers (ibid., 346-9, Nos. 389-91). No examples which can be dated before the 13th century have been excavated in England.

However, manuscript illustrations provide earlier evidence for the use of hanging lamps in England, although they were made pottery as well as glass, and it is not usually possible to tell what material the lamps in these representations are made of. A Latin Psalter of c. 1200 depicts a lamp hanging over the altar in a scene of the Martyrdom of Becket (BL, Harl. 5102, fol. 32; Charleston 1991, 259, Fig. 118). A 12th century manuscript from St Alban's depicting Hugh of St Victor teaching, shows a similar lamp (Bodleian Library, Oxford, Ms. Laud. Misc. 409, fol. 3v.; Matthews 1983, 151). McCarthy and Brooks cite a depiction from a copy of the Utrecht Psalter dating to c. 1180-90, as being a pottery hanging lamp, although it is impossible to confirm this from the illustration (Bibliothèque National, Paris, Ms. Latin 8846; McCarthy and Brooks 1988, 117). 'Spiked' pottery hanging lamps, of a very similar form to glass lamps, but with a solid stem, were common in England from the 12th century onwards (Barclay and Biddle 1990, 987).

Although glass lamps have not been excavated from 12th century deposits, this period is notoriously obscure for all glass vessels, and it may simply be that they have not been found. The existence of glass hanging lamps in France in the 12th century, and the familiarity of the form in manuscript illustrations suggests the possibility of their existence in England in the 12th century. It seems likely that hanging lamps of glass would have been preferable to those of pottery by those who could afford the more expensive material. The glass lamps would have produced more light, as well as having a greater capacity than the pottery lamp with its solid stem. However, it is not certain whether the amount of light and the length of the burning time were important issues,

and a pottery lamp might have been quite sufficient, as well as being cheaper and more robust.

There is evidence from various furnace sites in the Surrey/Sussex Weald that hanging lamps were produced there during the medieval period. These sites include Blunden's Wood, which has been dated to the 14th century, Chiddingfold, Wephurst, Gunter's Wood and Hazelbridge Hanger (Kenyon 1967; Wood 1965). It is probable that these widely used vessels were also produced at other glass furnace sites across England, although less research has been done on furnace sites outside the Weald. There is no way of assessing whether any of these lamps were imported from other areas of Europe which made similar potash glass lamps. French lamps vary much more in their shape (Foy and Sennequier 1989, 346-351, Nos. 388-396) than the very uniform profile of the lamps found in England.

Section 3.3 has discussed the suggestion that the colourless bowls with blue-trailing with an S-shaped profile may have been used as standing table lamps, and considers this improbable (see pp. 63-4). A fragment from Ludgershall Castle may have come from the finial of a Mediterranean-style hanging lamp (H4). These colourless glass lamps, common in Italy, often have a rounded ball finial at the base of the stem, as two examples from Murano show (Stiaffini 1991, 197, Fig. II, 6-7). There is no other evidence for this Italian-style lamp in England. Two miscellaneous potash glass rim fragments from York which may come from an unusual form of lamp are discussed in Section 3.8 (H20; see p. 94).

The single imported lamp of a different type is the Islamic lamp from Knaresborough Castle (E2). This is made in the same form as the more familiar gilt and enamelled mosque lamps of which many are preserved in museums (Atil 1981, 134-7, Nos. 52-3). The Knaresborough lamp is an undecorated version of this type, originally with a flared funnel neck, a rounded body with three handles, and a pedestal foot. It may have been suspended by the handles, or stood on a surface. Whether the Islamic glass found in England was the result of Crusaders' souvenirs, gifts or trade, is discussed in Chapter 4 (see pp. 119-121).

Almost half of the total quantity, and the largest concentrations of glass hanging lamps excavated in England were from monasteries. Lamps had a particular importance in the Church. They had a ritual significance in both the Islamic and Christian religions. The 'Verse of Light' from the Koran (XXIV, 35) appeared on all enamelled lamps made for use in mosques: 'God is the light of the Heavens and the Earth: His light is as a niche in which is a lamp, the lamp in a glass, the glass as it were a glittering star' (Honey 1946, 50; Atil 1981, 120). Most of the iconographic evidence shows hanging lamps being used in an ecclesiastical setting, usually hanging above altars. Medieval documentary sources demonstrate that the hanging lamp had an important place at the tombs of martyrs, saints, and important ecclesiastical dignitaries. Comte quotes

examples including an early Christian treatise by St Jerome in the 4th century who encouraged the use of lights to 'honour' martyrs' tombs, as well as a description of a glass lamp over the tomb of Martin of Tours in the 6th century. Glass hanging lamps are depicted over the tombs of St Denis in a manuscript miniature of the 13th century, and of St Catherine in an engraving of the 15th century. There are records of the oil maintenance costs of a glass hanging lamp in the chapel where Bishop Guillaume de Chemillé of Angers was buried in the 13th century (Comte 1989, 344-5). In excavations of medieval tombs in France, glass lamps are often found in the tombs of the more important ecclesiastical figures, lit during the funeral ceremony and thought to have still been burning as the tomb was sealed (ibid., 343).

Light was also important in other areas of the monastery. Chapter 22 of the 'Rule of St Benedict' instructs 'Candela jugiter in eadem cella ardeat usque mane' ('There shall be a light burning in the dormitory throughout the night' (McCann 1952, 70-1)), and it is possible that this light was provided by glass lamps, since they were in common use in monasteries. Two hanging lamp bases were found at St Alban's Abbey were found in a pit which was thought to be associated with the guest house, rather than any other area of the abbey (pers. comm. Birthe Kjólbye-Biddle).

The archaeological evidence shows that glass hanging lamps were also common in domestic use, being found in town and manor houses. It is surprising that so few glass hanging lamps are found in castles. A hanging lamp is shown in domestic secular use in an early 15th century French manuscript in the British Library. This shows a King and Queen in bed. Above the bed is a canopy from which various items hang, including a hanging lamp, although it could be either glass or pottery (BL, Burn. 257, fol. 27). This suggests that glass hanging lamps were suitable for use by European royalty. Perhaps the upper nobility preferred more exotic lamps such as the Islamic lamp from Knaresborough Castle, or alternatives such as candles which were notoriously expensive, although it is not known whether glass lamps were more or less costly. Very few medieval depictions of feasting scenes show the lighting arrangements in the hall. In the later 15th and 16th centuries we sometimes see candles. A manuscript of this date from the British Library shows two candles in candlesticks in front of the host (BL, Ms. 24098, fol. 19v; Black 1992, frontispiece). Lighting may not have been shown because it was not a table feature, but could have been mounted on walls or suspended from ceilings.

Research by Simon Ellis shows how lighting was used in the Roman home to create appropriate atmospheres for reception rooms (Ellis 1994). Lighting could be used as a status symbol, and focused light on the most significant areas of the room such as the apse in which the dining table stood. These lighting effects may well have also been applied to the medieval house, especially when entertaining, and used to perpetuate social differentiations of status. Social differentiation is often illustrated in the medieval

hall by reference to the dais platform on which the high table stood (see p. 147). The fire, and large windows, were also situated at the high end of the hall, with less important guests at the opposite end. Artificial as well as natural light may have been focused on the host at the high table, as the superior area.

Relatively little research has been conducted into the alternatives for lighting. Barclay and Biddle in their study of the development of lighting in Winchester demonstrated the decline of pottery lamps in around 1300, and concluded that the possible reason for this decline was the increased use of candles. Since there was no apparent reduction in the cost of wax candles, which were hitherto a luxury item, they suggested that the increase was in the use of tallow candles. They suggested that a possible explanation for the stimulus behind the change included 'a growing awareness of the danger and relative inefficiency of (pottery) oil lamps'. However, glass oil lamps continued in use into the 16th century, so this seems unlikely. Another factor may be the innovative use of cotton instead of flax wicks, which made tallow candles more efficient (Barclay and Biddle 1990, 990-1). Cotton allowed an 'intense and steady light' and is said to represent 'a major shift in illumination' (Mazzaoui 1981, 102).

Since fragments of only two glass lamps survived in the excavations of Biddle's *Winchester Studies*, Barclay and Biddle do not consider the role of glass lamps in the development of Winchester's lighting. Glass lamps only get a fleeting mention in the section on lighting (Barclay and Biddle 1990, 984), and are catalogued separately, with the other glass under Vessels (Charleston 1990). Glass hanging lamp bases have been found at a number of other sites in Winchester, including Westgate, the Brooks, and Parchment Street. The evidence of glass lamps suggests an alternative possibility, that pottery lamps could have been superseded by glass lamps. Due to the poor survival rate of forest glass it is impossible to attempt a study of the proportion of glass used in relation to other lighting materials during the medieval period. However, it can be confirmed that glass hanging lamps were in use by the 13th century, and remained widely used until the 16th century. The use of candles may have increased, but they were by no means the predominant form of lighting after 1300.

The latest examples of potash glass hanging lamps date to the 16th century. It is interesting that they go out of use at a time when glass becomes much more common in the archaeological record, and other functional forest glass types such as the urinal, flask, alembic and cucurbit continue to be used into the 17th century. The change may be due to new, preferable methods of lighting. Another factor may be that with the dissolution of the monasteries and such fundamental changes in the liturgy of the Church, such as the abolition of chantries and destruction of much imagery, the purpose of these lamps became defunct. They also disappeared from secular domestic contexts in the 16th century. Perhaps the production of glass lamps was no longer viable without

the major custom of the Church, or it was no longer fashionable to use an artefact associated with the obsolete liturgy of the old Church.

3.6: Wide- and Narrow-Necked Flasks including Urinals

The catalogue for this class contains the largest number of vessels in the survey, totalling a maximum of six hundred and twenty-three. It includes green glass flasks with wide and narrow necks. They have either kicked or convex bases. The rims and bases generally survive detached from the body of the vessels, since the body glass is usually thin and breaks and decomposes more easily than the thicker rims and bases. Although most wide-necked flasks originally had convex bases (F1), and most narrow-necked flasks had kicked bases (F5-6), these stereotypes cannot always be applied. Wide-necked flasks are also found with kicked bases (F2), and there is evidence that some narrow-necked flasks may have had convex bases (see p. 82). Although narrow-necked flasks of types F5-6 have similarities with flasks of class D, they are included here since the forms overlap in terms of the identification of fragments. Some of the undecorated green glass kicked bases catalogued here may have come from flasks or jugs of class D. Convex 'base' fragments may also come from the rounded domes of alembics (G1).

The wide and narrow necks of the flasks imply different functions. It is not only the scale of the rim diameters which distinguish between their uses. The wide-necked vessel usually has the rim everted outwards to form a horizontal plane, and is turned up at the extreme edge. This design makes the vessel impractical for pouring liquids, but the upturned edge prevents liquids held in the vessel from being split easily. It is therefore designed to contain rather than to pour liquids. However, the wide aperture prevents them from being sealed easily, so they are not practical for storage or transport. Narrow-necked flasks, however, have a slightly everted rim which makes them practical for pouring liquids, and they can also be sealed.

However, the different functions are not clear cut between wide- and narrow-necked flasks. Wide-necked vessels with convex bases are recognised as the classic 'urinal' form, and were widely used as uroscopy vessels. However, they also had other industrial purposes, such as the preparation of medical, herbal and alchemical recipes (see below). Illustrations sometimes show narrow-necked flasks with convex bases, which may have had similar purposes, although no vessels of this combination have been identified in England.

Most of these green glass flasks are made of English potash glass. Fragments of these types have been found on English glass furnace sites, for example in the Surrey/Sussex Weald. Flasks and urinals were manufactured in the same style from the 13th until the 17th century (Charleston 1984a, 33). They become more numerous in the archaeological record in the 15th century. The composition of the glass changed, with more lime added from the end of the 15th century, but no distinction can be made by visual examination alone. The dating of the contexts in which they were found has to be

relied upon. Similar flasks and urinals were widely used across Europe, but there would be no reason to import them if they were readily available in England. However, two vessels are imported. A convex base from Swan Lane in London (GF491) was found on analysis to be made of soda glass (Mortimer 1991). A flask/urinal excavated from Salisbury Friary (GF18) has a profile much closer to Italian flask/urinals than any English examples. It narrows very little in the neck area, and the rim is only slightly everted. Similar flask/urinals from Italy include a 14th or 15th century excavated vessel from Tuscania (Stiaffini 1991, 227, IV, 1). One of the many illustrations is found in a painting by Domenico di Bartolo in S. Maria della Scala in Siena, dating to 1440-1 (ibid., 229, Fig. 1). These flask/urinals may have belonged to foreigners, such as Italian merchants travelling to work in England for a while and bringing their personal effects including their uroscopy vessels with them. However, imported Mediterranean urinals may have been preferred by the more discerning since soda glass was often more transparent than English glass, an important factor in uroscopy, where the colour of the contents of the flask was diagnosed.

Uroscopy, the examination of the colour of the urine, was the principal method of medical diagnosis in the medieval period. A clear description of this practice is given by William Vaughan in his 'Fifteen Directions to Preserve Health' of 1602: 'at nyght make water at least once and cast it out; but in the morning, make water in a urinal; that by looking on it, you may ghesse somewhat the state of your body' (Robbins 1970, 400). A 14th century poem affirms the same practice in the medieval period:

> He wol wagge his urine in a vessel of glaz,
> And swereth that he is sekere than evere yet he was...
> (Robbins 1970, 399)

Medical knowledge was based on the theory of the four humours: air, fire, earth and water, and their corresponding bodily fluids: blood, choler (yellow bile), melancholy (black bile), and phlegm (Rawcliffe 1995, 33). The body was understood to be strongly influenced by astrological factors, and illness was seen as an imbalance of the bodily humours. This was reflected in the colour of the urine, where the superfluous humours were excreted (Robbins 1970, 399).

The rounded convex base and thin glass of the urinal was necessary for unimpeded observation. The wide neck was necessary to allow for a sample to be provided easily. A translation of the treatise of Isaac Judaeus illustrates the importance of a clear view throughout the liquid:

> There are three positions of the urine, bottom, middle and top. The bottom begins at the lowest part of the urinal flask and extends to the breadth of two fingers: the middle position begins when the lowest part stops and extends to the circle which lies at the top: and when there is froth at the top, it indicates wind or inflation or some other ailment of the lungs.
> If the circle is thick, it indicates excessive pain in the head...
> In the lowest position there are sometimes small, sandy particles, and then it means that the patient is suffering from stone. If the sediment is black, this is poisonous matter expelled by the urine and is a sign of death... (Talbot 1967, 133)

The range of colours of urine are shown in an illustration from the 15th century 'Tractatus de Pestilentia' by Albik, now in Prague University Library (Foy and Sennequier 1989, Pl. XXIX). This shows twelve glass urinals with different coloured contents, and the diagnosis for each colour. There are many other medieval scenes of patients with doctors examining their urine in a glass urinal. A mid-15th century French *Proprieté des Choses* depicts five physicians around a table consulting a book, and examining urinals made of glass with a greenish tint with yellowish contents (BL, Aug. vi, fol. 66). Numerous Middle English prose urinologies exist, some of which have illustrations of 'jurdones', the urinal form. Up to twenty-eight different colours of urine have been documented from medieval manuscripts (Robbins 1970, 399).

Uroscopy was introduced to the Islamic world from Greek and Roman texts preserved in the eastern Mediterranean, such as works by Galen, Hippocrates and Aristotle (Talbot 1967, 133). These manuscripts were collected by the Arabs, one depository being the 'House of Wisdom' in Baghdad in the 8th and 9th centuries, and translated into Arabic (ibid., 24). The medieval study of medicine spread across Europe from the 12th century onwards, partly as a result of increased contact with the Muslim world. One of the earliest centres of western medical learning was Salerno in Italy, where a collection of translations including the 11th century Latin translations of Constantine the African, a monk of Monte Cassino who had travelled extensively in the East, became available.

However, it was not until the 13th century that the material evidence of uroscopy vessels can be seen from archaeology and documentary references in western Europe. The flask/urinal form is found throughout the period in western Europe from the 13th to 15th centuries, and continues with no differentiation in the form until nearly 1700 (Charleston 1984a, 33). The glass urinal became the symbol of the doctor across medieval Europe, including the two doctor-saints Cosmas and Damian, stressing the central importance of uroscopy to medicine (ibid.).

A large number of wide-necked flask/urinals, most commonly their rims or convex bases, have been found on sites across England (F1, F3 and F9). In common with all other glass forms, no flask/urinals have been excavated from less wealthy sites. Given the importance of uroscopy in medieval life, it is likely that many of these were used as urinals. They were the most common vessel glass form, and equally common on monastic sites, in castles, manors and town centres. Documentary evidence records that Edward I (1272-1307) possessed 'duo urinalia vitrea' (Thorpe 1935, 83).

Since uroscopy was central to medieval health, a urinal would have been an essential for anyone who could afford it. There is very little evidence for the prices of glass urinals. The few references that exist imply that they were comparatively cheap to those with a disposable income (see p. 144). However, the possession of a glass urinal implied other costs. Graduate physicians were few in number, and were consulted at a price. It is claimed that there were only sixty in the 15th century (Robbins 1970, 408). They were of high social standing and expensive. Chaucer describes his 'Doctour of Phisik' as dressed in luxuries: 'In sangwyn (red) and in pers (blue) he clad was al, Lyned with taffata and with sendal' (General Prologue, lines 439-440; Benson (ed.) 1987, 30).

While the wealthy may have been able to afford to visit a trained physician, presumably taking their own urinal in its wicker case, it is most unlikely that the less wealthy could. If they did consult a less expensive, non-graduate 'leech', or a monastic infirmary, perhaps uroscopy vessels would have been borrowed there rather than purchased especially for the occasion. Access to doctors appears to have increased by the 15th century. Medical manuscripts were originally written in Latin for the graduate physician. However, the Singer *Survey of Medical MSS in the British Isles* shows a dramatic increase in the number of medical documents in Britain in the 13th century, continuing to increase in the 14th and 15th centuries, particularly in Middle English (Robbins 1970, 393). For example, the treatise *De Urinis* of Isaac Judaeus (died c. 932), was translated into English as *The Dome of Urines* in 1377 by a Dominican Friar, Henry Daniel, who dedicated it to his friend Walter Ketton, a secular professional physician. It appears in several Middle English manuscripts (Talbot 1967, 187; Robbins 1970, 399). There was a significant difference between the Latin texts written for the graduate physician with far more scholarly detail, and those written in Middle English providing for the un-Latined practitioner.

Most 15th century physicians were not university trained. Medical knowledge was available to a wider section of the population now that it was being simplified and translated into Middle English. Medical practitioners may have included workers in the monastic infirmary and others who had been taught there, barber-surgeons, apothecaries, local wise women, and 'leeches'. Each large household probably had its own basic medical equipment. Chaucer's Dame Pertelote taught herself the fundamentals:

> Though in this toun is noon apothecarie,
> I shal myself to herbes techen yow
> That shul been to youre hele (health) and for youre prow (benefit)
> (Nun's Priest's Tale, lines 2948-50; Benson (ed.) 1987, 255)

Monastic communities each had their own infirmary, and also maintained hospices for the sick and lepers as a Christian duty and a contribution of the medical education they had received. However, monks and canons were forbidden to practice surgery from the mid-13th century onwards, and physicians were employed by them in some cases. In c. 1420, Norwich Cathedral Priory employed Master Mark, a graduate physician, expressly 'for the examination of urine' (Rawcliffe 1995, 49). The Infirmarer's accounts record an increase in the purchase of glass phials and urinals in 1400 (ibid). This rise in the importance of uroscopy in the 15th century is reflected in the increased number of excavated flask/urinals in England.

A typical 15th century collection of vernacular English medical documents belonged to an untrained practitioner, John Crophill, of Wix near Harwich (BL, Harley Ms., 1735). Amongst the handbook which includes diagnosis, prognosis (days for favourable treatment) and treatment, is a list: 'Here (be) the men and women that I, John Crophill of Wykys, hath scen hare uryn and don curys unto hem and medsynnys thoro the grace of god and houre lady and the holy gost'. This is followed by one hundred and fifty names from the surrounding towns and villages, with receipts, illustrating that he was not as expensive as the graduate doctor, but still reasonably costly. At Otley, he received five shillings and eight pence from Richard Armigard and twenty pence from William Marriot (Talbot 1967, 190). Although the increase of doctors and medical knowledge in the 15th century appears to have corresponded with a growth in the numbers of flask/urinals found on archaeological sites, they remain restricted to the more wealthy sites, and show no evidence of having filtered down the social scale by 1500.

By the 15th century there is evidence that the urinal was transported and stored in a cylindrical basket with a cover and handle. A monks' medical lecture from an early 15th century French manuscript shows two round-based urinals with two cylindrical containers with lids (BL, Royal E III, fol. 36). A urinal, with a narrower neck than is usually shown, and wicker case are also seen in a scene of a patient with two doctors, from a late 15th century Flemish treatise (BL, Royal 15 E II, fol. 77v; Black 1992, 129, Fig. 57). Patients could send a messenger to the physician with their filled urinal for diagnosis (Talbot 1967, 139). It is not known from what date carrying cases were used for urinals. Wicker baskets do not survive archaeologically. They continued in use in the post-medieval period. At Westminster, Henry VIII had 'vii cases of wicker twoo of

them p(ar)telye guilte w(i)th vii brode mouthed Urynalls in theym w(i)th laces of thrid (thread) to eache of theym' (BL, Harl. 1419, fol. 147v; Charleston 1984a, 33). A series of wood engravings made in 1587 entitled *The Medical Professions* by Hendrik Goltzius show the glass urinal accompanied by its wicker case (Zigrosser 1985, Nos. 30 a and b). An early 16th century painting *St Luke painting the Virgin and Child* by a follower of Quinten Massys, shows a flask and alembic on a shelf, and two wicker baskets hanging on the wall below (National Gallery, NG 3902; Dunkerton et al 1991, 139). It is likely that these held urinals, and the presence of all these items symbolises St Luke as a doctor.

The 'urinal' had a different function from the 'jordan', which it is often confused with. The 'jordan' could be made in a variety of materials, usually pottery, and may have included glass although it was not necessary, and it did not require a rounded base. These vessels were used as chamber pots, as well as to collect urine which had many uses in the medieval world, including as an agent in cloth-making, tanning, a solvent in glass illumination, and medical and veterinary recipes (Moorhouse 1993, 129; McCarthy and Brooks 1988, 116).

Research by Stephen Moorhouse has revealed documentary and pictorial evidence for various industrial uses of the flask/urinal form, including the preparation of herbal, alchemical and medical recipes. It cannot be assumed that all wide-necked vessels with convex bases were uroscopy vessels, so they are catalogued as flask/urinals. A 15th century recipe for vermilion requires the use of 'a good thick jordan of glass' and 'another glass jordan whose mouth is almost as large as the other' (Moorhouse 1993, 147, No. 9). The scribe has illustrated a vessel of urinal form in the margin. Other chemical illustrations show diverse glass vessel forms with rounded bases, with various shapes of neck and body. Many of these have never been identified archaeologically (ibid. 1993, 141; BL, Harley 2407, fol. 108). Wide-necked vessels have been excavated with convex (F1) and kicked bases (F2).

It is difficult to distinguish whether a wide-necked vessel was used as a urinal or for industrial purposes by examining whether there was any distilling equipment in the same context to suggest industrial use. Physicians and apothecaries who used distilling equipment to make herbal, alchemical or medical preparations, probably also practised uroscopy. Urinals are often listed together with distilling items. Chaucer, in the 'Canon's Yeoman's Tale', lists:

> ...sondry vessels maad of erthe and glas,
> Oure urynales and oure descensories,
> Violes, croslets and sublymatories,
> Cucurbites and alambikes eek...
> (lines 791-4; Benson (ed.) 1987, 273)

The inventory of 1494-5 of John Plumtre, a Nottingham 'potycarye', also known as John Fezicion (physician), states: 'Be hit hade in mynde that y left with John'a Dammys in the Castelle', and follows with a list including two glass stills, crucibles, a galipot, a furnace with an iron grate, a pair of bellows, a 'double-glass', four pounds of copper and two urinals (Records of the Borough of Nottingham 1882, 284). This still fails to answer our question whether these urinals were used for uroscopy, or industrial preparations. John Plumtre is also referred to in 1503 as a grocer with a shop in the Drury Hill area of Nottingham, near the Weekday Cross market. Flask/urinal fragments have been excavated at Drury Hill, Middle Pavement and Weekday Cross in Nottingham, but if they were originally owned by doctors, they could have been used for either purpose.

The terms used to describe pottery vessels in medieval documents are notoriously vague (Moorhouse 1993, 127-8), and it is likely that references to glass forms were equally ambiguous. A 'urinal' might indicate a uroscopy vessel, a chamber pot, or a vessel of another function which is of the general shape of a urinal. Scribes evidently sometimes felt that it was necessary to illustrate the vessel form recommended in specific recipes, and drawings are occasionally found in manuscript margins (ibid. 147).

Another earlier use for the wide-necked glass form, as a consecration vessel, is suggested by a 12th century wallpainting in Pittington Church, County Durham (Fowler 1893, 39 and Pl. 1). Here, St Cuthbert is consecrated Bishop by Archbishop Theodore, who pours oil over his head and hands from the flask, which has a rounded base, bulbous body, and everted wide neck. Although a kicked base was not drawn, it may have existed on this vessel, but the artist may not necessarily have drawn it as it was an internal feature. However, the painting provides a warning to keep an open mind regarding the functions of vessel forms. A number of flasks of similar shape but with kicked bases and trailed decoration have been found in ecclesiastical contexts, which may have been used as consecration or liturgical vessels (D8).

Various different shapes and sizes of flasks must have also served general domestic purposes. A colourless glass flask with a wide neck, everted rim, and kicked base is shown on the top shelf of a scholar's study, in a Bruges manuscript of 1479 (BL, Royal 18 E III, fol. 24; Basing 1990, 99, Pl. XIII). It is empty and the function is not shown, but its context implies a general domestic use.

The archaeological contexts in which these flasks were found provide little information to suggest their functions. Large numbers of wide-necked flask/urinals were present on monastic sites such as Battle Abbey and Pontefract Priory, although distilling vessels were also found there, so they have been for industrial, medical or general use. It is not particularly significant that many flasks are found in garderobes

and latrine pits, as these were used as general waste disposal pits for all types of rubbish. Large numbers of flask/urinals have been found in town centres, such as at The Brooks in Winchester, and at least thirteen were excavated from Goldsmith Street in Exeter. If they were used as urinals, it is puzzling why so many were found in one context. It is possible that they were used for a variety of purposes, or that they were the stock of a merchant, ready to sell. Doctors or apothecaries may have possessed larger numbers for treating patients and preparing recipes.

Narrow-necked green glass flasks both with and without optic-blown ribbing are also frequent finds in England (F5-6), although not as common as wide-necked flasks. The function of these flasks is not obvious. They are suitable for a number of purposes, including storage, serving, discussed in section 3.4 (see p. 67), or industrial functions which overlap with those of wide-necked flasks. Whether we can refer to the optic-blown wrythen ribbing on flasks of type F6 as 'decoration' or not, in the sense that they may have been used as tableware, is not clear. Their form is very similar to a flask from Oxford which has a pouring lip, which implies that it was used as a serving vessel (D6). A few examples of wide-necked green glass flasks have also been excavated with wrythen ribbing, dating to the 15th century, which suggest overlapping functions for ribbed flasks (F4). These narrow-necked flasks retained the same form and style from the 13th to the 17th century. This suggests that they were purely utilitarian, more similar to flask/urinals or hanging lamps which did not change throughout the medieval period, than to fashionable glass tablewares which changed their styles frequently.

Medieval documents refer to 'vials' in many medical and alchemical recipes (Moorhouse 1993). The frequency of references to glass containers in recipes suggests that they were in common use. Glass phials were often advocated for storing medicines in preference to other materials, due to the impervious nature of glass. Monastery records document the use of glass bottles for storing the large quantities of ink which would have been used (ibid., 140). The 1415 inventory of a London apothecary, John Hexham, lists '20 nova viol' et 80 glass' cum diversis aquis' ('twenty new vials and eighty glass bottles with diverse waters', Trease and Hodson 1965, 79-80). This affirms the use of glass flasks for the storage of medicines and other 'groceries'. Apothecaries diversified into grocery throughout the medieval period, and sold spices and syrups as well as drugs and herbs. The glass flask must have been a common sight on the apothecary's shelf.

3.7: Distilling Vessels: Alembics, Cucurbits, Receivers and Other Forms Connected with Industrial Processes

Excavations in England have produced a number of large groups and individual fragments of medieval forest glass vessels used in distillation and other industrial processes. The alembic was the most distinctive form, and its unique shape was specifically used for distilling. The vessels employed as the cucurbit and receiver could also have been used for other general purpose industrial and utilitarian functions. A range of flasks may have been used for other industrial processes, including the preparation of medical, herbal and craft recipes. Kicked and convex bases from deposits which only contained distilling vessels are included here. Other bases, which may have come from distilling equipment but had no identifiable distilling vessels in the deposit, are included in the previous section with wide- and narrow-necked flasks.

The distilling set, composed of a cucurbit, alembic, and receiver, is usually known as a still (Fig. 3). The liquid to be distilled was placed in the cucurbit, which was either heated directly, or placed in a ceramic base or coated with clay to protect the vessel and dissipate the heat. The alembic was placed above, resting on the top of the cucurbit, and the gap between them was sometimes sealed. The vapour from the boiled liquid was directed up out of the cucurbit into the alembic where it condensed on the inside surface of the dome. This condensed liquid, known as phlegm, ran down the sides of the dome into the collecting channel. From there it ran through the alembic spout, to be caught in the receiver. The distillate was eventually all that remained in the cucurbit.

A related process was sublimation, where heated solids changed to vapour and collected in a solid state on the surface of the upper vessel. There was no liquid stage, so no need for a collecting channel or spout. Glass had advantages over other materials for chemical use by virtue of its non-porous character. Bartholomew the Englishman in a 13th century compilation entitled *On the Properties of Things*, comments that mercury 'is best kept in glass vessels, for it pierceth, boreth, and fretteth other matters' (Holmyard 1957, 109). Other materials used for distilling equipment in medieval England included pottery, pewter, bronze and silver. Different materials were sometimes used in combination, such as a ceramic cucurbit and a glass alembic (Moorhouse 1987, 366-7). Documents and illustrations, and archaeological finds of glass such as that from Pontefract Priory, suggest that there were many more variations on the glass vessel forms used for related 'industrial' processes, some of which are referred to below.

The earliest historical records of distillation are from Hellenistic Egypt from the late 4th century BC onwards. Greek and Roman alchemical works by authors such as Zosimos and Democritus include illustrations of distilling apparatus, with the cucurbit, alembic and receiver set up in the same way as they were in the medieval period and

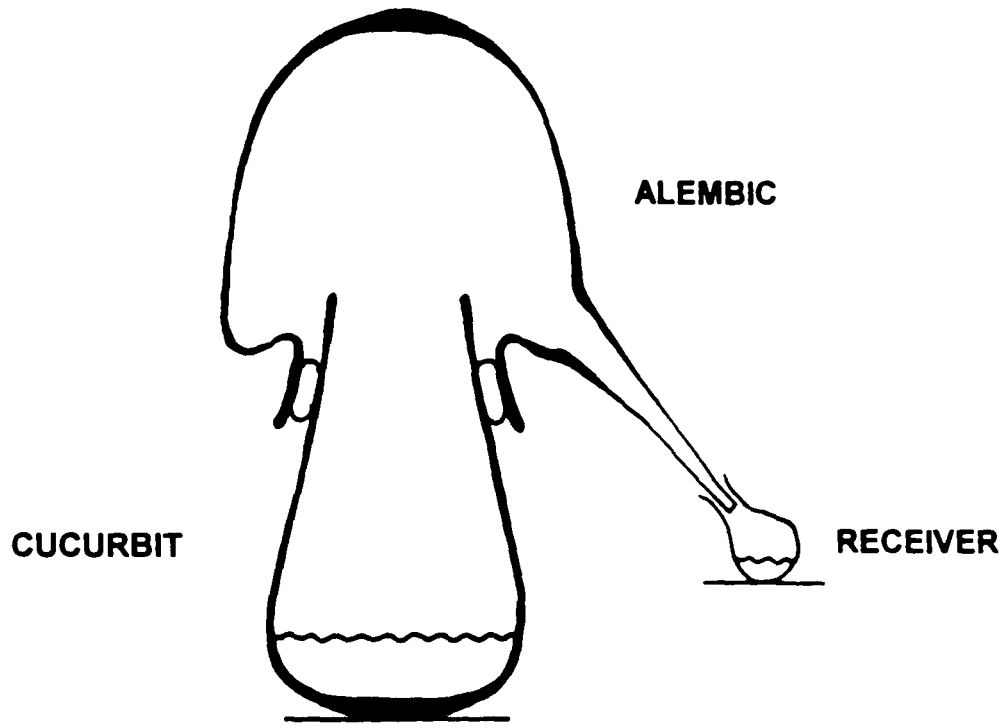


Figure 3:

The Distilling Set

later (Holmyard 1957, pl.11). The Islamic world acquired libraries of Greek manuscripts from centres such as Constantinople during the conquests of the 7th century. Prince Khalid ibn Yazid, who died in 704, is said to have been the first to take an interest in the manuscripts, and initiated their translation into Arabic (ibid., 61). This led to further alchemical and other scientific developments in the Islamic world.

In the 12th century scholars from western Europe travelled to Islamic areas in order to study, and began to translate texts from Arabic into Latin. Robert of Chester is credited with translating the first alchemical treatise into Latin, the *Book of the Composition of Alchemy*, completed in 1144 (Holmyard 1957, 103). Hundreds of books on alchemy, astrology, medicine, mathematics, geometry, philosophy and other sciences were translated into Latin in the medieval period, and further scientific developments followed. The 12th to 13th century has been called the 'Scientific Renaissance' of Europe. Compilers of this new knowledge included Bartholomew the Englishman, who wrote *On the Properties of Things* in Latin in the 13th century, translated into English in 1397 (ibid., 103).

Later medieval documents which refer to distillation and the equipment used include inventories and accounts from households and monasteries. Treatises and recipe books include Thomas Norton's *The Ordinall of Alchimy*, and various 'leechbooks' used by physicians, apothecaries and households (Moorhouse 1993). Instructions on how to carry out assaying, to test the purity of coinage, are described in written legislation (Greenaway 1972, 86-7).

Medieval processes which made use of distillation include the preparation of medicinal herbal remedies such as Oil of Benedict, and flower oils including rose (Moorhouse 1993, 146). Alcoholic liqueurs and aquae-vitae were concentrated through distillation, and used to relieve feelings of chill in enteric (intestinal) diseases from the 14th century (Greenaway 1972, 84). Recipes for crafts include pigments such as vermilion and 'water of silver' with which 'you shall write gold as fast as with ink' (Moorhouse 1993, 147). Assaying, which tested the purity of silver or gold by distilling them with acids, was important in regulating coinage (Greenaway 1972, 84-6).

Alchemy has had a long and complex history. Its basic aim was to turn base metals into silver or gold using intermediary acids. Assaying and alchemy used mineral acids such as nitric and sulphuric acid (ibid., 84). It was believed that all metals were composed of different proportions of mercury and sulphur, and that by altering the proportions of each by processes including distillation, a base metal could be transmuted into a higher metal. This involved removing impurities, and supplying deficiencies by means of an Elixir, also known as the Philosopher's Stone or the Tincture (Duncan 1939/40, 243). This physical process was inextricably linked in the medieval period to a more philosophical exploration. The search for the Elixir to transform metals was symbolic of the transformation of sinful man into a perfect being through prayer and the

grace of God, and it is significant that many practitioners were members of religious orders (Holmyard 1957, 14). The Elixir was also seen as substance that would make man immortal. It was not until the post-medieval period that alchemy degenerated into occultism (Greenaway 1972, 85).

The sites on which glass vessels connected with the distilling process have been found all date to the 15th century or later. This is surprising, since the documentary evidence establishes that glass distilling equipment was in use by the later 14th century, and perhaps earlier, in western Europe. Chaucer's 'Canon's Yeoman's Tale' from *The Canterbury Tales*, written in the 1380s or 1390s features alchemy, and glass is described amongst the distilling apparatus of the canon:

> That into poudre grounde been ful smal;
> And in an aerthen pot how put is al,
> And salt yput in, and also papeer,
> Biforn thise poudres that I speke of heer;
> And wel ycovered with a lampe of glas;
> And of muche oother thyng which that ther was;
> And of the pot and glasses enlutying (sealed with clay)
> That of the eyr myghte passe out nothyng. (lines 760-7)

> ..sondry vessels maad of erthe and glas,
> Oure urynales and oure descensories,
> Violes, croslets and sublymatories,
> Cucurbites and alambikes eek...
> (lines 791-4; Benson (ed.) 1987, 272-3)

In 1403-4 Henry IV issued a proclamation that no-one should practice alchemy without royal assent, implying that the activity was well-established by that date. Royal licences were enrolled on Patent Rolls, but none of these include the institutions where glass distilling equipment has been excavated (Moorhouse 1987, 369). Although not all of the equipment would have been used for alchemy, there is strong evidence to suggest that some of it was (see below). Distilling was certainly known in England before the 15th century.

The 15th century sites where distilling or industrial glassware has been found are predominantly monastic. Large deposits have come from Pontefract Priory, Selborne Priory, and St Leonard's Priory in Stamford. Smaller quantities have been found at Bayham Abbey, Battle Abbey, Denny Abbey, Eynsham Abbey, Kirkstall Abbey, Polsloe Priory and Grove Priory. The documentary evidence supports the central role of monastic sites for distilling activities. The infirmary would have used a

variety of medicines, including alcoholic liqueurs, for which they are still famous through modern liqueurs such as Benedictine and Chartreuse. Colours and pigments would have been needed for the scriptorium. Stills were also bought by the kitchener and sacrist (Moorhouse 1987, 365). Alchemy is often associated with members of religious orders, particularly canons, as Chaucer's character was (see p. 88). One of the most prominent 15th century alchemists was George Ripley. After studying in Rome, Louvain and Rhodes, he was recorded in 1471 as a canon in the Augustinian Priory at Bridlington 'where the fumes and unpleasant odours emanating from his alchemical laboratory proved a nuisance to the rest of the community' (Holmyard 1957, 183). Ripley taught the craft to Thomas Norton, author of the *The Ordinall of Alchimy*, and William Holloway, Prior of Bath Abbey (ibid. 184-5).

At St Leonard's Priory, Stamford a dense mass of glass distilling vessels were found in the reredorter drain, with crucibles connected with metallurgy, and mercury, copper and sulphur. Metal clasps from books and the possible remains of pages appear to be the remains of a scientific library, thrown in with the other contents of the laboratory. In an adjacent cellar clippings from the edges of silver coins were recovered. These finds suggest that either alchemy or assaying were taking place (Mahany 1977, 21-22).

Glass distilling vessels have also been found in castles, including large groups from Sandal, and smaller quantities from Ludgershall, Bramber, Winchester and possibly Old Sarum. Again, documents attest to alchemical experimentation in medieval castles. The inventory of apothecary John Plumtre of Nottingham of 1494-5 reads: 'Be hit hade in mynde that y left with John 'a Dammys in the Castelle', and lists items including glass stills, double glasses and urinals (Records of the Borough of Nottingham 1882, 284). John 'a Dammys is believed to be the same John Damian, who is recorded as James IV's physician, with whom he practised alchemy at Stirling Castle. Accounts of the laboratory equipment exist for 1501 and 1508, listing very expensive equipment, including a silver alembic, which evidently required a wealthy patron (Holmyard 1957, 214-5). Alchemy was a high-status art with support from the aristocracy, universities and monasteries.

Wealthy households in castles, manors and towns distilled herbal and medicinal products on a small scale. In 1416-17 Bishop Richard Mitford's household purchased a glass still 'to distill the medicine' (Moorhouse 1987, 370), and in 1550 Lady Petrie of Ingatestone Hall in Essex bought '6 stilling glasses' in Chelmsford to distil herbs (Emmison 1961, 158). Glass stills continued to be common in 16th and 17th century household accounts (Moorhouse 1972, 106).

Glass distilling vessels are found on a much smaller scale in towns. Unfortunately, when only one fragment is found it is not usually possible to confirm whether the vessel was used for distilling, since most distilling vessels share features

with other forms. Possible glass distilling vessels have been excavated in Colchester, Leicester, Norwich, Exeter and London. One larger group including alembic tubing was recovered from Lion Walk, Colchester, in a deposit dating to 1500-25. This is interesting because there is archaeological and documentary evidence for apothecaries on this site from 1549 to at least 1797. Over seventy-seven tin-glazed ceramic drug jars dating to the 16th and 17th centuries were excavated, and documents record apothecaries from the Buxton and Great families working here (pers. comm. John Cotter). The medieval glass suggests that apothecaries may have practised on the site from an earlier date. Glass alembic tubing was also found in a pit of c. 1525 in Culver Street, Colchester, where there was less definite ceramic evidence for distilling. Both sites produced narrow- and wide-necked flasks which could have been associated with apothecaries' industrial or medicinal activities. In Trichay Street in Exeter, an alembic was found in what was described as an industrial pit, and may indicate professional functions similar to those found in Colchester. Medieval documents record stills amongst the goods of physicians, apothecaries, spicers, merchants and haberdashers, which would have been used for domestic as well as professional purposes (Moorhouse 1987, 365-6). Distilling would also have been used in towns for assaying to regulate the coinage, and some alchemy took place. Thomas Norton, who wrote the *The Ordinall of Alchimy* in c. 1477 lived in Bristol, and surely experimented at home. It is clear that distilling was widespread by the 15th century or earlier. However, only some of the equipment would have been made of glass.

Less common glass forms used for related industrial processes are referred to in documentary and pictorial evidence, which are difficult to identify archaeologically. One specific type recorded in documents is the 'double-glass'. A mid-15th century recipe for a 'medicine for the gout and ache that swells' instructs:

> Gather these berries (woodbine) between the two feasts of Our Lady, and put the juices together into a double glass and shake them well together. Then set it in a pit a yard within the earth and let it be open, save for laying a board upon the glass (to keep off) the rain. (Moorhouse 1993, 146, No. 4)

This type is also listed in the inventory of John Plumtre, apothecary and physician of Nottingham in 1494-5, with other distilling equipment: 'Item ij. dovbulle glasses, price iiij.d.' (Records of the Borough of Nottingham 1882, 284). Unfortunately these references do not specify what the glass looked like.

A number of later glass forms have the 'double' prefix. These include the German 'doppelkonische', the double-conical bottle. This is in the form of two cones, the upper one, which has a narrow neck, is inverted and attached to the lower cone by an

internal and external fold. These were manufactured from the 15th century or earlier in Germany. Twenty-two examples were excavated from a 15th to 16th century context from a monastery in Würzberg, Germany. They were walled up in a niche, and believed to have belonged to the apothecary of the monastery (Baumgartner and Krueger 1988, 420, No. 527). Other later glasses with the prefix 'double' include forms with two separate compartments in the same flask, but this is clearly not the form described in the woodbine recipe, since the berries could not be shaken together. The double-conical flask is most likely to be the 'double-glass'.

Other rarer forms of distilling vessels are known. One is the 'pelican', the upper vessel shown on the right-hand furnace in a laboratory illustration from *The Ordinall of Alchimy* (BL, Add. Ms. 10302, fol. 37). This vessel is similar to the alembic, but the tubing returns the vapour back to the cucurbit. It continues to be re-distilled, a process known as cohobation. Scientifically it has no advantage, but it was the belief of medieval alchemists that the distilling process had to be repeated hundreds of times to achieve complete success (Holmyard 1957, 50). Another variant of the alembic was the serpantory. This is referred to in a late medieval recipe for aquae vitae, and has a long spiralling spout (Moorhouse 1987, 370). It should therefore be taken into account that fragments which appear to come from alembics, may alternatively come from the pelican or serpantory. One more variant on the alembic has been proposed. At Pontefract Priory, five 'vents' were found (G11). It has been proposed that they may have been used in the domes of alembics which were stacked above one another. The process of 'fractionation' worked on the principle that alembics towards the top of the stack became cooler, and their differential temperatures enabled different products to be distilled in each alembic, and a stack of alembics is illustrated in *The Ordinall of Alchimy* (BL, Add. Ms. 10302, fol. 37). A vent would be necessary to allow the vapour to rise into the next alembic. Late medieval treatises include other distilling forms which have not yet been recognised in the archaeological evidence (Moorhouse 1993, 141, Fig. 10.10, BL, Harley 2407, fol. 108; Basing 1990, 120, Fig. 66, BL, Add. Ms. 10302, fol.1).

The glass from Pontefract Priory includes a number of unusual fragments from uncertain forms, although some are thought to be industrial given the nature of the rest of the glass. One fragment (G8) has an inverted conical body, with a short 'stem' section and a widely everted rim above that. The widely flared rim suggests that it was intended for a liquid which could be poured in easily, but which the small aperture would prevent from spilling. One possibility is that it was an ink-well. It has been noted that colouring pigments were produced by distilling, and would have been used in the monastery (see p. 87). Bellamy and Nicholson suggest that the fragment is from a flask, quoting a 15th century parallel in the Stadtsmuseum, Cologne, and later examples in England (Bellamy and Nicholson 1972, 94). However, the function of the flask is not suggested. A flask

with a very similar rim, a kicked base, and a tubular spout leading out from the body from Düsseldorf Museum is described as a *milchpumpe* (Baumgartner and Krueger 1988, 433-4, No. 546). Its rim diameter is similar to the Pontefract fragment. This vessel was presumably used to feed milk to babies. Other vessels with unexplained functions include flasks from Pontefract and Ludgershall with long tubular necks (G9), and two very large and crudely made vessels from London and Winchester of the 13th to 14th centuries (G5). A flask from London had a curious narrow 'shelf' running around the internal upper body, for which no close parallels are known, but it is suspected to have an industrial, rather than a table or storage function (G10).

Although no recognisable fragments of glass distilling vessels have been discovered on medieval glass furnace sites in England, there is no reason to doubt that distilling equipment was made here since these vessels were all made of green forest glass. The evidence for English production sites has already been discussed, concluding that the evidence is scarce, but they existed all over England (see pp. 24-5). The large deposit of glass from Pontefract Priory is remarkably homogeneous in appearance. While this may simply be due to the similar burial conditions of the fragments, it is possible that it was made at one furnace site, possibly even in the Priory itself. Glass was used in large quantities in west Yorkshire, and also found at Sandal Castle, and more recently, Pontefract Castle, suggesting the likelihood of a relatively local production site. Scientific analysis may be able to characterise the glass from the area, to test whether it forms a distinct group. However, the difficulties in distinguishing groups of glass from a particular furnace site have been discussed (see pp. 43-4). Industrial forest glass vessels were also made across the rest of Europe.

Thomas Norton's *The Ordinall of Alchimy*, of c. 1477, confirms that alchemical glass was made in England. In a passage in which he recommends glass as one of the major materials for alchemical equipment, he states that the English glass is made from fern ash, the best is the new mix, and the tougher glass is made from cullet:

> All other vessells be made of glasse,
> That spirituall maters shuld not owte passe.
> Of ashis of verne in this londe euerych on
> Be made, but els where thei be of stone.
> Of oure glassis the bettir kynde
> The mornynge stuffe ye shall it fynde,
> Which was ashis the nyght bifore,
> Stondynge in hete all nyght & more.
> The hardir stuffe is callide freton,
> Of crippinge (clippings) of othir glassis it com;
> Tyncture with anelynge of Glaciers

Will not perse hym as thei reherse.
(Reidy (ed.) 1975, 87, lines 2803-2814)

In addition to specialist distilling apparatus, wide- and narrow-necked flasks would also have been used in these processes. Urine was a common prescription and ingredient in medical recipes (Moorhouse 1993, 129), and may have been stored or transported to the workshop in flask/urinals. Chaucer also mentions urinals in the same passage as other distilling equipment (see p. 88).

3.8: Miscellaneous Decorated, Coloured and Other Glass Fragments of Special Interest

The glass catalogued here includes small fragments from undiagnostic vessel forms, as well as those which could be ascribed to more than one different form. They include potash, high lead and soda glass, and a variety of unusual colours. They are divided into body, rim and base fragments.

Of particular interest are a blue glass fragment from Weoley Castle (H1), with pale blue enamel painted decoration, consisting of a roundel with a serrated border and a heraldic beast in the centre. This decoration is comparable to a flask from London (D21), and a bowl from York (C8), and has parallels in French Gothic art of the 13th and 14th centuries. The Weoley fragment is flat, and this and a fragment from Canterbury may come from glass box reliquaries. The use of glass vessels as reliquaries are discussed in Section 3.2 (see pp. 57-8).

A number of high-lead glass fragments from undiagnostic vessels, some with applied decoration, have included here (H2). As is the case with the other high-lead glass vessels found in England, these are all of yellow rather than green lead glass, although both these colours are found on the Continent. Three fragments from Winchester are probably also made from high-lead glass. These have dark green trails, but the body glass is not as brightly coloured as other lead glass (H3).

Green glass fragments include a hollow ball finial from Ludgershall Castle which may come from an Italian style hanging lamp, a goblet lid, or some other form (H4). There are a number of fragments with applied trailing dating to the 12th to 13th century (H5), similar to flasks of that date which often have liturgical associations (D8). Fragments of suspended decoration (H6) are comparable to the decoration applied to the stems of some goblets (A2.1). A 15th century fragment of green glass from Leicester, of an inverted rim with optic-blown ribbing, may come from a Germanic drinking vessel of the 15th century, either a tall narrow 'keulenglas', or a small handled 'scheuer' (H19.2). Rim fragments from two green glass vessels of a unique form were found in York (H20). The rim profiles would provide a suitable design for a hanging lamp, although the glass is very thick and may not have let enough light through. Alternatively, they may come from some form of industrial flask.

There are a variety of fragments of different coloured glass. The blue (H10) and opaque red (H12 and H28) glass could come from a number of different production areas at different dates. The emerald green (H12) and red/purple fragments (H14) are likely to come from Venetian Renaissance-style vessels of the 15th century. It is not certain where or when the only amber glass fragments in the survey were produced (H13 and H23). Two opaque white glass base fragments were found in 15th century contexts in London (H18.2). These were probably *façon de Venise*, and opaque white glass is

usually regarded as being produced in the second half of the 15th century. However, it should be noted that opaque white glass fragments of goblet lids have been found in 14th century contexts in London (A18), and documentary evidence also suggests that this type of glass may have been produced at least as early as c. 1400.

An earlier opaque white gilded glass fragment was found, dating to the 12th to 13th century and possibly from the Near East (H18.1). Islamic fragments of a similar date include dark purple or black glass fragments with opaque white marvered festoons from Canterbury (H17), and a manganese glass base with marvered opaque white and red drops and stripes from Restormel Castle (H29). An enamelled fragment from London has a Near Eastern appearance, but analysis of the enamel suggests that may be a European copy (H16).

The large number of small fragments of undecorated potash glass body fragments have not been catalogued in full, and they are only included if they are from sites where there was no other glass. This was thought necessary to gain an unbiased view of all the different types of sites where vessel glass was used in the medieval period, since there is some controversy over whether it was only restricted to certain sections of society, or whether this impression is due to the different disposal and survival of glass on certain types of site (see pp. 143-4).

Chapter 4: The Distribution of Medieval Glass Vessels in England

4.1: Introduction

This chapter will discuss the range of medieval sites from which glass vessels have been excavated. It will also interpret the functions represented by the various glass forms found on different types of sites. It is hoped that this will show which groups of society were carrying out the practices represented by the different glass forms.

Table 1 lists all the sites on which glass has been found, with similar site-types grouped together (castles, towns, monastic sites etc., see pp. 123-133). A key is provided for the codes for each site type (see p. 134). Monastic establishments are divided further into different orders. The total estimated number of vessels for each site is summarised. This is then divided into categories of probable functions. Tablewares reflect high-status entertaining and access to luxury imports, and include other decorative vessels which may have had a ceremonial or liturgical use (see Chapter 3.1-3.3). Lighting is represented by green glass hanging lamps, and one Islamic lamp. Green glass flasks with wide and narrow necks and kicked bases were used for many different functions which may have included storage, industrial processes, and perhaps tableware (see pp. 82-4). Flask/urinals with convex bases were employed on a large scale in uroscopy for medical diagnosis, although some may have been used for general domestic or industrial purposes (see pp. 77-82). Distilling and other industrial vessels may have been used for small-scale domestic preparation of herbal, alcoholic or medicinal recipes, and on a larger scale, for the philosophical pursuit of alchemy (see pp. 85-93). While the specific functions of many glass vessels are not certain, they can provide a general picture of some of the activities which took place on each site. The sample is unbiased in that it includes as much of the vessel glass excavated in England as possible, although whether it is entirely representative is uncertain.

Table 2 summarises the percentages of the glass functions which are found within each group of sites (p. 135). These figures should be used with extreme reservation for a number of reasons. Because of the small sample of most site types and the restricted volume of glass itself, the accuracy of the average values can be extremely biased. Table 3 shows a related table, which shows the actual estimated number of glass vessels on each group of sites, so that the reliability of the sample can be assessed (p. 136). Both tables also show the number of sites within each group. A concordance in Appendix 3 gives a complete list of sites in alphabetical order. This tabulates the forms and types of glass vessels found on each site by code, from which they can then be referred to in the catalogue (Appendix 2).

The categorisation of the sites into 'types' can be ambiguous. Towns are the most problematic as they include many different social groups side by side, including bishops' palaces, workshops, large town houses, tenements, and rubbish dumps. If only

a small area of the site is excavated, as is often the case in urban 'rescue' excavations, it can be difficult to interpret the character of the site. Monastic sites have a more clearly defined group of inhabitants, and there is documentation of the religious orders to which each community belonged. Nevertheless, they also provided accommodation for guests, and owned secular properties themselves. Castles, palaces, and the larger manor houses, while owned by nobility, also contained a wide-ranging household of servants and retainers. These three broad groups are discussed separately below, with a discussion of the character of the sites, and the range of activities represented by the glass found on them.

Only one fragment of medieval vessel glass has been discovered on a rural village site in England. This was a fragment of a blue gilded Byzantine bottle of the 12th or 13th century, from the deserted medieval village of Seacourt in Berkshire (GD97). Clearly, Byzantine bottles, which are highly decorated and very rare, would not have been present in the typical medieval village. Perhaps this glass was discovered as a fragment on a rubbish dump and taken back to the village as a curiosity, with its deep blue hue and gilded decoration.

4.2: Glass from monastic sites

'Monastic sites' is a general term which covers a range of different orders and rules present in medieval England, of monks, nuns, canons and friars. Colleges of vicars, hospitals and churches are also discussed here. Fortunately, there is ecclesiastical documentation of to which religious order each monastic site belonged. This indicates who occupied each site and the lifestyle which they pursued, which is valuable in assessing the contexts in which the glass found on the site might have been used.

However, the coenobites were not the only occupants of monastic sites who may have used glass. In addition to the members of the rule, monasteries had varying numbers of lay servants, and the Cistercians had lay brothers living in the community until the 14th century. Guest houses were used by monastic visitors, and as travel lodges by the laity, including the benefactors of the monastery. The Guest House at Kirkstall Abbey in West Yorkshire was situated a third of the way along the manorial route across the Pennines, linking the two Lacy centres of Pontefract and Clitheroe, and it is likely that it was used as a staging post by the travelling household (Moorhouse 1993, 130). Fragments of a high-lead glass beaker and a green glass goblet were excavated in the Guest House area, as well as much unexpected non-local pottery. Moorhouse suggests that the unusual pottery assemblage can be explained by the use of the Guest House by these manorial visitors (ibid., 130). This implies that much of the high-status glass tableware found in monasteries might have been used by visitors rather than the members of the community. The abbot or prior and their guests may also have

enjoyed more luxurious tableware and food at their table. Monasteries also accommodated aged 'corrodians' for an advanced payment (Greene 1992, 133), and elderly lay people from benefactor families, in the infirmary (ibid. 158). Some monasteries used secular doctors from outside, since monks were forbidden to perform surgery. In Canterbury, Master Feramin administered to sick monks, and Master W. 'physicus', received a salary of two marks from the Cathedral in the 13th century, possibly for the same purpose (Urry 1967, 110).

The distinction between the monastery and the outside world is also blurred because monasteries owned properties elsewhere which cannot be distinguished from secular buildings. Many owned manor houses or granges, where lay brothers or peasants farmed the estate, or which were used as rest houses (Greene 1992, 134-5). Abbots and Priors often lived in local manor houses rather than the monastery itself, such as the Prior of Durham, who frequented the manor at Beaurepaire (now Bearpark) (Knowles 1955, 253). Monks of all orders would retreat to one of these 'seyney houses' for recuperation and nourishing food after practising blood-letting, which was thought to be beneficial spiritually and physically. Christchurch Priory, Canterbury, owned a manor at Caldicote to the east of Canterbury for this purpose (Platt 1984, 143). Town houses were owned for monastery officials needing to attend court and participate in secular administration (Greene 1992, 172). These urban 'satellite' monastic properties cannot be distinguished from secular town buildings by their layout. Moreover, their character was essentially secular since they were used as guesthouses rather than religious centres. Some of the unidentified urban sites in this survey may in fact have been owned by the church. However, the glass can be interpreted in a secular context, so this does not cause a great problem.

The proportions of excavated monastic houses belonging to the different orders on which glass has been found generally accords with the proportions of the total number of monastic orders which existed in the medieval period. Knowles and Hadcock list the total number of houses of each order documented in England and Wales in the medieval period (1971, 488-95). The rule with the largest number of houses in around 1500 was that of the Augustinian Canons with two hundred and eight houses, followed by the Benedictine Monks with one hundred and fifty houses. The other rules had between five and seventy-six houses. Table 2 shows the number of houses belonging to each order where vessel glass has been excavated (p. 135). Vessel glass was used in the greatest number of houses by the Benedictine Monks, followed by the Augustinian Canons, with smaller numbers for all the other rules. While these are not an exact reflection of the original proportions, they are not greatly different.

Medieval vessel glass has been found on thirty-three monastic sites in England. The largest groups come from Dissolution deposits spanning between the late 15th and early 16th century (Table 1a, pp. 123-4). The latest Dissolution deposits contain

medieval-type vessels which are likely to have been use in the 15th century, so they are included in this survey. The glass itself may even have been deposited at an earlier date, since many monastic houses had reduced in size considerably before the Dissolution. Selborne Priory had very few occupants after the mid-15th century, and the glass is thought to have been dumped at this date, although it was not dissolved until 1486 (Moorhouse 1972, 98). After the Dissolution the sale of many monastic sites to landowners meant that post-medieval glass is also found on the site, and it can be difficult to ascertain which was in use before the Dissolution when the site still had a monastic function. At Eynsham Abbey most of the buildings were destroyed, but the Abbot's Lodging was sold and lived in for at least a century. The monastic cellars were infilled in the 16th to 17th century, and some perhaps as late as the 18th century (pers. comm. Graham Keevil). Most of the finds are of a late medieval character, although if any were early post-medieval it would be impossible to distinguish some vessels, such as flasks and urinals, from late medieval vessels which are identical in form.

Comparison of the quantities of glass present on sites with 13th to 14th century deposits with those with glass of the 15th and early 16th centuries shows that far less evidence survives from monasteries in the 13th and 14th centuries. Before the 15th century monasteries appear to have been very efficient at disposing of their glass off the site. Much more glass dating from the 13th and 14th centuries is found in towns and castles, from rubbish disposed of in pits on those sites, presumably when the property changed hands. However, this periodic clearance would not have occurred in a monastic community where occupation by the same community was continuous for centuries.

Medieval glass tableware, generally, is most frequently found in archaeological deposits of the late 13th and 14th centuries. Consequently, tableware is under-represented on monastic sites, because layers of that date are largely absent. However, small quantities of tablewares have been found on some monastic sites, indicating that it was certainly used by the religious orders, but there must have originally been considerably more. Those fragments which do survive did not reach the rubbish collections, or could have been in use right up to the Dissolution. Vessels in use in the 13th and 14th centuries include trailed green glass flasks and fragments from Tynemouth Priory, St Alban's Abbey and the Franciscan Friary at Lincoln may have been used as liturgical vessels, since many similar vessels across Europe have been found on religious sites, often inside churches (D8). Fragments from single vessels of 13th to 14th century luxury glass include a Venetian enamelled beaker from Dale Abbey in Derbyshire, high-lead glass tablewares from Kirkstall and Battle abbeys, and a Byzantine blue bottle from the Augustinian Priory at Breedon-on-the-Hill. An Islamic gilt and enamelled flask was found in the Pyx Chapel of Westminster Abbey, which was used as a royal treasury, so its context may be better described as royal than monastic.

Groups from stratified 13th and 14th century layers are more rare, but deposits sealed below the refectory have been excavated at Boston Dominican Friary. Fragments from five imported vessels were found, including colourless bowls, beakers and a goblet. Tableware of this date is found, even if in small quantities, in communities of monks, nuns, canons and friars.

It is unclear whether the members of the community, the monastic officials or the guests were using the tableware. At Christchurch Priory, Canterbury, the documentary records show that individual monks used specific silver cups, including a silver-gilt cup in use in the refectory called 'cuppa W. Terri'. This was probably the cup of William, the son of Theoric or Terric the Goldsmith, a prominent Canterbury citizen who owned property in the Longmarket (see p. 54), and who may have manufactured it. William became an official in the Priory (Urry 1967, 112-3, 175). It may have been his office which allowed him the privilege of owning a particular silver cup. This implies that monastery officials, if not ordinary monks, had their own individual possessions. Nuns were allowed their own possessions as part of their 'dowry' when they took the veil.

While large quantities of glass survive in Dissolution deposits, very little of this comprises tableware. Six decorated or tableware vessels were excavated at Battle Abbey, of which the finest fragments, a high-lead glass jug handle and a trailed green jug, were 13th to 14th century styles. It is not known if these vessels were still in use in the 15th century, or if they were buried in the 13th or 14th century. In general, tableware is a very small percentage of the glass dating from the 15th to early 16th century. A fragment of a Venetian-style blue goblet was found at the Austin Friars in Leicester, a blue handle fragment came from the Dissolution deposits from Battle Abbey, and a pale blue mould-blown patterned bowl was excavated at Bayham Abbey. Venetian-style colourless fragments with enamelled decoration were found at Christchurch Priory in Dorset, and a beaker rim was excavated at Christchurch Priory in Canterbury. Various trailed green glass bases and a handle came from Pontefract Priory. However, tableware was only found on a few of the 15th and early 16th century monastic sites, and it is very little compared to the quantities of other glass forms.

It seems likely that if valuable Venetian-style glass vessels were in use in these monasteries at the time of the Dissolution, they would have been removed with the personal belongings of the resident or by the commissioners of the Dissolution. The large numbers of Renaissance Venetian glass vessels in museum and private collections testify to the fact that many vessels have been treasured through the centuries and never reached the archaeological record. A 'True Account of the Island of England' in 'about the year 1500', written by a Venetian traveller, describes the English monasteries as brimming with treasures and 'more like baronial palaces than monastic houses' (Sneyd 1847, 29). This, and the other medieval documents complaining of the lax behaviour of

the religious orders must be taken into account, since the archaeology can only give us a partial picture. The movable goods that were left in rubbish deposits on the monastic sites after the Dissolution consist of what was of no use to their former occupants, the Crown commissioners, or local 'entrepreneurs' stripping the sites of anything salvageable.

Hanging lamps were present on all types of religious sites throughout the period 1200 to 1500. They were used, not surprisingly, in relatively large quantities. For example, nine were found at Battle Abbey, and eight at Bayham Abbey. They may have been used inside the church, and are often seen hanging above altars in medieval iconography (see p. 72). Lamps have been found inside the churches at Bordesley and Denny abbeys, as well as in St Mark's Church in Lincoln. They may have been used in other areas of the house, such as the dormitory where the Benedictine Rule stated that a light (not necessarily a glass lamp) must be kept burning throughout the night (see p. 72). At St Alban's Abbey, two lamps were found in a pit associated with the guest house, separated from the rest of the site by a wall. It is unlikely that the rubbish from the community's part of the site would have been carried across the boundary to the guest house, so the lamps must have come from the guest house.

Green glass narrow-necked flasks are represented amongst sites of all the different rules of monks. They were also used by nuns at Denny Abbey, and canons at Bayham Abbey. However, none have been found at friaries. They may represent various different functions (see p. 84). Wide-necked flask/urinals are present at friaries, but there are no other flasks or distilling vessels. This strongly suggests that they were used for medical uroscopy, rather than industrial activities. Flasks and distilling equipment are found as well as flask/urinals at examples of houses of monks, nuns and canons, and may represent a number of possible functions. Monasteries provided medical care for the outside community as well as for the monks (Talbot 1967, 170-1). Each house would have had an infirmary, where uroscopy would have been carried out. An illustration of a monks' medical lecture shows two urinals being displayed with their cases in the background (Black 1992, 85; BL, Royal E III, fol. 36).

Distilling would have been carried out for medicinal, herbal and alcoholic preparations, and to prepare colour pigments for the scriptorium. Alchemy was practised on some monastic sites, and there is documentary evidence that these included canons. Famous medieval alchemists include George Ripley, a Canon in the Augustinian Priory of Bridlington in 1471 (Holmyard 1957, 183). Chaucer's 'Canon's Yeoman's Tale' narrates a story of a Canon who practised alchemy (Benson (ed.) 1987, 270-81). Large deposits of distilling equipment were excavated at the house of canons at Selborne Abbey, and the Cluniac monastery at Pontefract Priory. Excavations at the Benedictine monastery of St Leonard's Priory in Stamford produced glass distilling equipment associated with crucibles, mercury, sulphur and copper, and silver coin

clippings in an adjacent cellar, which imply alchemy rather than distillation for purely practical reasons. These three excavations present quite a contrast to the excavations of other monasteries, where specialist distilling equipment is found in far smaller quantities, if at all. They may have used pottery distilling vessels, but glass was more suitable. These three sites suggest that particular monasteries specialised in distilling and alchemy. Monks also practised blood-letting. No glass bleeding-cups have been identified in medieval English sites, but they have been found in a 16th century context in Strasbourg (Baumgartner and Krueger 1988, 433, No. 545).

Some patterns in the glass assemblages of the different orders are recognisable. Table 2 shows that in general, friars have the highest collective percentage of tableware than any of the other monastic orders, with four of the nine friaries having 100% tableware (Table 1a). This is partly due to the small number of utilitarian wares used, with only a few lamps and urinals, but no 'industrial' vessels. These imply a purely domestic and medical use rather than any self-sufficiency in the preparation of recipes or in crafts. Unlike other monastic orders, who wished to isolate themselves from the secular world, the friars were situated in towns, and pursued greater contact with the laity in order to preach to them, as well as relying on them for sustenance. The glass tableware may have been gifts, a consequence of their success in relying on donations and patronage, rather in contrast to their original principle of being mendicant beggars in order to espouse poverty. The material success of friaries was also seen in their architecture (Lawrence 1984, 261). In this urban environment, they must have become more accustomed than other orders to maintaining a worldly status through their material culture, and participating in secular fashions and rituals in their entertaining. The amount of glass tableware may also be influenced by the more direct access by friars to urban markets.

Since friaries were urban, their rubbish disposal methods differed from rural monasteries, which makes it difficult to compare their assemblages directly. In the 13th and 14th centuries it was an urban characteristic that rubbish was disposed of in pits on the site, preserving the glass for later excavations. However, in rural monasteries, very few archaeological finds of this date survive, suggesting that rubbish was either taken off the site, or left in open heaps where glass would decay. While it is clear that the friars possessed glass tableware in the 13th and 14th centuries, it is not possible to assert that rural houses did not. It therefore does not necessarily indicate that urban friaries were more wealthy than rural monasteries. The two Carmelite friaries are slightly different from other friaries, as they have no tableware, but lamps and urinals.

Houses of monks show the greatest mixture of glass functions. This may partly be due to the presence of larger quantities of glass, perhaps because the communities tended to be larger. The assemblages consist mostly of utilitarian wares, reflecting their

self-sufficient lifestyle. There are also some tablewares. and the members of the community who might have used them has already been discussed (see p. 100).

The two nunneries, Polsloe Priory in Exeter, and Denny Abbey in Cambridgeshire, had one fragment each of distilling equipment, but there are no further similarities. Polsloe produced two fragments of tableware, while Denny had nine lamps and flasks. Little can be said from such a small sample.

Of the canonical sites only Bayham Abbey and Selborne Priory have any significant quantity of glass. Bayham is similar to the glass assemblage of monasteries, dominated by utilitarian wares, with some table vessels. Selborne may be an example of the alchemical interests of some canons, with 100% distilling vessels. The other canonical sites have one or two fragments each, three sites having 100% tableware. There appears to be quite a difference in the character of sites within the canonical order. Indeed, in the later medieval period houses of canons included 'all types', including 'mere groups of priests serving a church', 'centres of letters and education', and 'places of strict monastic solitude' (Knowles 1940, 175).

Excavations at the College of the Vicars Choral in York have produced the largest number of tableware vessels, at approximately fourteen. They included a wide range of luxury imported vessels including Venetian enamelled glass, Mediterranean blue-trailed bowls, a painted bowl which may be French Gothic, and a north-west European high-lead glass goblet and jug. This assemblage is more closely comparable to the houses of town merchants and the nobility than to other monastic sites. The site at Lurk Lane, Beverley, may similarly be a vicars' college (Armstrong, Tomlinson and Evans 1991, 242). It produced one goblet stem and four flask/urinals.

No vessel glass has been found in any excavations of Carthusian priories, such as Mount Grace Priory in Yorkshire. These monks lived austerely in individual cells, and came together communally only on Sundays and major festivals, for mass, a chapter meeting, and dinner in the refectory. On other occasions meals were passed through a hatch in the wall of each cell (Greene 1992, 26). All physical surroundings were extremely austere, including the church where gold and silver vessels other than the chalice were forbidden (Lawrence 1989, 161). It therefore seems less likely that fine tablewares would be found in these Charterhouses than on other monastic sites, although the guest house and the abbot may have used more luxurious vessels.

However, the statistics show no distinctions between the different *rules* of the monastic houses. The two canonical sites with distilling equipment are Premonstratensian and Augustinian, while other canons of these two rules have only glass tableware. Distilling vessels are found amongst all the *different* rules of monks, but not at *all* of any of these rules. Similarly, friaries and nunneries each have differences in their assemblages. There are greater distinctions between the orders of monks, friars, canons and nuns, than there are between the different rules. This is not

entirely surprising since the different rules of the same orders had broadly similar lifestyles. For example, Cluniac, Cistercian and Premonstratensian monasteries all adopted versions of the Benedictine Rule. In the end, each monastic house must be considered as an individual community, with different guests and access to markets, and particular skills and requirements, rather than participating rigidly in a specific pattern.

Moorhouse shows that spatial analysis of the pottery within monastic sites can be informative when looking at the areas in which it was used, for example at Kirkstall Abbey and the Charterhouse at Coventry (1993, 129-130, Fig. 10.1). At Charterhouse, similar types are found across the site, but the different proportions of each are likely to reflect the use of the different areas. Spatial analysis is not so easy with glass as it is found in such small quantities. It is impossible to judge whether the glass has remained in the area in which it was used. Examining the reliability of the pottery distribution may help. At Kirkstall Abbey, the minimal movement of pottery across the site indicates that it is probable that the glass found in the Guest House area would have been used in that building. However, this information is not always available.

Battle Abbey is typical of a monastic site where most of the glass found comes from Dissolution debris. Of forty-three medieval glass vessels, all but three came from deposits in the reredorter area. Although a few fragments may have accumulated in the reredorter during the medieval period, most were dumped there just after the Dissolution, blocking an entrance and part of the drainage system. This must have occurred after the abbey went out of use. The deposits include a wide range of material from all over the abbey. The range of finds indicates that some of the material was old at the time of disposal, from coins dating from the 14th and 15th centuries, to jettons of c. 1500 or the early 16th century (Hare 1985, 42-3). Some of the pottery is also slightly later, and Sir Anthony Browne may have continued to add the later glass to this dump after the site was granted to him in 1535 (ibid., 14). The 'Dissolution debris' therefore contains material from before and after the time of the Dissolution. It is probable that most of the glass was in use before the Dissolution, since the forms represented are common on other late 15th century sites. They include hanging lamps, flasks, flask/urinals, distilling vessels, and a few fragments of tableware.

The three remaining fragments of glass were found in the area to the north of the reredorter. The high-lead glass handle, probably from a jug, came from the Chapter House. The trailed jug was found to the east of the Dormitory range. A convex base was found in residual 19th century gardening layers in the Chapter House area, and it can therefore be dismissed of being of any value in a spatial analysis. It is interesting that the two other fragments found outside the reredorter area were also the two most impressive tableware vessels, dating to the 13th to 14th century. They therefore represent the only two fragments which *might* have remained in their original area of use, rather than in the context of a rubbish dump, although they may have been

discarded as rubbish. However, if these findspots were near their areas of use the actual context or room in which they might have been used remains unclear. Spatial analysis therefore contributes little to interpreting where the glass was used in the monastery, but awareness about the nature of the glass deposits can avoid misunderstanding their use.

Other spatial analyses show vessel glass in dumps of Dissolution date at Denny Abbey, Shrewsbury Abbey, St Augustine's Abbey in Canterbury, and Northampton Greyfriars. At Eynsham Abbey, the Dissolution debris was deposited in the cellars, but there was later occupation on the site, as at Battle, and these deposits may have been added to in the post-medieval period. At Bayham Abbey a large group of glass vessels, including lamps, flasks and distilling equipment, were found in the vault above the south chapel of the new north transept (Charleston 1983a, 112). This group represents a Dissolution clearout. While some of these vessels, particularly the lamps, may have been used in the Church, the rest are unlikely to have been. The group also included window glass which had been removed from the windows in order to strip the more valuable lead off it, a common practice during the Dissolution (Greene 1992, 189). It is possible that the glass was originally accumulated to sell, but there is no evidence to suggest that the practice of cullet collection by glassmakers was taking place at this date (see p. 144). The occurrence of lamps inside the church at Bordesley and Denny abbeys and associated with the Guest House at St Alban's Abbey has already been mentioned. At Bordesley, two lamps were also found in the area to the east of the cloister where the sacristy and bookstore were situated. At Tynemouth Priory the levels containing the vessel glass, window glass and pottery were found in the area outside the sacristy. The glass included hanging lamps, and a trailed flask with liturgical associations, and it is conceivable that they may have been stored in the sacristy for use in the church. However, more conclusive evidence is required.

The two churches (independent of monastic sites) where vessel glass has been found are both in Lincoln. One produced a lamp, a familiar find in monastic churches (see pp. 71-2). At the other, a wide-necked flask and a miscellaneous fragment were found, whose significance are inconclusive.

The Hospital of the Holy Trinity, the Maison Dieu in Arundel, is included with monastic sites. It was founded by the Earl of Arundel in the late 14th century, and housed twenty poor, aged or infirm men. The Master was a resident priest, there were regulations for divine service, and garments similar to a monk's habit were worn (Evans 1969, 65). It was in some ways similar to a monastic community. An opaque red glass flask was excavated there: a high-class piece of tableware. This hospital may have been relatively wealthy, but hospitals differed very much in their foundations and purposes, so it cannot be viewed as a typical example of a medieval hospital, or of the glass used in hospitals.

4.3: Glass from castles, manor houses and palaces

Castles, manor houses and palaces are grouped together, on the basis that the situations in which glass would have been used were similar in character. They were high-status, seignorial, secular households, although a few manors were also owned by the church. While some medieval 'moated manor' sites may simply have been successful farming homesteads, all of those included here which possessed glass appear to have been 'high-status'. For example, Northolt Manor was sold in 1346 to Simon Fraunceys, a prominent city merchant, member of parliament, sheriff of London, and twice mayor of London (Hurst 1961, 218-9). Penhallam Manor was one of the principal houses of the Cardinham family, who were wealthy Cornwall landowners. 'King John's Hunting Lodge' in Writtle was owned by the Duke of Buckingham in the 15th century. Of the palaces in this survey, two are episcopal and two are royal. Bishops' palaces were secular rather than monastic in character. A number of the castles were royal, including Ludgershall, Sandal, Hadleigh and Knaresborough, often forming part of the dowry of the queens of England. Durham was the seat of the powerful Prince Bishop. Others were owned by Dukes and Earls. The difference in the classification between castles, and manors or palaces, is in whether they were fortified or not, castles being fortified residences. However even this is a grey area. Weoley Castle is one example of a manor house which acquired a licence to crenellate in 1264, becoming classified as a castle (Birmingham Museums and Art Gallery 1974). The 'fortifications' on many castles in this later period were more often for show and status than for defence. Manors and castles are here classified under the name by which they are generally known. These sites therefore represent the highest social classes in medieval England.

Many of these castles, palaces and manors were one of the owners' many properties, and only visited periodically. This has implications for the number of finds that can be expected to be excavated from each site. The entourage and possessions of Edward I's household during a move between residences towards the end of his reign is described as 'all embracing' ... 'from plate and clothes to beds and chapel furnishings' (Beaumont James 1990, 168). In 1244, large quantities of ceramic tableware and tablecloths were sent from bishops' manors in Hampshire, Berkshire, Buckinghamshire, Wiltshire and Surrey, to Wolvesey Palace in Winchester for the feast of St Edmund (ibid., 88). However, there were variations in the mobility of individual households and the scale of their moves. Gilbert de Clare moved every two weeks in 1309, whereas Hamon le Strange did not move once between 1341 and 1352 (ibid., 166). It is therefore not clear how far each of these establishments would have permanently stocked glass vessels, and how far they would have been transported with the owners. Glass would have been especially vulnerable to breakage during transport by cart. If glass was transported between residences, then the proportions of glass used at each residence is difficult to assess from the archaeology. The vessels discovered during excavation

would reflect only the proportion of breakages which would have occurred, and the glass consequently disposed of, while the site was inhabited by the owner. A castle which the owner visited for only a month would consequently have less glass in its rubbish pits than one inhabited for eight months, even though the same numbers of vessels may have been used in each. The glass from temporary residences would therefore appear under-represented compared to the glass of a residence which was permanently inhabited, making it difficult to compare the statistics between the two, or between a temporary castle residence and a permanent town house. However, it seems unlikely that this mobility makes a great difference to the statistics, since the excavated vessel glass is such a tiny and biased proportion of the original amount in use.

The mobility of large households decreased generally towards the 15th century. From the later 14th century, the owners of multiple estates had less cause to visit them all. The growth of the market economy meant that produce from the estate could be sold, a change from earlier years when the owners travelled to each estate to consume the produce themselves. Many of these estates were rented out to, or managed by, farmers (Dyer 1989, 99-100).

The medieval glass vessels in this thesis have been found at two bishop's palaces, two royal palaces, nineteen castles, and ten manor houses. In general these sites have higher percentages of tablewares than other types of sites. In comparison with monasteries, this is partly because castles have more stratified 13th and 14th century levels, a time when glass tableware is more prolific. Monasteries are dominated by late 15th to early 16th century Dissolution deposits, when glass assemblages are characterised by utilitarian vessels.

There are some discernible patterns in the glass found on these sites. One notable statistic is that green glass hanging lamps have only been found at two of the twenty-three castle or palace sites. Hadleigh Castle had three green glass hanging lamps from a 15th century context. The site of the 'History Building' in the North Bailey in Durham, which is situated in the area of the administrative buildings in the fortified area outside the castle controlled by the Prince Bishop, has also produced one lamp base. No context information is available, but it was found with other 13th and 14th century glass, so it may date to the same period. An Islamic-style glass lamp was found at the royal castle at Knaresborough. This lamp of eastern Mediterranean origin was more impressive and decorative than an English forest glass hanging lamp. Even Ludgershall Castle has glass of every other vessel function, but no hanging lamps. Perhaps local green glass lamps were not prestigious enough to be displayed by the highest sections of society. While it is evident that glass tableware was a luxury item to be displayed, and that utilitarian glass was used behind the scenes, the status of glass hanging lamps is more enigmatic. There is no obvious explanation for this low occurrence of glass lamps in castles and palaces. Hanging lamps are found in excavations of four of the ten manor

houses, and wealthy town houses, so they cannot be a particularly low-status vessel. There may be a practical reason, such as the ceilings of the great halls in castles being too high to hang lamps from. It is possible that lamps found in Hadleigh and Durham castles were used in the chapel rather than the secular part of the castle, since lamps are known to have been popular for liturgical use.

An early 15th century French manuscript illustration shows a King and Queen in a four-poster bed with a hanging lamp suspended from a rail above, with various other items including a sword (BL, Burn. 257, fol. 27). The material of which the lamp is made is not clear. The shape is found in both pottery and glass, but the height at which it is suspended suggests that it is probably glass, as a pottery lamp would not give any effective light from that height. This implies that hanging lamps were acceptable in castles and palaces, in France at least, and that the low occurrence of lamps from English castles could be a coincidence due to a bias in the archaeological data. Very little evidence is available from castle excavations to suggest which alternatives might have been used for lighting in castles. Finds include stone cresset standing lamps from Launceston Castle in the 12th century, Bramber Castle in the 13th to 14th century, and of unknown date from Portchester Castle. Late 11th to 12th century pottery lamps have been found at Castle Acre Castle. Fragments of candlesticks have been excavated at the castles at Lochmaben in Scotland, Laugharne in Wales, and Conisborough in Yorkshire (Kenyon 1990, 173). However, it is necessary to survey a great deal more evidence than this to be able to ascertain the typical range of lighting methods which were prevalent in medieval castles.

Tableware, not surprisingly, makes up a prominent percentage at all of these three site-types (Table 2). Of the four palaces where glass was found, three of them have 100% of glass tableware. These are the royal palaces at Clarendon and King's Langley, and the Bishop of Winchester's palace in Southwark. The Bishop of Winchester's Palace at Wolvesey produced two tableware vessels, an enamelled beaker fragment from Venice, and a high-lead glass goblet fragment from northern Europe, as well as a flask and three flask/urinals. No other 'industrial' vessels were found. Stemmed goblets were found at Clarendon and in Southwark, and various beaker types and a 'pilgrim-flask' were excavated at King's Langley. These palaces clearly lived in some luxury. Uroscopy is also known to have been conducted in royal households, with documentary evidence that both Edward I and Henry VIII possessed urinals (see pp. 80-2).

Manor houses also contain relatively high proportions of 13th and 14th century tableware. For example, a blue-trailed bowl from the Mediterranean region was found at Micheldever Manor, a prunted beaker came from Northolt, a blue jug from Penhallam, and a 12th to 13th century style bowl with blue and colourless applied decoration was excavated at Drayton Bassett. Although a statistically smaller

percentage of the glass found at castles consists of tableware due to the presence of other types of glass, the actual number of table vessels is higher in this than any other group (Table 3). Excavations at Ludgershall Castle produced some very fine European potash glass stemmed goblets with decorative fins and frills around the stem, including an almost complete example, and an opaque red high-lead glass beaker. High-lead glass goblets were found at Old Sarum, Durham and Knaresborough castles, with fragments of blue jugs or flasks from Old Sarum and Durham. At Pevensey, a green glass jug with opaque red marvered trailing was excavated from a well. At Winchester Castle, a colourless beaker with blue trailing was found. Colourless bowls with ribs or blue trailing and a prunted colourless beaker came from Hadleigh. An Islamic gilt and enamelled flask, an eastern Mediterranean decorated manganese-purple glass base and a Venetian enamelled beaker were found at Restormel Castle. A similar Venetian beaker was found at Launceston Castle, also in Cornwall. Another Islamic gilt and enamelled vessel and a fragment of blue glass painted with pale blue enamel, possibly French Gothic, came from Weoley Castle.

There was a reduction in the use of castles in the 15th century, with widespread disuse and dereliction. Thompson lists documentary references to derelict or abandoned castles in the early 16th century, which are only a sample of the actual number (1987, 170). Ludgershall Castle was in use from c. 1100-1400. Lewes Castle had no resident lord after 1347 and fell into disrepair. A similar reduction in use occurred in palaces. Clarendon Palace, for example, was used less in the late 14th century, had 'some brief revivals' in the early 15th century, but had no royal visitors in the second half of the 15th century (Beaumont James 1988, 9). Royal residences decreased in number and became concentrated in the south-east, around London and the Thames Valley by the 15th century (Beaumont James 1990, 164-7).

A consequence of this change is that tableware is rare on castle sites in the 15th century. Those occupied in the 15th century include Pleshey Castle, Bramber Castle and Sandal Castle. There is very little 15th century tableware from these, other than a possible beaker rim from Sandal. Although tableware is less common amongst glass assemblages of the 15th century in general, deposits of Venetian-style 'cristallo' of the late 15th and early 16th centuries have been found in excavations in towns such as Upper Bugle Street in Southampton, and from sites in London, so it was certainly in use. Even monasteries, where it has been proposed that fine 15th century glass is under-represented in excavations, there are more fine 15th century vessels than at castle sites. It could therefore be expected that some fragments of 15th century glass would be found at castles still in use. It appears that those castles that were still inhabited were no longer used as centres of conspicuous consumption. A similar decline is seen in the glass from manor houses and palaces. 'King John's Hunting Lodge' at Writtle had one imported flask, but other flasks were made of local green glass. The other manor house

with 15th century glass was at East Haddesley, but again, this only had utilitarian flasks of green glass.

Distilling equipment was present in the 15th century at three or four castles, and one manor house, with a particularly large deposit at Sandal Castle. It is known from documentary evidence that alchemy was practised in some castles. For example, James IV, King of Scotland, practised medicine, surgery and alchemy. He and his assistant John Damian equipped an alchemical laboratory at Stirling Castle in the late 15th and early 16th century (Holmyard 1967, 213-5). An inventory of 1494-5 of John Plumtre, an apothecary of Nottingham, introduces a list of distilling vessels of various materials including glass, with 'Be hit hade in mynde that y left with John' a Dammys in the Castelle' (Records of the Borough of Nottingham 1882, 284). This may even have been the same John Damian of Stirling. Castles may have possessed their own apothecary or physician. On a smaller scale, all large households including manors were responsible for the everyday health of their household. In the 16th century there are records of Lady Petrie of Ingatestone Hall in Essex buying glass distilling vessels, probably for herbal or medicinal use (Moorhouse 1972). This practice is likely to be similar a century earlier. Fragments of tubing which may come from alembics were found at the manor site at Waterperry in Oxfordshire. Flasks and urinals are common on all three types of site.

Spatial analysis of castle and manor sites is of limited value. Ludgershall Castle in Wiltshire has the most informative range and quantity of glass vessels of any of the castle sites, with a detailed distribution map available from the excavations (pers. comm. Peter Ellis). It was a royal castle, occupied from c. 1100 to 1400. Glass was found in two broad areas. The north ringwork contained the royal chamber block and domestic quarters, the standing tower, and the great hall where entertaining would have taken place. Most of the vessel glass was excavated from 14th century garderobe pits in this area. It included a large number of 'urinals', a few fragments of tableware including an opaque red high-lead glass beaker, some ribbed rims which may also come from tableware, a few kicked flask bases, and some tubing thought to come from an alembic. Other contexts in the domestic range produced stems from two goblets, a blue jug, and a 'finial' from an unknown vessel, possibly a goblet lid or a Mediterranean-style lamp. Flasks and a kuttrolf in later disturbed layers may also be medieval. Tableware, utilitarian and industrial functions are therefore represented in this area.

Glass was also found in the south ringwork, in a latrine pit associated with stone building 18 which is of unknown function. This pit contains an almost complete stemmed goblet with decorative fins, and a 'flask/urinal'. Fourteenth century documents refer to 'service areas' of the castle, which may have been situated in this area. However, it would seem more probable that the stemmed glass was used in the main north ringwork area. All that can therefore be concluded from the spatial analysis is that

the distribution of the glass reflects disposal rather than the areas in which the glass was used.

In conclusion, tableware makes up a large percentage of the glass assemblage from palaces, castles and manors in the 13th and 14th centuries. Less evidence is available for interpretation in the 15th century. It was at these sites that 'conspicuous consumption' would have been used to its greatest extent, discussed in Chapter 5 (see pp. 148-51). A range of other utilitarian functions are also represented. Little distinction can be made between the use of glass in castles, palaces and manors. The apparent lack of hanging lamps in castles and palaces has been noted, and the particularly high percentage of tablewares in palaces. Otherwise, their use of glass was similar.

4.4: Glass from towns

Medieval vessel glass has been found on one hundred and twenty-nine sites from twenty-nine different towns in England. These sites do not include urban monastic sites. It is not always possible to be specific about the character of the site, since urban rescue excavations often cover very small areas. Sites of different character are juxtaposed in a town, so it is not usually possible to guess the character of the site from the general area in which it is located without further evidence. Much of the excavated glass comes from rubbish deposits, including pits and cesspits within individual tenements, but also more mixed dumps in open areas, and waterfront revetments on the Thames foreshore in London at Trig Lane, Swan Lane, and Baynard's Castle. The dumps and revetment deposits may contain rubbish of mixed value collected from various different areas of London. They contain material discarded by a cross-section of society, and the status of the owners of the glass is difficult to evaluate. Baynard's Castle is described as having finds of a 'high-class milieu' although 'there are also everyday items' (Egan and Pritchard 1991, 4). Glass has been excavated from rubbish dumps at the Gas Works in Norwich, and the Shires site in Leicester contained a large number of pits in a sparsely populated area, which may contain rubbish from a different area of Leicester. A site at Eastgate in Beverley contained soil make-up layers brought from another area of the town (see p. 113). Towns also contain sites of monastic or aristocratic character, such as friaries, urban castles, and palaces, for example Winchester Palace in Southwark.

In many cases, the urban sites are clearly 'high-status'. These include stone-built houses with stone-lined cesspits. Good examples are the Longmarket in Canterbury, Cuckoo Lane and High Street in Southampton, the Brooks in Winchester, and the General Post Office Site in Newgate Street in London. These high-status urban sites include the premises of both merchants and consumers of glass. Some excavated sites, particularly in port towns or London, may be temporary depots owned by landowners,

where goods including glass were stored before being transported to regional estates or monasteries (Dyer 1994, 261). If any of the finds were goods in storage ready to sell or transfer, this is not distinguishable from the archaeology. For example, the enamelled beakers from the goldsmith's pit in Foster Lane, which numbered between six and eight vessels, were in a pit with semi-industrial as well as general household waste. Rubbish from the work area and the domestic area were evidently disposed of together, and we cannot separate them.

There is some evidence of the social classes who owned the town houses in which glass was found. It has been postulated that the site at Cuckoo Lane A in Southampton was owned by Richard of Southwick, a prominent burgess and property owner who died in 1290 (Platt and Coleman-Smith 1975, 294). His seal-matrix was excavated from the same cesspit as the vessel glass, as well as the seal-matrix of Bernard de Vire, possibly a visiting Norman merchant. Documents show that he also owned property in other areas of Southampton. The pit certainly contained the rubbish of a 'well-off household' (ibid., 293). It included a gold ring, Spanish lustre pottery from the Malaga region, polychrome pottery from the Saintonge region of France, Iranian silk, fig seeds, palm and rush fibres possibly used to pack goods from the Mediterranean, and the skull of a barbary ape (ibid., 293 and 356). Other sites excavated in Southampton which produced glass vessels were stone-built houses of a similar character, and probably owned by similar wealthy merchants and burgesses. The sites include High Street C, Upper Bugle Street, Wool House and Westgate. The situations in which the glass may have been used are discussed in Chapter 5 (pp. 150-2).

In Canterbury, documentary research of the rent rolls of Christchurch Priory by William Urry has provided the names of some of the owners of properties excavated in the Longmarket. The Longmarket is situated in the town centre, not far from the Cathedral Gate. The medieval houses excavated were built of stone, and much fine vessel glass was found in a stone-lined cesspit dating to 1275-1300. In about 1200 this part of the site was owned by Theoric the Goldsmith, described by Urry as 'one of the great men of the city in the last years of the century' (Urry 1967, 174-5). Amongst his many business activities he was a financier, helping to fund Richard I's expeditions to Brittany and Wales, and a Borough Reeve (ibid., 118 and 175), and had died by 1208. His sons may have continued his business on the same site in the 13th century. This central area of Canterbury remained a prime location throughout the medieval period, and the inhabitants would have been of a similar status to Theoric in the 13th century, confirmed by the fine glass and other artefacts excavated there.

The amount of glass found in London is exponentially greater than any other town. This is partly due to its larger size and to the number of excavations carried out in London. London also acted as a centre for luxury trade, particularly from the 14th century onwards (Miller and Hatcher 1995, 214-5). Although other ports clearly did

import and transport glass, London may have had a monopoly on the smaller numbers of the more exotic Venetian or eastern Mediterranean goods. In the 15th century, the bishop of Carlisle and the cellarer of Durham Priory bought spices from London merchants, even though they would have been available in a nearer port or town (Dyer 1994, 261). Nobles were increasingly drawn to London as a political and social centre towards the 15th century. Consumers also came to prefer to buy imports directly from the London quayside rather than using regional towns, merchants or fairs (ibid., 280).

There is no evidence that any of the urban sites containing glass are of 'lower status'. However, an excavation in Eastgate in Beverley was in an 'artisan' area of the town. It was situated in what was a 'marginal' area of Beverley, which environmental evidence shows was seasonally waterlogged. The first evidence for buildings dates to the 1070s or 1080s, which were of an industrial nature until the 14th century, after which the stratigraphy became too disturbed for excavation. The site provided evidence for cobbling, textile processing and other crafts and industries of an anti-social nature which were often situated at the edge of towns due to their fumes, smoke and waste. Late 13th century records document a mason and a carpenter living in Eastgate, both 'working class' occupations. Friaries were commonly given grants of marginal land, and the Beverley Dominican Friary was characteristically situated in this area, near Eastgate. In the late 14th century the records show that Eastgate was a popular area for landlords to build rented housing blocks, but it remained a low-status area (Evans and Tomlinson 1992, 270-2).

It is surprising then that two fragments of medieval vessel glass were found at Eastgate, contrary to the character of the sites where most glass is found. One fragment came from a high-lead drinking glass. It is extremely surprising to find such high-status glass on a low-status site until we examine the context. The glass was from soil levelling layers brought in during building. The soil also contained 13th century window glass, and it is likely to have been the rubbish from a religious site, possibly the nearby Dominican Friary, where other high-lead glass has been found (Evans and Tomlinson 1992, 65 and 102-3).

There are no distinctive differences in the patterns of use of glass in towns between the 13th to 15th centuries. There is clearly an intermingling of society in towns which makes it difficult to be certain of the social groups who used glass and what it was used for. This gives more significance to any patterns that can be ascertained from the glass found in monasteries and castles. The statistics may simply reflect the fact that because the number of town sites is much greater, the resulting averages make it impossible to identify any patterns in the glass used.

4.5: The national distribution patterns of glass in England

There are gaps in the overall geographical distribution of glass in England. Some regional gaps may be due to the lack of archaeological research or information available, such as in the area around Bristol. Areas which are not heavily populated, such as Lancashire, have fewer excavations, and may also have been sparsely populated during the medieval period. The absence of glass from all rural village sites (except Seacourt, see p. 97) is probably a genuine absence, since many deserted medieval villages and other sites have been excavated and no vessel glass has been found. This lack of glass on 'lower status' sites will be discussed further in Chapter 5 (pp. 143-4). English sites have produced some imported forms only found in England in addition to a wide range of the vessel forms known in the rest of Europe. This must partly be a consequence of the amount of research into medieval glass which has been carried out in Britain, concentrated in a much smaller area than most other European countries. However, little is known about the glass used in Wales or Scotland.

Distribution maps of the glass are the product of many different methods of dispersal. Trading routes can be discerned to some extent for artefacts such as local English pottery by examining its distribution (McCarthy and Brooks 1988, 81-96). Unfortunately this is far more difficult with an international luxury trade such as glass. We rarely know the precise area of production, and consequently we do not know which trading routes the glass took. Distribution patterns may sometimes reveal clusters of glass around particular ports. For example, if a glass type has been found only in London, this suggests that it was only traded there, and consequently a restricted luxury item.

Glass vessels are shown in significant quantities in ports or their dependent towns. There is documentary evidence for the importation of medieval vessel glass in Southampton, Hull and London. However the nationalities of the ships which brought it, recorded in port customs accounts, reveal little about the origin of the glass (see pp. 33-4). They may have carried cargoes from many countries including other ports in England, since water transport was cheaper than road transport (Dyer 1994, 262), and provided a smoother journey for fragile glass. Large quantities of glass are also found inland, and it is not possible to confirm how the glass reached these sites. It may have originally been purchased from a shop or fair, directly from the port or an inland town, by the owner or one of his household, or an agent (Britnell 1993).

As noted in pottery studies, trade is not the only method by which goods are distributed across the country. Glass, being a luxury product, may have been presented as a gift or brought back from other countries as a souvenir or gift (see pp. 119-21). Some is likely to have been transported between estates when the great landowners' households moved. Moorhouse noted that the non-local pottery found at Sandal Castle came from Conisbrough, Doncaster, West Sussex, Buckinghamshire and the Welsh

Marches, and that these areas correlated with the other estates of the Warenne family who owned Sandal (McCarthy and Brooks 1988, 92-3). It is interesting to note that medieval glass was also found at the Warenne's castles at Conisbrough, Castle Acre, Lewes, Reigate and Sandal, although the glass from Sandal dated to the 15th century when the castle was in royal hands. Perhaps some of that glass arrived in those castles in the Warenne's baggage, rather than being bought in local towns.

The distribution of vessels of selected glass types from different production areas (or traditions, since we rarely know the specific area in which particular vessel types were made) are discussed below. They include stemmed glasses of potash glass from northern Europe, soda glass bowls from Mediterranean Europe, high-lead glass vessels from north-west Europe, and glass from the eastern Mediterranean.

4.5.1: Potash glass

Green potash glass was produced in Europe as well as England (see pp. 24-7). English potash glass products were dominated by 'functional' wares, including hanging lamps, flasks, urinals and distilling vessels. There is some inconclusive evidence that beakers and some other types of tableware such as jugs may have been made in England. It is unlikely that any of this 'functional' forest glass was imported, other than with the personal belongings of foreign visitors. Potash glass tablewares found in England which are likely to have been imported from Europe, where parallels have been found on production and consumption sites, include goblets, beakers and decorated flasks and jugs.

Since it is difficult to identify the specific production area of some types of potash glass, this section will consider the distribution of potash goblets of types A1-5 only. These date to the late 13th to 14th centuries and were probably made in France and the Low Countries (see Vol II, p. 4). They include goblets with mould-blown fins or ribbing around the bowl. In England, these are almost exclusively distributed in the south of the country, apart from one fragment which was found in Kirkstall Abbey Guest House in West Yorkshire. This deviation in the pattern could be interpreted as having reached Kirkstall in personal baggage. The remaining goblets are found in port towns at Exeter, Poole, Southampton, Winchester, and London, and elsewhere at Ludgershall Castle, Clarendon Palace, Glottenham moated site, Winchester and Canterbury. Other types of 13th and 14th century potash glass tableware do not challenge this distribution pattern dramatically. More beakers are found in the north, but many of these date to the 15th century, suggesting a slight change in the pattern of trade by then. A trailed flask from Tynemouth Priory and an jug with opaque red marvered trails from Lincoln date slightly earlier, to the 12th to 13th centuries.

The general distribution of these 13th to 14th century goblets suggests that they arrived in south coast ports, and that they were not traded much further inland by

middlemen. This pattern differs from the distribution of soda and high-lead glass which are also found up the eastern coast of England. It is possible that potash glass tableware was valued slightly less than soda and high-lead glass because it was made of the same glass colour and composition as local utilitarian wares. There is some suggestion that soda glass, with its transparent 'cristallo' appearance, had some symbolic importance attached. For example, in litanies of the Virgin Mary she is likened to a 'clear glass', and earlier carved colourless rock crystal had a magical status (pers. comm. Nicholas Penny, National Gallery). This may partly explain why merchants did not make significant efforts to travel to the east coast of England or further inland to sell potash glass vessels.

4.5.2: High-lead glass

High-lead glass was recognised as a medieval type of vessel glass in north-western Europe only as recently as 1987 (see p. 9; Krueger 1987). A wide range of these vessels from across Europe were displayed and published in the 1988-89 exhibition 'Phoenix aus Sand und Asche' in Bonn and Basle (Baumgartner and Krueger 1988). They are believed to have been manufactured in north-west Europe. Preliminary lead isotope analyses have suggested that four fragments excavated in Germany were made using local lead from the Harz Mountains. However, other lead glass may have been made elsewhere (see pp. 30-2).

The total number of high-lead glass vessels known in England now stands at twenty-nine. A distribution map shows their locations (Fig. 4). They have a distinctly more northerly element in their distribution than other types of vessel glass. This suggests that the glass either arrived in north-eastern ports from north-west Europe, or that some may have been produced in northern England. However, the continent has a wider range of forms which include yellow, green and opaque red lead glass, while all but one of the English finds are of yellow glass, with one opaque red vessel from Ludgershall Castle. Lead isotope analyses on the lead glass found in England may identify whether the glass contains German lead, or whether any might have been made in England with local lead.

However, there is also a southern presence with lead glass excavated in Southampton, Old Sarum, Ludgershall, Winchester, and Monmouth in south Wales. A possible explanation for the general north-eastern bias in the distribution may be the early 13th century date of the glass. A trading pattern concentrated on the east coast in the 13th century, and the south as well as the east coast in the 14th century, is suggested by the distribution of colourless bowls with blue trailing (see pp. 118-9). The distribution pattern is therefore unable to confirm where the lead glass was imported from.

4.5.3: Mediterranean European soda glass

Colourless soda glass was produced over a wide area around Mediterranean Europe, including south France, north Italy, south Germany and Switzerland, the Balkans and Spain. In England colourless soda glass has been excavated across the whole country, concentrated along the areas of the major ports in the east and south. Since the specific origins of many of the glass types cannot always be distinguished, and particular types may have different origins, merchants, dates and trading routes, only one specific type is discussed here.

A group of colourless bowls with applied blue trailing were produced in southern France and northern Italy in the late 13th and 14th centuries (Type C3). There is undeniable evidence for their production at furnace sites in southern France, and although no bowl fragments have been found on production sites in Italy, it was part of a similar cultural area with similar styles of glass in production. The bowls have an S-shaped or hemispherical profile, and often have an applied pincered base ring. They can be divided into two styles. Those with blue trailing combined with colourless drops, and those with blue trailing only. Fragments from the first group have been found in Nottingham, from a late 13th to early 14th century pit at Drury Hill, and an undated pit at Weekday Cross. Those from the second group, with blue trailing only, come from early 14th century contexts in the south at Southampton, Hadleigh Castle, Micheldever Manor, as well as Nottingham in the east.

An examination of the glass from the southern French furnace sites of Planier, La Seube, Cadrix and Rougiers suggests that there is indeed a division in the dating of these two types between the 13th and 14th century. Bowls with blue trailing combined with colourless drops have been found at Planier which is dated to the 13th century. The second type with blue trailing only is found at the other three sites, which are dated to the 14th century. The difference in the glass styles between Planier and the other three sites cannot be attributed to regional variations. Planier is situated close to both Rougiers and Cadrix in the area to the north and north-east of Marseilles, while La Seube lies some distance away to the north of Montpellier. However, Rougiers and Cadrix have more similarities with that from La Seube, all dating from the 14th century, than with their 13th century neighbour Planier. These differences are therefore determined by date rather than geography.

Italian merchants dominated Mediterranean trade in the 13th and 14th centuries, and it is likely that they brought glass, including these bowls, from southern France to England (Ruddock 1951, 82). The Italians on the west coast in towns such as Genoa, Lucca, Florence and Siena, are likely to have sailed past southern France on their journeys. The Genoese particularly are known to have brought a wide variety of products to England from the Mediterranean region, including those from southern France (ibid., 106 and 111). Shipping in the early 16th century used routes which kept

Figure 4:

Distribution of High-Lead Glass

close to the coast, hopping from port to port, and probably used similar methods in the preceding centuries. This was not so much because the 'high seas' were more dangerous, but because it suited the organisation of trade (Braudel 1949, 103-8). Commodities could be sold and bought at each port, presumably making the venture more profitable. Ships from north-west Italy would have sailed past southern France, and surely have traded in her ports. Ships from southern France may also have have brought French products to English ports.

The differences between Nottingham and Southampton, with bowls dating from both the 13th and 14th centuries in Nottingham, but only the 14th century in Southampton, suggests that the east coast of England was more heavily involved with Mediterranean trade at an earlier date than the south coast ports such as Southampton. Nottingham's imports are likely to have come from the ports of Boston or Kingston-upon-Hull. This pattern is supported by documentary evidence for trade patterns which show that the key English export of wool came in the majority from the Cistercian abbeys of Yorkshire in the 13th century (Ruddock 1951, 16-17). For example, in May 1277, wool exported to Italy from customs accounts in England totalled 5115 sacks, with 45 sacks from Southampton, but the rest from Boston, Hull, and other east coast ports (ibid., 18). Merchants from towns such as Florence, Siena, Genoa, Bologna and Lucca, travelled north and exported wool from Newcastle, Kingston-upon-Hull, Lynn and Boston to the Low Countries for cloth making before transporting the cloth back to Italy. However Southampton lay off the main route of Italian trade for most of the 13th century. It became more important after the outbreak of the Hundred Year's War with France in 1337, which made the east coast of England less safe for shipping (Ruddock 1951, 29). Small scale Italian trade in Southampton is documented from the end of the 13th century, including some wool, but an insignificant amount compared to that of the east coast. The earliest state-organised fleets from Venice started to use Southampton as a major port in earnest in the 14th century.

The distribution of blue-trailed glass bowls in Nottingham in the 13th century, and Southampton (as well as Nottingham) in the 14th century fits in well with this trading pattern. It makes it likely that soda glass was brought by Mediterranean ships, possibly Italian or southern French merchants, rather than carried in stages overland to the Atlantic coast of France for a shorter sea journey or overland and up the Rhine.

4.5.4: Eastern Mediterranean and other Islamic soda glass

Fragments from at least nineteen glass vessels of Islamic, Byzantine or other eastern Mediterranean origin have been found from seventeen sites in England, eight of these in London. The Islamic glass may come from Syria, Egypt, or possibly Spain (see pp. 27-30). The glass has been excavated in towns, castles and monastic sites, as well as a fragment from the deserted medieval village of Seacourt (see p. 97). Its distribution

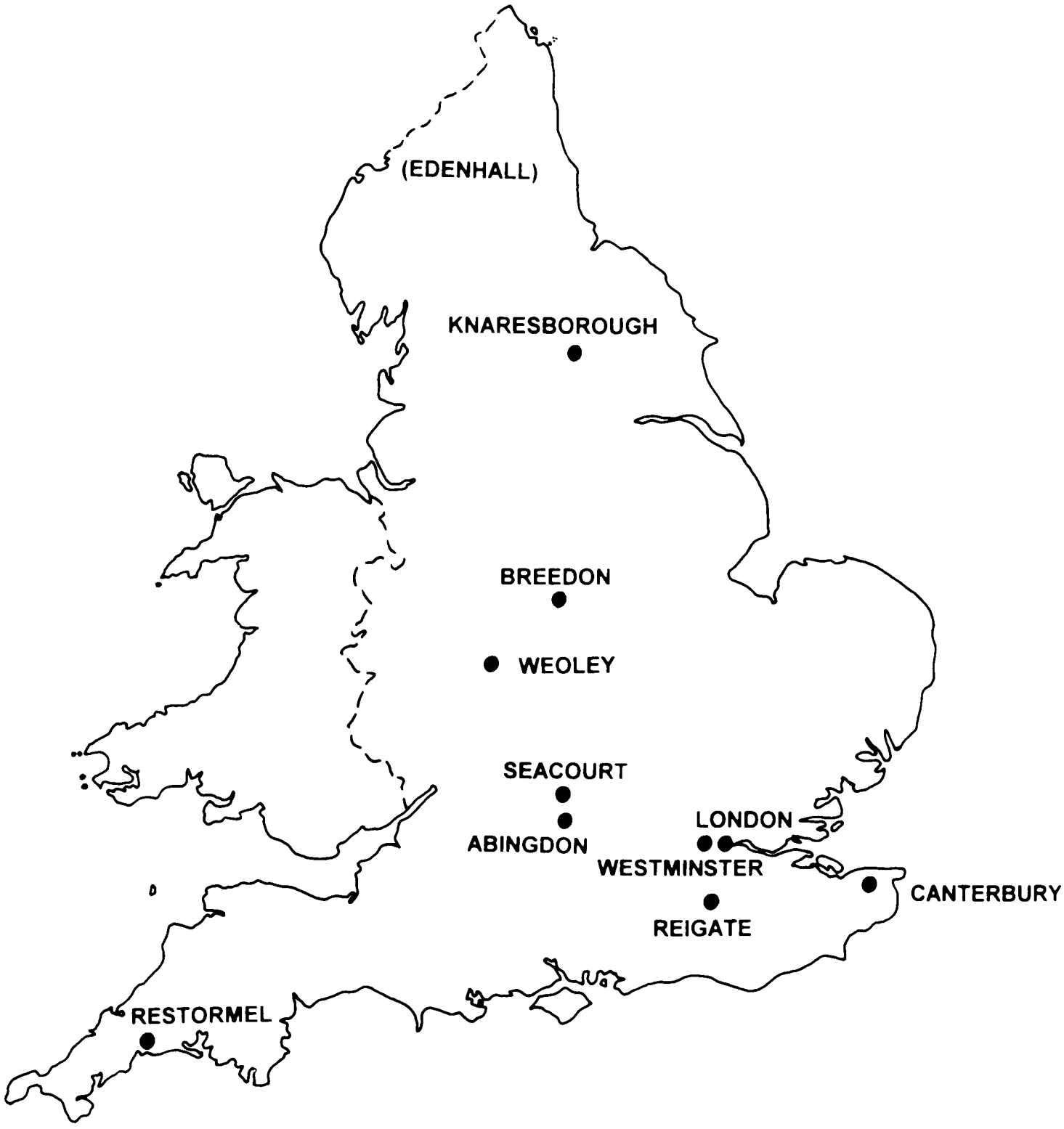


Figure 5:

Distribution of Islamic and Byzantine Glass

does not create any discernible pattern of trade routes, as it is found across the whole country, although on a small scale (Fig. 5).

It is often suggested that eastern Mediterranean glass vessels were brought back to Europe by Crusaders, from Syria, Egypt or the Byzantine Empire (Pinder-Wilson 1991, 135; Cotter 1991, 52). There is evidence that glass vessels were made as pilgrim souvenirs in the Holy Land, such as a pair of beakers now in the Walters Art Gallery, Baltimore. These are painted in gilt and enamel, with scenes which have been interpreted as the Dome of the Rock and the Holy Sepulchre in Jerusalem, and Christ entering Jerusalem on a donkey (Atil 1981, 126-7, Nos. 44-45; pers. comm. John Carswell). Others may have been diplomatic gifts, such as the Islamic flask from the royal Pyx Chapel at Westminster or the fragments from the Earl of Cornwall's castle at Restormel.

Some glass vessels may have reached Europe by these channels, but it is also reasonable to suggest that others arrived by trade. It is true that Islamic and other eastern Mediterranean glass is not found on a large scale in England, but there are few individual types of imported glass from Europe which are found in any quantities. However, trade was undoubtedly occurring. By their very nature, these luxury vessels would have been found on a small scale. They were also so elaborate and exotic that many must have passed through generations as heirlooms and collectors pieces, under-represented in archaeology, as they never reached a buried context, such as the Luck of Edenhall (GB58).

An Islamic lamp was excavated at Knaresborough Castle in Yorkshire. The occupants of the castle included royalty, the baron Piers Gaveston, and John of Gaunt, Duke of Lancaster from 1372 (Illingworth 1938, 63). The lamp dates to the 13th or 14th century, but was disposed of in a pit of the late 14th or early 15th century. Whether it belonged to John of Gaunt, or was left by previous owners, is unknown. The high rank, mobility and wealth of all of these characters make it equally possible that the lamp was donated as a gift, brought back from travels, or purchased in England.

Glass should not be looked at in isolation when assessing its volume and likelihood of having been traded from the eastern Mediterranean. Other products were acquired from the east, including pottery, metalwork, silks, spices and precious metals (Cotter 1991, 50-2). Italian merchants acted as intermediaries in the trade between east and west (Postan, Rich and Miller 1963, 165-8). It is likely that many Islamic goods reached Britain indirectly through Italian trade, possibly passing through the hands of other merchants before reaching England.

To sum up, there are some discernible patterns in the distribution of medieval vessel glass, despite it being such a small proportion of the glass that was originally in use. Finds were restricted to 'high-status' sites. Amongst different types of these sites,

there were some distinctions in the proportions of the functions and dates of the glass found. For example, the glass found in monastic houses may reflect the different lifestyles of the orders, or the degree to which they practised crafts. Palaces had an especially high proportion of luxury tablewares. These patterns may sometimes be affected by depositional and post-depositional factors more than the actual proportions of glass originally in use. Spatial analysis within individual sites was of limited value. However the distribution of glass across England showed slight variations in the glass found in particular areas. A consideration of how the glass reached its destinations concludes that although a number of means of dispersal may have been relevant, such as personal carriage or gift exchange, trade is likely to have been responsible for the distribution of most of the glass.

Table 1: Summary of the glass vessels and their functions found on each site.

1a: Monastic Sites

SITE	Type	Dates	Total	Table	Lamp	Flask	Urinal	Dist.	Misc.
Battle Abbey	BM	13th-e16th	43	6	9	13	12	2	1
Canterbury, Linacre Garden, Christchurch Priory	BM	l15th-e16th	28	3	0	18	7	0	0
Canterbury, St Augustine's Abbey	BM	l15th-e16th	22	0	0	4	18	0	0
Exeter, Cathedral Close	BM	13th-15th	1	1	0	0	0	0	0
Eynsham Abbey	BM	15th-e16th	47	2	1	10	32	2	0
Shrewsbury Abbey	BM	l15th-e16th	1	0	0	0	1	0	0
St Alban's Abbey	BM	12th-e16th	14	3	2	4	5	0	0
Stamford, St Leonard's Priory	BM	l15th	-	-	-	-	-	Yes	-
Tynemouth Priory	BM	13th?	6	1	2	3	0	0	0
Westminster Abbey, Pyx Chapel	BM	13th	1	1	0	0	0	0	0
Winchester, Cathedral Green	BM	l11th-13th	5	4	1	0	0	0	0
Grove Priory	BM (A)	13th-e16th	16	0	1	4	7	4	0
Pontefract, St John's Priory	ClM	15th	142	6	8	34	26	68	0
Bordesley Abbey	CM	13th-15th	5	0	3	1	1	0	0
Kirkstall Abbey Guesthouse	CM	13th-15th	3	2	0	0	0	1	0
Exeter, Polsloe Priory	BN	13th-15th	5	4	0	0	0	1	0
Denny Abbey	FN	e16th	10	0	5	3	1	1	0
Bayham Abbey	PC	e16th	55	1	8	37	6	3	0

SITE	Type	Dates	Total	Table	Lamp	Flask	Urinal	Dist.	Misc.
Dale Abbey	PC	13th-14th	1	1	0	0	0	0	0
Breedon-on-the-Hill, Augustinian Priory	AC	13th	1	1	0	0	0	0	0
Christchurch Priory, Dorset	AC	14th-15th	3	3	0	0	0	0	0
London, 2-7 Dukes Place, Priory of Holy Trinity, Aldgate	AC	14th-15th	7	0	0	0	7	0	0
Selborne Priory	AC	15th	16	0	0	0	0	16	0
Waltham Abbey	AC	13th-15th	1	0	0	0	1	0	0
Beverley Dominican Friary	DF	13th-14th	1	1	0	0	0	0	0
Boston Dominican Friary	DF	13th-14th	5	5	0	0	0	0	0
Dunstable Friary	DF	14th	1	0	1	0	0	0	0
Ipswich, Falcon Street, Carmelite Friary	CF	13th-15th	9	0	4	0	5	0	0
Nottingham, Friar Street	CF	13th-15th	1	0	0	0	1	0	0
Leicester, Austin Friars	AF	115th	1	1	0	0	0	0	0
Lincoln, Silver Street BII	FF	9th-13th	1	1	0	0	0	0	0
Northampton Greyfriars	FF	115th	3	1	0	0	2	0	0
Salisbury, Franciscan Friary	FF	13th-15th	1	0	0	0	1	0	0
Beverley, Lurk Lane	?CO	112th-115th	4	1	0	0	3	0	0
York, The Bedern, College of the Vicars Choral	CO	13th-15th	36	14	2	8	8	2	2
Arundel, Maison Dieu	HO	14th-15th	1	1	0	0	0	0	0
Lincoln, St Mark's Church	CH	Residual	1	0	1	0	0	0	0
Lincoln, St Paul's-in-the-Bail	CH	11th-15th?	2	0	0	0	1	0	1

1b: Palaces, Castles and Manors.

SITE	Type	Dates	Total	Table	Lamp	Flask	Urinal	Dist.	Misc.
Southwark, Winchester Palace	BP	14th	2	1	0	0	2	0	0
Winchester, Wolvesey Palace	BP	13th-15th	6	2	0	1	3	0	0
Clarendon Palace	RP	14th	1	1	0	0	0	0	0
King's Langley	RP	1291-1431	5	5	0	0	0	0	0
Bramber Castle	CA	115th-e16th	5	0	0	2	1	2	0
Castle Acre Castle	CA	12th?	1	1	0	0	0	0	0
Conisbrough Castle	CA	13th-15th	1	0	0	1	0	0	0
Durham, History Building, North Bailey	CA	13th-14th	7	2	1	0	4	0	0
Guildford Castle	CA	113th	5	0	0	0	5	0	0
Hadleigh Castle	CA	13th-15th	11	4	3	4	0	0	0
Knaresborough Castle	CA	13th-14th	4	3	1	0	0	0	0
Launceston Castle	CA	13th-14th	2	1	0	0	1	0	0
Lewes, Barbican House	CA	?13th	1	0	0	0	1	0	0
Lewes Castle	CA	13th-14th	1	0	0	0	1	0	0
Ludgershall Castle	CA	13th-15th	41	9	0	6	17	4	5
Old Sarum	CA?	includes 13th-14th	10	5	0	1	3	1	0
Pevensey Castle	CA	12th-13th	1	1	0	0	0	0	0
Pleshey Castle	CA	15th-e16th	2	0	0	1	1	0	0
Reigate Castle	CA	114th-15th	1	0	0	1	0	0	0
Restormel Castle	CA	14th-15th	3	3	0	0	0	0	0

SITE	Type	Dates	Total	Table	Lamp	Flask	Urinal	Dist.	Misc.
Sandal Castle	CA	15th	33	1	0	0	0	32	0
Weoley Castle	CA	13th-14th	3	2	0	1	0	0	0
Winchester, Assize Courts Ditch	CA	14th	5	2	0	0	2	1	0
Drayton Bassett	MM	12th-13th	1	1	0	0	0	0	0
East Haddesley	MM	15th	3	0	2	1	0	0	0
Glottenham Moated Site	MM	13th-14th	1	1	0	0	0	0	0
Goldsborough Manor	MM	13th-14th	1	0	1	0	0	0	0
Micheldever Manor	MM	13th-14th	1	1	0	0	0	0	0
Northolt Manor	MM	13th-14th	2	1	1	0	0	0	0
Penhallam Manor	MM	13th-15th	2	1	0	0	1	0	0
Reigate, The Old Vicarage	MM	13th	1	1	0	0	0	0	0
Writtle, 'King John's Hunting Lodge'	MM	15th-e16th	5	1	0	4	0	0	0
Waterperry	?MM	13th-15th	6	1	1	0	1	2	1
Seacourt Deserted Medieval Village	VI	13th	1	1	0	0	0	0	0

1c: Towns.

SITE	Type	Dates	Total	Table.	Lamp	Flask	Urinal	Dist.	Misc.
Abingdon, Lombard Street	TH	13th	1	1	0	0	0	0	0
Barnstaple, Green Lane	TO	13th-14th	1	1	0	0	0	0	0
Bedford, St Mary's Street	TH	13th-14th	1	1	0	0	0	0	0
Beverley, Eastgate	TD	12th-14th	2	2	0	0	0	0	0
Canterbury, Longmarket	TH	13th-15th	19	6	1	0	11	0	1
Chichester, Chapel Street	TH	13th-14th	1	1	0	0	0	0	0
Chichester, Tower Street	TH	13th-14th	1	0	0	0	1	0	0
Christchurch, Staggs site	TH	13th	1	0	1	0	0	0	0
Colchester, Culver Street	TH	15th-e16th	7	0	0	2	2	0	3
Colchester, Lion Walk	TH	15th-e16th	34	2	6	9	5	12	0
Colchester. Long Wyre Street	TH	114th-e15th	1	0	1	0	0	0	0
Colchester, Middleborough	TH	115th-e16th	2	0	0	1	1	0	0
Colchester, Trinity Street	TH	13th-15th	1	0	1	0	0	0	0
Coventry, Much Park Street	TO	13th-15th	3	0	0	0	0	0	3
Dorchester, County Hall	TO	13th-15th	1	0	0	0	0	0	1
Exeter, Flower Pot Lane	TO	13th-15th	1	0	0	0	0	1	0
Exeter, Friern Hay	TO	113th-14th	5	2	0	0	2	0	1
Exeter, Goldsmith Street	TH	13th-14th	40	11	2	6	18	0	3
Exeter, Knott's, South Street	TO	113th	1	0	0	0	1	0	0
Exeter, KP	TO	13th-15th	1	0	0	1	0	0	0
Exeter, Trichay Street	TO	15th	5	2	0	1	1	1	0
Gloucester, East Gate	TO	13th	1	1	0	0	0	0	0
Hartlepool, Church Close	TO	14th	1	0	0	0	0	0	1

SITE	Type	Dates	Total	Table.	Lamp	Flask	Urinal	Dist.	Misc.
Hull, Blackfriargate	TH	14th	1	1	0	0	0	0	0
Hull, High Street	TH	l13th-e14th	5	3	0	1	1	0	0
Hull, Scale Lane	TH	14th-e16th	3	3	0	0	0	0	0
Hull, Sewer Lane	TH	14th-15th	3	3	0	0	0	0	0
Hull, Vicar Lane	TH	l15th	1	1	0	0	0	0	0
Leicester, St Nicholas Circle	TH	14th-15th	10	0	2	3	0	5	0
Leicester, The Shires	TO	13th-15th	2	1	0	0	0	0	1
Lewes, Brooman's Lane	TH	11th-12th	1	0	0	0	1	0	0
London, Albion House, 34-35 Leadenhall Street	TO	13th-15th	5	0	1	1	3	0	0
London, Aldgate	TO	l13th-e14th	1	1	0	0	0	0	0
London, Bank of England	TO	13th-14th	3	3	0	0	0	0	0
London, Baynard's Castle	WA	14th	29	10	4	1	12	0	2
London, Billingsgate Lorry Park	WA	13th-14th	2	1	0	0	1	0	0
London, Billingsgate Watching Brief	WA	1360-1400	1	1	0	0	0	0	0
London, 76-86 Bishopsgate	TO	13th-15th	4	1	0	0	3	0	0
London, Blossom's Inn Yard	TO	13th-14th	11	0	0	2	7	1	1
London, Blossom's Inn Yard Extension	TO	?15th	4	0	0	2	2	0	0
London, 64-66 Cheapside	TH	13th-15th	3	1	0	0	2	0	0

SITE	Type	Dates	Total	Table.	Lamp	Flask	Urinal	Dist.	Misc.
London, Cheapside House	TO	l13th-14th	1	1	0	0	0	0	0
London, Former City of London Boys School and Guildhall School of Music and Drama	WA	1450-1550	2	0	1	0	1	0	0
London, Dyers Arms, Cannon Street	TO	l15th-e16th	1	0	0	1	0	0	0
London, 7-10 Foster Lane	TH	14th	22	21	1	0	0	0	0
London, Gateway House, Watling Street	TO	l14th-l15th	25	4	0	6	15	0	0
London, 1-4 Great Tower Street	TH	13th-15th	2	2	0	0	0	0	0
London, Guildhall Art Gallery	TO	1150-1350	2	0	0	0	2	0	0
London, Guildhall House, 81-87 Gresham Street	TH	1350-1500	1	0	1	0	0	0	0
London E9, Hackney, Shore Road	MM/ TO	14th	3	3	0	0	0	0	0
London, 8 Hart Street	TO	13th-15th	3	0	0	2	1	0	0
London, 9-12 King Street	TO	13th-15th	1	0	1	0	0	0	0
London, Leadenhall Court, 1-6 Leadenhall Street	TO	13th-15th	6	1	0	1	3	1	0
London, 104-106 Leadenhall Street	TO	13th-15th	2	0	1	0	0	1	0
London, Lime Street	TO	12th-13th	1	1	0	0	0	0	0
London, Little Britain	TH	13th-15th	4	3	0	0	1	0	0
London, Lombard Street	TO	l13th-15th	1	1	0	0	0	0	0

SITE	Type	Dates	Total	Table.	Lamp	Flask	Urinal	Dist.	Misc.
London, Lothbury	TO	113th-14th	1	1	0	0	0	0	0
London, 10 Milk Street	TH	13th-15th	11	5	2	3	1	0	0
London, 1-6 Milk Street	TH	13th	1	0	0	0	1	0	0
London, Middle Area, General Post Office Site, Newgate Street	TH	14th-15th	4	2	0	0	2	0	0
London, Midland Bank	TO	13th	1	0	1	0	0	0	0
London, New Change, Bank of England	TO	14th	2	2	0	0	0	0	0
London, Nicholas Lane	TO	13th-14th	9	4	0	0	5	0	0
London, Old Jewry Chambers	TO	13th-15th	2	0	0	1	1	0	0
London, Post Office Court	TO	14th-15th	11	5	0	2	4	0	0
London, Queen Victoria Street	TO	13th-14th	2	1	0	1	0	0	0
London, 40 Queen Street and 1 Skinnard Lane	TO	13th-15th	4	0	2	0	2	0	0
London, Rangoon Street, 61-65 Crutched Friars	TO	15th	4	0	4	0	0	0	0
London, St Alban's House, 124 Wood Street	TO	13th-15th	1	0	1	0	0	0	0
London, St Swithins House, Walbrook	TO	14th-15th	2	1	0	0	1	0	0
London, St Swithins Lane	TO	13th-14th	1	1	0	0	0	0	0
London, Steelyard, Upper Thames Street	TO	15th	1	0	0	1	0	0	0

SITE	Type	Dates	Total	Table.	Lamp	Flask	Urinal	Dist.	Misc.
London, Stothard Place, Spital Square, 284-294 Bishopsgate	TH	1270-1500	2	1	0	1	0	0	0
London, Swan Lane, 95-103 Upper Thames Street	WA	113th-15th	15	12	1	0	2	0	0
London, Thames Exchange	WA	13th-15th	5	0	1	2	2	0	0
London, 63 Threadneedle Street	TO	13th-14th	1	1	0	0	0	0	0
London, 178 Tower Street	TO	12th-13th	1	1	0	0	0	0	0
London, 2-3 Trig Lane	WA	113th-15th	17	15	0	0	0	0	2
London, Watling Court, 39-53 Cannon Street and 11-14 Bow Street	TH	13th-14th	12	2	2	1	7	0	0
London, Watling House	TO	13th-15th	28	6	2	4	16	0	0
Lincoln, Chestnut House, Michaelgate	TH	13th	2	1	0	0	1	0	0
Lincoln, Danes Terrace II	TH	14th-15th	2	0	1	0	0	1	0
Lincoln, Flaxengate	TH	12th-13th	3	3	0	0	0	0	0
Lincoln, Steep Hill	TH	14th-15th	1	1	0	0	0	0	0
Lincoln, St Mark's Station	TH/ CF	15th	1	0	0	0	1	0	0
Lincoln, Swan Street	TH	13th-14th	1	1	0	0	0	0	0
Northampton, Derngate	TH	13th-15th	1	0	0	0	1	0	0
Northampton, Marefair	TO	14th-15th	1	0	0	0	1	0	0
Northampton, Mayorhold	TH	13th-14th	1	0	0	0	1	0	0
Northampton, St Peter's Street	TH	14th-15th	9	5	1	2	1	0	0

SITE	Type	Dates	Total	Table.	Lamp	Flask	Urinal	Dist.	Misc.
Norwich, 49-58 Botolph Street	TH	13th-14th	1	1	0	0	0	0	0
Norwich, 49-63 Botolph Street	TH	13th-14th	1	1	0	0	0	0	0
Norwich, Gas Works, Bishopsgate	TD	12th-13th	1	1	0	0	0	0	0
Norwich, 13-25 London Street	TO	13th-15th	1	0	1	0	0	0	0
Norwich, 70-80 Oak Street	TH	13th-15th	1	0	0	0	0	1	0
Norwich, 31-51 Pottergate	TH	c1507	4	4	0	0	0	0	0
Norwich, 104-106 St Benedict's Street	TH	15th-16th	2	1	0	1	0	0	0
Nottingham, 48 Bridlesmith Gate	TH	113th-14th	1	1	0	0	0	0	0
Nottingham, Drury Hill	TO	13th-14th	27	23	1	1	2	0	0
Nottingham, Drury Hill, East Cesspit	TO	13th-14th	4	2	0	1	0	0	1
Nottingham, Middle Pavement	TO	13th-15th	16	5	0	5	6	0	0
Nottingham, Pepper Street Cave	TO	13th-15th	5	0	0	3	2	0	0
Nottingham, Weekday Cross	TO	113th-14th	2	2	0	0	0	0	0
Oxford, Cornmarket Street	TH	14th	1	1	0	0	0	0	0
Poole	TO	13th-14th	1	1	0	0	0	0	0
Seaford, Church Street	TH	15th	1	1	0	0	0	0	0

SITE	Type	Dates	Total	Table.	Lamp	Flask	Urinal	Dist.	Misc.
Southampton, Cuckoo Lane A	TH	l13th	5	3	0	1	1	0	0
Southampton, Cuckoo Lane B	TH	13th-14th	1	1	0	0	0	0	0
Southampton, Cuckoo Lane E	TH	14th	1	1	0	0	0	0	0
Southampton, High Street C	TH	e14th	31	25	1	1	4	0	0
Southampton, Upper Bugle Street	TH	14th-15th	1	0	0	0	0	0	1
Southampton, Westgate	TH	13th-14th	10	6	1	1	1	0	1
Southampton, Wool House	TH	14th	1	1	0	0	0	0	0
St Alban's, Gentle's Yard, now Christopher Place	TH	14th-15th	1	1	0	0	0	0	0
Winchester, Assize Courts North	TO/ CA	13th-15th	1	0	0	0	0	0	1
Winchester, Brook Street	TH	13th-l15th	4	3	0	1	0	0	0
Winchester, Brook Street C	TH	13th-15th	3	1	1	0	0	1	0
Winchester, The Brooks	TH	13th-15th	25	2	1	6	12	0	4
Winchester, Crowder Terrace	TO	14th	1	1	0	0	0	0	0
Winchester, LIDO	TO	13th-15th	1	0	0	0	0	0	1
Winchester, Parchment Street	TO	14th-15th	6	1	1	0	4	0	0
Winchester, Sussex Street	TO	13th-14th	1	0	0	1	0	0	0
Winchester, St George's Street	TO	14th	1	0	0	0	1	0	0
Winchester, St John's Street	TO	13th-14th	1	0	0	1	0	0	0
Winchester, Victoria Road	TO	13th-15th	9	1	0	5	2	0	1
Winchester, Westgate	TO	13th	1	0	1	0	0	0	0
York, 2 Aldwark	TH	l14th-15th	9	0	0	0	0	0	9
Bressingham Old Hall	GH	l15th-e16th	1	0	0	0	0	0	1

Key to Types of Sites

BM	Benedictine Monks
BM	Benedictine Monks
(A)	(alien house)
ClM	Clunaic Monks
CM	Cistercian Monks
BN	Benedictine Nuns
FN	Franciscan Nuns
PC	Premonstratensian Canons
AC	Augustinian Canons
GC	Gilbertine Canons
DF	Dominican Black Friars
CF	Carmelite White Friars
AF	Austin Friars
FF	Franciscan Grey Friars
CO	College
HO	Hospital
CH	Church
BP	Bishop's Palace
RP	Royal Palace
CA	Castle
MM	Manor or moated manor
TH	Town housing area or tenement
TO	Town, unidentified nature
TD	Town dump
WA	Waterfront deposit
GH	Guildhall
VI	Village

The numbers of glass vessels in Table 3 differ slightly from the numbers shown in Table 4, since Table 3 does not include glass from unknown sites, but it does include miscellaneous undiagnostic fragments.

No. of Sites	Site Type	Glass Function (Percentage of Vessels)					
		Table	Lamps	Flasks	Urinals	Distil.	Misc.
12	Benedictine Monks	11%	9%	30%	45%	4%	1%
1	Clunaic Monks	4%	6%	24%	18%	48%	0%
2	Cistercian Monks	25%	38%	13%	13%	13%	0%
15	**All Monks**	**9%**	**8%**	**27%**	**33%**	**23%**	**0%**
1	Benedictine Nuns	80%	0%	0%	0%	20%	0%
1	Franciscan Nuns	0%	50%	30%	10%	10%	0%
2	**All Nuns**	**27%**	**33%**	**20%**	**7%**	**13%**	**0%**
2	Premonstratensian Canons	4%	14%	66%	11%	5%	0%
5	Augustinian Canons	14%	0%	0%	29%	57%	0%
7	**All Canons**	**7%**	**10%**	**44%**	**17%**	**23%**	**0%**
3	Dominican Friars	86%	14%	0%	0%	0%	0%
2	Carmelite Friars	0%	40%	0%	60%	0%	0%
1	Augustinian Friars	100%	0%	0%	0%	0%	0%
3	Franciscan Friars	40%	0%	0%	60%	0%	0%
9	**All Friars**	**39%**	**22%**	**0%**	**39%**	**0%**	**0%**
2	**Colleges**	**38%**	**5%**	**20%**	**28%**	**5%**	**5%**
2	**Churches**	**0%**	**33%**	**0%**	**33%**	**0%**	**33%**
1	**Hospitals**	**100%**	**0%**	**0%**	**0%**	**0%**	**0%**
4	**Palaces**	**60%**	**0%**	**7%**	**33%**	**0%**	**0%**
19	**Castles**	**25%**	**4%**	**12%**	**26%**	**29%**	**4%**
10	**Manors**	**35%**	**22%**	**22%**	**9%**	**9%**	**4%**
1	**Villages**	**100%**	**0%**	**0%**	**0%**	**0%**	**0%**
129	**Towns**	**40%**	**8%**	**13%**	**28%**	**4%**	**6%**

Table 2

Distribution of Glass Functions Amongst Site Types (Percentage)

No. of Sites	Site Type	Glass Function (Number of Vessels)					
		Table	Lamps	Flasks	Urinals	Distil.	Misc.
12	Benedictine Monks	21	16	56	82	8	1
1	Clunaic Monks	6	8	34	26	68	0
2	Cistercian Monks	2	3	1	1	1	0
15	**All Monks**	**29**	**27**	**91**	**109**	**77**	**1**
1	Benedictine Nuns	4	0	0	0	1	0
1	Franciscan Nuns	0	5	3	1	1	0
2	**All Nuns**	**4**	**5**	**3**	**1**	**2**	**0**
2	Premonstratensian Canons	2	8	37	6	3	0
5	Augustinian Canons	4	0	0	8	16	0
7	**All Canons**	**6**	**8**	**37**	**14**	**19**	**0**
3	Dominican Friars	6	1	0	0	0	0
2	Carmelite Friars	0	4	0	6	0	0
1	Augustinian Friars	1	0	0	0	0	0
3	Franciscan Friars	2	0	0	3	0	0
9	**All Friars**	**9**	**5**	**0**	**9**	**0**	**0**
2	**Colleges**	**15**	**2**	**8**	**11**	**2**	**2**
2	**Churches**	**0**	**1**	**0**	**1**	**0**	**1**
1	**Hospitals**	**1**	**0**	**0**	**0**	**0**	**0**
4	**Palaces**	**9**	**0**	**1**	**5**	**0**	**0**
19	**Castles**	**34**	**5**	**17**	**36**	**40**	**5**
10	**Manors**	**8**	**5**	**5**	**2**	**2**	**1**
1	**Villages**	**1**	**0**	**0**	**0**	**0**	**0**
129	**Towns**	**259**	**50**	**86**	**182**	**25**	**39**

Table 3

Distribution of Glass Functions Amongst Site Types (Number)

Chapter 5: The Social Context of Glass Vessels in Medieval England

This chapter discusses the context and role of glass vessels in medieval society. First of all the changes in the use of the glass forms and their quantities between the 13th and the 15th centuries are outlined, and their significance is considered in relation to the development of medieval society. The reasons for the high status and value of medieval glass are examined. The social situations in which glass was used are then considered, and how glass tableware was used as a 'symbol of power', to maintain and enforce social relations.

5.1 The evolution of glass vessels between the 13th and 15th centuries

Table 4 shows the numbers of different excavated glass forms from specific date ranges between AD 1200 and 1500. The dating evidence for each type is discussed in Appendix 1. For tableware vessels, the date range attributed to the style of each type is used. The utilitarian vessels, most of which do not change in style between the 13th and 15th centuries, are dated by their contexts. Vessels which can only be dated within the period 1200 to 1500, or are unstratified but medieval in style, are listed together in the penultimate column. The bold figures show when each vessel form was at its most abundant. Miscellaneous fragments from unidentified forms are not included here.

	12th-13th C	13th C	13th-14th C	14th C	14th-15th C	15th C	15th-16th C	13th-15th C	**Totals**
Goblets	0	1	**59**	4	3	2	2	5	**76**
Beakers	0	4	**67**	0	11	15	12	1	**110**
Bowls	3	0	**41**	1	2	1	2	0	**50**
Flasks	15	3	17	16	**32**	11	0	18	**112**
Lamps (Islamic)	0	0	**1**	0	0	0	0	0	**1**
Lamps (green)	0	8	10	13	6	17	**31**	22	**107**
Flask/ Urinals	3	32	49	98	32	95	**200**	114	**623**
Distilling	0	0	1	3	3	**119**	23	18	**167**
Totals	**21**	**48**	**245**	**135**	**89**	**260**	**270**	**178**	**1246**

Table 4

Overall, the numbers of vessels increase in the three centuries between the 12th to 13th century, and the 15th to 16th century, although there is a slight decline in types attributed to the 14th to 15th century. English green glass utilitarian wares are more

numerous than imported tablewares overall. The major change between the 13th and 15th centuries is from the dominance of tablewares in the 13th to 14th centuries, to that of utilitarian wares in the 15th century. The largest quantities of goblets, beakers and bowls are all found in the 13th to 14th centuries. Decorative flasks and jugs, although being relatively numerous in the 13th to 14th centuries, are found in their greatest numbers in the 14th to 15th centuries. These are mainly flasks with long narrow necks, bulbous bodies, and pedestal feet. Tablewares also dominate the assemblage in the 12th to 13th centuries. These are largely vessels from the eastern Mediterranean, such as Islamic sprinklers, gilded blue Byzantine bottles, and 13th century Islamic gilt and enamelled wares, in addition to a few north European vessels with trailed decoration. This reflects the early influence of eastern Mediterranean glass in Europe, manifested in some subsequent European glass. For example, European enamelled beakers (B20-21) were strongly influenced by Islamic gilt and enamelled beakers (B18-19).

Tablewares, particularly goblets and bowls, decrease in the 15th and early 16th centuries. Beakers are the most common type of the tableware found in the 15th century, although their numbers are far smaller than in the 13th to 14th centuries. This trend is reflected in the iconographical evidence. The glass vessels seen in 13th to 14th century illustrations are dominated by goblets, with a few beakers. However, by the 15th century the drinking vessels shown are almost exclusively beakers, often in conjunction with glass flasks of Types D19 and 20. The only excavated stemmed glass goblets of the 15th century are those of the Venetian style, which are often made of cristallo or brightly coloured glass, with gilt or enamel decoration, and they appear to have been reserved for particular ceremonial uses. A 15th century Venetian lidded gilt and enamelled goblet from Deblín in Bohemia bears two engraved inscriptions. Under the bowl a Czech inscription reads 'Praise the lord and drink cool wine to the health of the masters of Deblín'. Another under the foot in Latin reads 'Let everyone drink from this in the year 1415'. Historical documents record that the overlordship of the castle and village of Deblín was sold in 1415 (Tait 1979, 36, No. 23, Pl. 2). It is probable that the goblet was either made or engraved to commemorate this sale. Some Venetian goblets were used as betrothal cups, to celebrate marriages. An emerald-green gilded and enamelled goblet has portraits of a man and woman on opposite sides, with the motto 'AMOR.VOL.FEE' ('love requires faith') (Tait 1979, 36, No. 22, Pl. 4 and 5). Other Venetian vessels may have been presented as gifts. Queen Beatrix of Aragon, wife of King Matthias of Hungary, is known to have received gifts including Venetian 'cristallo' from Ferrara in 1486, and fragments of glass decorated with her arms have been excavated from the site of the royal palace in Budapest (ibid., 25). By contrast in the 13th and 14th centuries goblets and beakers are found in approximately equal numbers, in many different styles of decoration, and were both used for secular dining.

The production of forest glass utilitarian vessels reached massive numbers in the 15th and early 16th centuries. Flask/urinals (with wide rims and convex bases) are found in significant quantities throughout the whole period from the 13th century. They reach their peak in the 15th to early 16th centuries, and are the most common type of glass found overall. Narrow-necked flasks of potash glass which were also made in England are less common, especially in the 13th to 14th centuries, but they too are found in their highest numbers in the 15th to 16th centuries. Kicked bases are found in significant numbers in the 13th to 14th centuries, which may come from potash glass flasks with wide or narrow necks. Hanging lamps are found in slightly increasing quantities throughout the period, increasing more dramatically in the late 15th to 16th centuries. Distilling vessels are rare until the 15th century, when large deposits of them are found in castles and monastic sites, and smaller quantities in towns.

There is no single satisfactory explanation for this change in the use of glass, from tablewares to utilitarian wares in England between 1200 and 1500. It is likely to have been affected by many different complex factors. Some of these factors are considered here.

Dyer suggests that the aristocracy reduced their consumption of luxury goods in the late 14th and 15th centuries in order to adapt to and survive the changing economic climate and the financial crises that many of them suffered between 1350 and 1500 (Dyer 1989, 157). This was particularly affected by the famines and epidemics of the 14th century, including the Black Death, and the subsequent shortage of labour. Labour costs rose and land prices fell, to the disadvantage of the aristocracy, but to the advantage of the peasant and artisan classes (Dyer 1982). Overall, living standards and opportunities for most sections of society improved (Horrox 1994, 2), but the aristocracy had to adapt to the redistribution of wealth. They achieved this by improving accounting systems, and reducing the size of households and their levels of consumption. The decline in the use of luxury goods could account for the decline in the use of glass tableware. Venetian-style vessels continued to be used in the 15th century, but they were rare, being used for ceremonial rather than domestic dining occasions, and confined to the extreme upper echelons of society. This contrasts strongly with the number, as well as the wide range, of tableware vessels of diverse European and eastern Mediterranean origins in use in the 13th and 14th centuries.

A study of the changes of the glass forms in use must consider those forms made in other materials which glass may replace, or be replaced by. The reason that glass flasks and jugs were not at their most numerous in the 13th to 14th centuries, as other tableware vessels were, may be because ceramic jugs were popular at that date. A survey of pottery from excavated sites in London by Vince shows that jugs and pitchers

were at their most popular in the late 13th century, declining after that into the 15th century (Vince 1985, 73, Fig. 34). Glass tableware of the 13th to 14th century is often found on the same sites as contemporary highly decorated polychrome jugs from the Saintonge region of France, and these jugs may have been used for serving wine into drinking glasses. These sites include Westgate, High Street C and Cuckoo Lane A in Southampton; the Longmarket in Canterbury; the Brooks in Winchester; and the High Street in Hull. However, ceramic jugs became less decorative as well as less common in the late 14th and 15th centuries (Le Patourel 1968, 101), which may be a factor in explaining why decorative glass flasks reach their greatest popularity at this later date.

In the 15th century the use of all glass tablewares, and similarly pottery vessels, declined. It has been suggested that between 1350 and 1500 ceramic jugs were under increasing competition from metal jugs and ewers. Metal jugs were expensive, and extremely rare in peasant households, but many upper class households owned them (Dyer 1982, 39). There was also a change towards other vessels of metal in the later 14th and 15th centuries. For example, the cellarers' accounts at Battle Abbey demonstrate that while clay and wooden dishes were customary at the table in 1275, by 1359-60 pewter dishes, plates and cruets were purchased for the use of the monks (Cherry 1991b, 45). The increased ability of the artisan and peasant classes to use pottery rather than wooden vessels may have encouraged the upper classes to maintain class distinctions by using more expensive materials than pottery, such as metal, when appropriate (Dyer 1982, 39).

It is not clear what relevance these changes in material consumption had to glass vessels. The 15th century evidence consists of increased numbers of green glass utilitarian wares, and smaller quantities of tablewares. The enduring tableware types were either rather plain undecorated or mould-blown greenish vessels, or very highly decorated coloured or 'cristallo' Venetian-style vessels. A possible interpretation is that the more common glass was devalued as a material, in a similar way to pottery, initially by its lower costs and greater availability, and consequently abandoned by the upper classes. They restricted their glass tablewares to the distinct and prominently expensive *'façon de Venise'* glass, with its jewel-like gilt and enamel decoration, and brightly coloured and 'cristallo' glass.

Other materials are known to have lost their appeal to the upper classes having come within the price range of the increasingly prosperous artisan classes. For example, squirrel fur, which had originally been an expression of the wealth of the upper classes, lost its appeal to them when a drop in price and the increased income of the lower classes in the 15th century made it available to the urban middle classes (Dyer 1982, 36). However, if glass had become accessible to the middle classes, surely there would have been an increase of archaeological finds from artisan sites in the 15th century, which is not the case in this period. Glass in the late 15th century continues to be found

on prosperous sites, such as 31-51 Pottergate in Norwich, whose social status is described as one of 'considerable wealth' (Carter, Evans and Margeson 1985, 84).

Contrasting with the decline in tablewares in the 15th century was the huge growth in utilitarian wares. The most dramatic growth was in the numbers of glass distilling vessels. This corresponded with, and may have been influenced by, the increase in education and science in the 15th century. This growth in scientific learning can be substantiated by looking at the increase of scientific manuscripts in the 15th century. Dorothea Waley Singer's survey of 30,000 to 40,000 scientific texts dating from before the 16th century shows that the ratio of surviving 15th to 14th century texts is at least six to one (Murray Jones 1994, 101). Furthermore, an increasing number were written in Middle English in the 14th and particularly the 15th century, making them accessible to a wider proportion of the population (Hope Robbins 1970, 393). The increasing spread of non-graduate medical practitioners is demonstrated in 1421, when graduate physicians felt threatened enough to petition to exclude non-graduates from practising (ibid., 394). A wider section of society would consequently have had the necessary knowledge of how to monitor their health by uroscopy, and how to distil various liquids and substances for a number of purposes.

It must be remembered that many of these 15th to early 16th century utilitarian vessels were from monastic Dissolution deposits. Very little glass survives in monasteries before this date although it was certainly in use, which makes the contrast in the numbers of glass vessels in the 15th century appear more exaggerated than it actually was. At the same time there is less evidence from the 15th century in towns, where more tablewares might have been used. The late 14th and 15th centuries are notoriously problematic for providing dating evidence in towns (see p. 48). Rubbish disposal methods were also different in the 15th century, with fewer cesspits of this period found in towns (Platt and Coleman-Smith 1975, 34). Perhaps the contrast between numerous utilitarian wares and few tablewares in the 15th century is exaggerated, but the general trend appears to be reliable. By the 16th century forest glass vessels of tablewares as well as utilitarian wares were undoubtedly in use further down the social scale. William Harrison's *Description of England* in 1586 states that:

> The poorest also will have glass if they may; but, sith the Venetian is somewhat too dear for them, they content themselves with such as are made at home of fern and stone.
>
> (Charleston 1984a, 50)

The fortunes of the glass producers themselves may have been another factor which affected the quantities and types of glass vessels in circulation. If glass tableware was not being produced in late 14th and early 15th century Europe due to a decline in

the number of craftsmen, consumers would have had to change their allegiance and tastes to another material. Similarly, the increase of local forest glass wares in the 15th century may be due to an increase in production and marketing by English glass producers. More research is required into the organisation of the glass industry and whether there were any changes in production methods to answer this question.

5.2 The value and social status of glass vessels

Glass as a material is not intrinsically valuable. The raw materials include sand, a plant ash, mineral or lead flux, lime, and small quantities of oxides and substances which improve the quality and give it colour (see pp. 18-21). Production requires a furnace, fuel, metal and wooden tools, clay or stone crucibles and sometimes moulds, and the skill and craftmanship to form the products. None of these resources are particularly valuable. Some decorative substances including colour pigments such as cobalt, used as a blue colouring agent, and the gilt used on later Venetian vessels, were costly, but they were only used on some tablewares. Iron was produced in the same areas of medieval England as glass, such as the Surrey/Sussex Weald, and used many of the same resources, yet iron products are found on a far wider social scale. Glass vessels appear to be found only on 'high-status', relatively wealthy, medieval sites in England. Glass has had different values throughout history, while production costs cannot have changed significantly until the advent of mass production in the late 19th century. Glass vessels were extremely common in the Roman Empire, reaching much further down the social scale, and thousands of fragments may be found on one site alone. It is necessary to consider why glass was comparatively rare and confined to the higher sections of society during the medieval period. The status that medieval glass vessels enjoyed was the value given to them by society, clearly for reasons other than intrinsic value.

Medieval glass vessels can be divided into two different contexts of social meaning. The contrast between the intrinsic value of the two categories is smaller than the differences in their social value. Forest glass utilitarian wares, probably all of English manufacture, which include lamps, flasks, urinals, and distilling vessels, belonged to the private sphere, and would not have been seen by the visitors that the owner wished to impress. Their purpose was purely practical, with no esoteric value, and consequently they were not symbols of wealth. They were undecorated and their styles remained the same from the 13th to the late 15th century and later. Contrasting with these, imported tableware and ceremonial vessels were intended to be seen in the public sphere. They had a 'socio-technic' function, a social importance that went beyond their practical purpose, and it was the style and form of the vessels themselves which elevated their value above forest glass utilitarian wares. They were usually decorated, although some vessels may have been valued for their elegant simplicity and 'cristallo'

colourless quality, a form of decoration in itself. The styles changed frequently so it was necessary for consumers to purchase new vessels to 'keep up with the Joneses'. It is not clear how long individual glass vessels were used for. While many vessels were excavated from contexts of the same dates as the production of the glass, in a number of cases they came from later contexts. For example, a lead glass goblet of 13th to early 14th century date was excavated from a late 14th to early 15th century pit in Knaresborough Castle. A 13th century Islamic beaker from Lombard Street in Abingdon was found in a pit with 15th century pottery. Some types are likely to have been more valued than others, although the fragility of glass would limit the duration of use to a greater extent than in other materials. Glass may have been disposed of after accidental breakage, rather than because it was no longer wanted.

The variety of sites from which archaeologists have recovered medieval vessel glass has already been discussed (Chapter 4). These include castles, monastic sites and other ecclesiastical establishments, and towns. Where the character of urban sites can be identified they are wealthy residences, for example the house of the prominent burgess and property owner Richard of Southwick in Southampton (see p. 112). Documents show that the richest merchants had incomes on the scale of the landed aristocracy, and are equated with them in various legislation (Dyer 1989, 193). Historians have also commented that these more successful merchants mixed socially with the aristocracy: 'They intermarried with the gentry, and shared their tastes and values...Urban society was no less dominated by matters of tenure and status than that of the countryside' (ibid., 23-4). They certainly appear to have had the same cultural tastes in tableware, and would have used it to entertain each other.

Glass has not been found on less wealthy sites. This is possibly because of a bias in the survival of glass in the archaeological record. Small rural communities threw their rubbish out on to open heaps, where medieval glass would have little chance of survival. Good preservation conditions are required for medieval glass (see pp. 21-2). However, these include buried waterlogged contexts such as cesspits. Cesspits were more common in towns where there was a shortage of space for rubbish heaps. Stone-lined cesspits which retained water and preserve glass well, were expensive to build and to have emptied (Dyer 1989, 209). So perhaps it is because rural and poorer communities disposed of their rubbish in different ways that we find no trace of them having used glass.

On the other hand, the total absence of glass from these lower status communities convincingly indicates that it is a true absence and more than a coincidence. Glass is sometimes able to survive outside cesspits, since occasional fragments are found in floor layers and other poor preservation contexts on wealthy sites. However, it is totally absent from pits and waterlogged deposits in areas of towns

which are not high-status, where glass could have survived. It is likely that if glass was used on these less wealthy sites, at least some of it would have survived.

Recycling of glass is another factor that must be considered. In the Roman period, as today, scrap glass known as 'cullet' was collected and recycled by glass manufacturers (Price and Cool 1991, 23-4). The cullet brings down the melting point of the new batch of glass so that the furnace requires less fuel, as well as reducing the quantities of raw materials needed. There is evidence of the re-use of painted window glass on English furnace sites in the 16th century (Kenyon 1967, 18-19). In Italy in the 13th and 14th centuries, there are documents recording the duty that dealers paid on the glass collected to be recycled in glass making. For example, in Bologna in 1288, four soldi was paid 'per salma (c. 250 kg) on glass vessels, and two soldi per salma on fragments (Whitehouse 1987, 317-9).

However, there is no evidence that broken glass was collected from domestic sites in England during the medieval period, although glass makers would have used waste glass already on the furnace site from previous batches. On the other hand, there is no conclusive evidence that cullet collection did not take place. Waste vessel glass has not been excavated from medieval English glass furnace excavations, but it would probably have been removed for re-use elsewhere when the furnace went out of use. Stronger evidence against cullet collection is provided by excavations of monastic sites. After the Dissolution of the monasteries large quantities of vessel and window glass are found in rubbish deposits. If it was the custom to collect glass for recycling, it would surely have been collected from the monasteries, and sold by the crown commissioners or local entrepreneurs, in the same way that the buildings were stripped of other materials such as lead. It is fairly certain that the absence of glass on lower status sites is not due to its sale as cullet. It seems unlikely that this process would only have been completely efficient on lower status sites, but would surely also have affected higher status sites if it had occurred.

There is very little documentary evidence for the prices of medieval glass vessels. A few inventories survive from the 15th century. The 1495 inventory of John Plumtre, an apothecary of Nottingham, lists two glass urinals at 2d. each, and two glass 'stills', either a distilling set or individual alembics, costing 20d. and 8d. each (Records of the Borough of Nottingham 1882, 284). In 1416-17, Bishop Richard Mitford's household spent 12d. on a glass still, to distil medicine (Moorhouse 1987, 370). In 1457-8, the bursar of Fountains Abbey paid 4d. for an unspecified number of glass urinals (Moorhouse 1993, 137). These prices can be compared with the average daily wage of a skilled building worker, which was c. 6d. a day in 1500 (Dyer 1989, xv). Ceramic vessels cost approximately ¼ to ½d. each. A smallholder's inventory of 1457 records eight wooden trenchers at a value of 1d (Dyer 1982, 170-3). So although glass was more expensive than wood and ceramics, 2d. for a glass urinal was not an excessive

expense in 1500. There is no evidence for how much more imported glass tablewares would have cost. No doubt they would have been much more expensive, and it is not surprising that they would only have been affordable to the wealthy. However, the price is not able to account for why ordinary working class people did not use local utilitarian forest glass vessels.

Sumptuary legislation, and its values, was an engrained characteristic of medieval England. A succession of laws in the later 14th and 15th centuries decreed which social classes were permitted to wear specific types of clothing and jewellery (Baldwin 1926, 10). To a lesser extent they attempted to control the scale of feasting (Postan, Rich and Miller 1963, 420). One of the motives behind these regulations was a desire to maintain class distinctions, at a time when the middle classes had more disposable income and were a threat to the traditional class divisions displayed through material wealth. For example, in the 1363 Act, the lowest classes, which include carters, ploughmen, shepherds and dairymen, were only permitted to wear blanket cloth and russet costing up to 12d. a yard. Grooms and lords' servants were forbidden to wear cloth costing more than 2 marks for the entire amount needed, or anything of gold, silver or silk, enamelled or embroidered. At the other end of the scale all knights and ladies with annual incomes from 400 marks to £1000 could wear anything they wished except ermine and apparel decorated with precious stones (ibid., 48-50).

However, there is no evidence of any medieval sumptuary laws relating to vessels of glass or any other material. In Venice in the 14th century wedding gifts were forbidden other than 'pladenate' or goblets (Newett 1902, 261), but there are no specific references to the control of vessels. Compared to dress, which was arguably the most prominently social symbol, glass vessels were probably not common enough to warrant legal restrictions. Regulations on possessions which were not always seen in public would have been even more difficult to enforce than those on dress, which were abused. However, it is possible that there may have been unwritten conditions in this very class-oriented society, of notions of appropriate behaviour, which would prevent someone below a certain social level from purchasing a glass vessel even if they had sufficient resources. It was not uncommon in medieval trade for priority to be given to particular groups for the sale of certain goods (Britnell 1993, 92). It may not have been appropriate for certain classes to approach a glass merchant or an agent to acquire glass vessels even if there were no legal restrictions.

A more pragmatic reason for the confinement of the use of glass vessels to the higher social classes may have been not the cost or availability of the glass itself, but the fact that the vessels represented high-status activities. Not everybody would have had a use or a desire for a glass vessel. The use of utilitarian vessels required a certain amount of education or access to specialists. Uroscopy, the examination of the colour of the urine for medical diagnosis through a glass urinal, required access to a trained specialist

since diagnosis was so complex. Diagnosis involved the study of a colour chart and of the consistency of the different levels of the urine, as well as the interpretation of astrological factors. Distilling was used for herbal and medical preparations, which may have required some education. Alchemy was a philosophical pursuit, practised in castles and monasteries, rather than a common craft. The spiritual mystery of alchemy may have given it a certain power and status. Imported glass tablewares would probably have been out of the price range of most of society, and would have been unnecessary and inappropriate in the 'habitus' of most artisan and peasant houses. However, costly tablewares were essential for the upper classes, to maintain their social position (see p. 148).

Consideration must be given to why glass tablewares, fashioned into particular forms and decorative styles, were considered high-status and valuable, and suitable for using as 'symbols of power'.

5.3 Glass tableware vessels as symbols of power

One of the most interesting features of the medieval glass goblet is the characteristic knop[1] around the centre of the stem. This is a conscious stylistic addition, rather than an essential practical feature. Examples of 13th and 14th century glass goblets with knops around the stems include potash glass goblets from Southampton, Ludgershall Castle and Bishopsgate in London (A1), Exeter (A2), a high-lead glass goblet from Nicholas Lane, London (A7), and colourless glass goblets from the Bank of England, Lothbury, Shore Road in London, Winchester Palace in Southwark (A8, 9 and 10) and Southampton (A12). The representations of knops found on these glass goblet stems include applied frills, rings, pronged knops, solid knops, or discs with suspended trailing between them.

The knop is also found on medieval stemmed goblets and chalices of metal. Earlier examples of stem decoration of slightly different styles occur on secular goblets of the Roman period (Van Lith 1991; Painter 1977, 29 and 75). However, the medieval central knop as a permanent and significant feature can be traced back to chalices of the early Christian church. Examples include the Byzantine chalices from Beth Misona and Antioch (Mango 1992, Figs. 12-13). The knop remains a feature of the chalice throughout the medieval period, one of the numerous examples being a 13th century English silver chalice (Cherry 1992, 45; BM, MLA 1975, 4-1,1). The chalice retains this symbolic form to the present day, having had its style preserved by the Christian church. It can therefore be suggested that medieval secular goblets of metal and glass were designed to emulate the Christian chalice.

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[1]The rounded ornament around the centre of the stem is described as a 'knop' in glass studies (Newman 1977, 172), but the same feature is described as a 'knot' in the study of metal vessels (e.g. Oman 1957, 40).

The purpose of this emulation of metal vessels by glass goblets may partly have been to imitate vessels of more valuable precious metals which were intrinsically valuable. However, it is also considered significant that secular goblets of metal and glass were both ultimately derived from the chalice form. Both aspired to acquire some of the symbolism of the most powerful medieval institution, the Church, to enhance their value. The emulation of the chalice form by the goblet was only one of many ways in which the medieval banquet had parallels with the Christian communion. Wine was drunk from secular goblets, just as it was from the chalice. The goblet was shared between a number of drinkers, just as the communion chalice was shared (see pp. 152-4). The use of the goblet may have been limited to selected guests, in a similar way that the chalice was only shared amongst restricted participants of the communion. The structure of the aristocratic medieval hall shared associations with the church. The high table of the hall on its raised dais which seated the host and most important guests, recalls the chancel area of the church, with its altar occupied by ecclesiastical officials. The secular banquet began with a procession of food and drink to the high table, just as the communion service started with a procession to the chancel. The medieval banquet was structured by the use of material culture (see pp. 149-50). In a similar way religious services were structured and the liturgy explained by the use of material props. The emulation of the church by the secular aristocracy reflects the importance of the church in medieval society. The King was God's representative. Domestic books of etiquette which listed the orders of precedence of all titled ranks, placed the Pope above all other men (Furnivall 1868, 170 and 70, *The Boke of Keruynge* and *John Russell's Book of Nuture*).

On a more secular level, other glass vessels also imitate, or share in the same art styles as metal vessels. The designs on enamelled beakers of the late 13th to mid-14th century beakers of Type B21 have parallels with contemporary enamelled metalwork (see p. 54). The wrythen ribbing on stems of high-lead glass goblets (A6), and 15th century Venetian-style goblets (A16), is also found on metal goblets and chalices (Cherry 1992, 45). The manufacture of vessels which imitate or emulate those of other materials is known as 'skeumorphism' (Vickers 1986, 7). It usually occurs when vessels copy others of a higher value to enhance their importance. This practice could also be interpreted simply as participating in the current art style. Nevertheless, vessels rarely imitate materials of a lower value, but usually copy more expensive vessels.

Heraldry is a common theme in the decorative art of medieval Europe, and can enhance the status of objects as symbols of power. Heraldic emblems are employed on the enamelled beakers of Types B20 and 21, the bright enamel colours making them an ideal medium for heraldry. They include coats of arms, and motifs used as heraldic emblems such as the lion and pelican. One beaker from Foster Lane has a heraldic shield, depicting a wolf over a lobed object, which has various interpretations (see p.

55). The 'Aldrevandini beaker' in the British Museum has a coat of arms identified as Swabian (Tait 1979, 16). Religious scenes, common on these beakers, were also adopted as emblems (Thrupp 1948, 252). The glass beakers with coats of arms may have been individually commissioned. Heraldry was used by the urban aristocracy including guilds and companies, as well as the nobility. Coats of arms could be obtained either through inheritance, a grant from the king, or the purchase of an official patent. They could also have simply been assumed, and this was the most usual way for merchants to acquire arms (Thrupp 1948, 251-2).

On the other hand, many of the designs found on these beakers are repeated on a number of them, and found all over Europe (Baumgartner and Krueger 1988, 126-160). Repeated subjects include the pelican plucking its breast, and robed figures between columns, both of which have a religious theme. This suggests that some of the designs were not specifically commissioned, and the heraldic themes could be seen as general decoration. Heraldic motifs are designed as non-specific background decoration on other medieval artefacts, such as stamped leather scabbards (de Neergaard 1987, 42-3), floor tiles (London Museum Medieval Catalogue 1940, 229-253) and ceramic jugs (ibid., 217-8). Therefore the use of heraldic decoration does not necessarily restrict the use of decorated glass vessels to the nobility. Nevertheless, it draws upon the symbolic code of the nobility, and heightens the status of all glass vessels with heraldic themes, whether they were individually commissioned or not.

Another factor contributing to the social value of glass is its fragility. Glass vessels were likely to have a short life compared to metal vessels, which were unbreakable, and could be used as bullion or melted for re-use when they were no longer wanted. This makes glass more uneconomical and consequently a more extravagant luxury.

5.4 Glass tableware and 'conspicuous consumption'

The high value placed on medieval glass tableware that has been demonstrated made glass ideal for using for 'conspicuous consumption'. This phrase was originally used by Veblen in his study of wealthy American society in the late 19th century, published in *The Theory of the Leisure Class* (Veblen 1899, 68-101), but it is often applied to medieval society (for example Dyer 1989, 89). It refers to the ostentatious display of wealth through luxury goods, to impress others in society by the ability to pay high prices. However, this consumption should not be seen as purely wasteful, since the visible manifestation of wealth was essential to medieval status. As Max Weber wrote: '"Luxury", in the sense of rejecting purposive-rational control of consumption is for the dominant feudal strata nothing superfluous: it is a means of social self-assertion' (1922, III, 1106). As well as the maintenance of social status, noble households competed to attract entourages, and a clear display of the wealth of the household would have made it

attractive to any potential followers. In other contexts, such as towns, merchants might have wished to attract patrons or clients. Ecclesiastical establishments may have competed for benefactors.

In addition to the display of wealth, medieval material culture was used to express, maintain and create social relations. This can clearly be seen in the context of the medieval banquet. The banquet is one of the most familiar images of the medieval period. In reality, it was not an everyday occasion, and was restricted to the households of the upper classes. This is the context in which glass tableware was probably used, since it has been excavated in castles, palaces and manor houses which possessed large halls. However, glass would also have been used in smaller town houses of the urban aristocracy and merchant classes, in a less complex manner than the great banquets of the castle.

Another context in which glass and other high-status vessels may have been used in towns is in the company or guild halls. Company halls were limited in number before the end of the 14th century, with only two known in London before that date (Unwin 1908, 178), but companies met instead in members' houses, halls of religious houses, or in taverns (ibid., 193). When permanent halls were built, their size, layout and status resembled, and were modelled on, those of noble households. They included great halls for entertaining, such as inside the Merchant Adventurer's Hall which still survives in York. The Merchant Tailor's Hall in London could seat two hundred guests (ibid., 176). Feasts were organised on a similar scale to those of the aristocracy in their luxury and expense, with guests from the nobility and royalty. In 1380 the Goldsmith's Hall in London entertained 'my very honourable lady Isabel, daughter of the King of England, and her daughter the Countess of Oxford, the Lord Latimer, the Grand Master of St John's, Clerkenwell, and the Mayor, with six other good folks of the city, which put the wardens to great cost' (ibid., 194). Each guild had its own livery and coat of arms, and along with the nobility may have commissioned glass beakers of Type B21 with specific coats of arms or other heraldic emblems. Glass has only been excavated from one guild hall, at Bressingham in Norfolk, but unfortunately it was not possible to identify the form from which the glass fragments came.

The medieval banquet was very much structured by the use of material culture, by which social differences could be maintained and perpetuated. It can be understood in the context of the 'habitus', the formation of a social world through physical surroundings, which creates a 'mind born of the world of objects' (Bourdieu 1977, 91). The importance of the high table was sometimes accentuated further from the other tables in the hall by standing on a 'dais', a raised platform. Large windows were usually at the high end of the hall, and that area may have been better lit by artificial as well as natural light. At the beginning of a meal a procession would bring the food and ceremonial vessels to the high table, such as the salt cellar which was placed in front of

the host. Glass vessels could have had an active role in creating or maintaining social relations. Social distinctions may have been manifested between the guests on the high table, and those at the other end of the hall, by the use of different types of vessels. The host may also have been identified by the possession of specific vessels, similar to the way in which his position was emphasised by placing of the ceremonial salt cellar in front of him at the beginning of the meal. In an illustration from the Luttrell Psalter, Sir Geoffrey's central position amongst his household at the dining table is enhanced by the possession of a large drinking vessel (BL, Add. Ms. 42130, fol. 208). Whether it was then shared with the other diners or not, this depiction shows how vessels could be positioned to convey social importance.

The lidded cup was a vessel of special distinction. Only the most important were entitled to have the cover of the cup held underneath as they drank (Mead 1931, 153). The lid had the potential of heightening the status of medieval glass goblets, enabling them to be used by those of a high social status as an alternative to precious metal lidded goblets, to display their rank. A number of lids from medieval glass goblets of the late 13th and 14th century have been identified (Types A17-19). They were also found on 15th century Venetian-style goblets. The food and drink consumed on the high table differed to that of the lower tables in the hall. In the late 13th century, the guesthouse at Beaulieu Abbey was instructed to give wine only to abbots, priors and other dignitaries, and some parsons and knights, while others had to be content with ale (Dyer 1989, 62). Accounts from the estate of Thomas Bozoun, a Northamptonshire landowner, show that when he was present in the household, fresh meat was regularly bought from the local market town of Higham Ferrers, but when he was away the meat purchases stopped and the household lived on 'stock' (Dyer 1989, 65).

The cupboard was set out with a display of plate to impress visitors, as instructed in *John Russell's Book of Nurture*: 'Than emperialle thy Cuppeborde / with Silver and gild fulle gay' (then deck your cupboard with the most decorative gold and silver plate) (Furnivall 1868, 15). A gilt and enamelled glass beaker of c. 1500 from a property in Great Tower Street in London may be an example of a precious vessel which was permanently displayed in bright sunlight. The colourless glass has acquired a pink tint, which may have been caused by the solarization of the manganese which was added to the glass as a decolourant, rather than an intentional colour. Manganese is the only element in glass which reacts to sunlight, which suggests that the beaker may have been displayed next to a window (see p. 20).

The social context in which glass might have been used in a town house can be considered from an examination of the archaeological evidence. A group of glass and other tableware vessels was found preserved in a late 13th century cesspit in Cuckoo Lane, Southampton in 1966 (Platt and Coleman-Smith 1975). The cesspit was part of a stone house believed to have belonged to Richard of Southwick, a prominent burgess

and property owner (see p. 112). In order to reconstruct the possible use of the contents of the cesspit, the processes by which they arrived in the cesspit must be understood, and whether they could have been in use at the same time. In the case of this cesspit, it was immediately adjacent to the house, and possibly located below a garderobe on higher level. It would therefore have needed to be cleaned out regularly, so the contents would not have accumulated over a very long period, but could have been in contemporary use, or may represent the final phase of use.

The assemblage in the pit is an exceptionally rich one, with equal numbers of imports to local goods (Platt and Coleman-Smith 1975, 293-4 and 356). Of course, it will not contain everything used in the house at one time, notably precious metals, but the waterlogged conditions do preserve some organic artefacts and ecofacts. The glass from the pit includes two fragments of possibly the same goblet, and a small beaker. It is impossible to identify which objects from the pit would have been used in the same situations or areas of the house. The pit also included a glass urinal, which would have been used in a different situation to the table vessels. It is only with the aid of the pictorial and documentary evidence that an attempt can be made to interpret the 'habitus' in which the glass was used, and the other vessels which may have been used in conjuction with it.

Amongst the vessels found in the cesspit were numerous wooden bowls, and pottery jugs, including polychrome Saintonge wares from the Bordeaux region of France. The goblet was also from France, and these vessels may have been particularly associated with the wine from the same area. The beaker may have been made in one of a number of European areas. The environmental evidence includes fig seeds, palm and rush fibres possibly to pack goods from the Mediterranean, Iranian silk, and the skull of a Barbary ape. The collection of exotic animals was an illustrious pastime, and Henry III owned a number of animals at the Tower of London (Beaumont James 1990, 90). It is not certain whether the skull was a curiosity, or if Richard kept a pet ape, but either would surely have drawn attention to the extravagant possessions of this merchant. However, the archaeological evidence is not able to provide a reconstruction of which of these items Richard would have used together. It is not known how many people would have been entertained. It is possible that Richard entertained on a small scale with the imported glass and pottery, using the wooden bowls for 'everyday' purposes. Alternatively, the artefacts might have been used as part of a larger scale presentation in which the burgess displayed his wealth and authority through the use of the glass goblet, beaker and the decorated pottery jugs for himself or the more honoured guests, while the less important guests drank from the wooden bowls. The Mediterranean foods, the silk textiles, and the Barbary ape skull or pet may also have been part of this high-status display.

Many questions about the use of glass remain unanswered even from such a well-preserved cesspit as this. But similar interpretations are simply not possible from the evidence of the later 14th to 15th centuries, or from contexts not as neatly defined as a sealed cesspit. It seems that it is necessary to rely on the historical and iconographical evidence to suggest a context of use for the archaeological artefacts that are excavated. However, the form and designs of the artefacts can provide information about their value and status, and their presence on certain types of sites can show how widespread their use was.

5.5 The communal use of glass drinking vessels

It has been observed that the stemmed glass goblet emulates the metal chalice form. Another consideration which again draws on the imagery of the communion is how far the goblet and other drinking vessels were used communally at the table.

There is plenty of evidence to suggest that goblets and beakers of glass, as well as of other materials, were used communally in the medieval period, with more than one person sharing a drinking vessel. The communal use of the drinking vessel is found in the early medieval period. Its use may be similar to that of the vessel, of unknown material, described in the poem *Beowulf*, probably written in the 8th century, but set in the 6th or 7th century: 'Then the lady of the Helmings went about everywhere among both tried warriors and youths, passed around the precious cup, until the moment when she, a noble-hearted queen, circlet-adorned, carried the mead goblet to Beowulf' (Swanton 1978, 63-4, lines 620-624). Indeed, many early medieval glass drinking vessels could not be put down while they still contained liquid, since they were shaped like horns, or had unstable rounded bases (Charleston 1984a, Pl. 4-5). This design meant that the drink had to be consumed without a break, either by one person, or passed around several drinkers.

This sharing of the cup continues in the post-conquest period. A miniature illustration from a bible of c. 1250 shows David offering a metal goblet to Michal. A second goblet is held by one of the other guests at the same table. No other drinking vessels are visible (Cockerell n.d., 172-3, No. 228, fol. 37v). Medieval books of etiquette, which outline table and other manners for the children of noble families, are a valuable source for researching the social practicalities of medieval feasts. These include instructions on the etiquette of the use of drinking vessels. One particular concern was that the drink was not contaminated by each guest, since the cup would have been passed to another guest. *The Babees Book*, in a 15th century English translation of the original 13th century Latin, instructs:

Whanne ye shalle drynke, your mouthe clence with A clothe;
Youre handes eke that they in no manere Imbrowe the cuppe, for thanne shulle noone be lothe
Withe yow to drynke that ben withe yow yfere. (Furnivall 1868, 255-6)

(When you drink, clean your mouth with a cloth, as well as your hands, so that they do not dirty the cup. Then nobody will be unwilling to drink with you who has done so before).

A manuscript of *The Boke of Curtasye* of 1460 also provides evidence of sharing when it tells its readers: 'Ne bacwarde sittande gyf not thy cupe, Nother to drynke' (Furnivall 1868, 180) (Don't give your cup to any one who has their back towards you). An early 15th century etiquette manual describes how:

The bowl should be held between two fingers:
The thumb should not touch the sweet wine.
A man's beard should not be immersed in the wine...
Drink and then turn the bowl to thy neighbour,
So that his lips are not placed where thine were.
(Henisch 1976, 175)

Diners who shared utensils and food with one another were said to be 'mess' companions. The number of people in each mess, and the number of dishes in that mess, varied with their rank, household and the occasion (ibid., 175-6). Certain standards of behaviour were required of mess companions:

Ill does the hand which hurries
To take a larger help out of a dish in common...
Do not poke about everywhere...
He who turns and pokes about on the platter, searching,
Is unpleasant, and annoys his companion at dinner. (ibid., 176)

An examination of the glass vessels shown in European manuscript illustrations, frescoes and paintings of between 1200 and 1500 which include glass vessels, reveals certain characteristics in the number of glass drinking vessels on the dining table. These representations show fewer drinking vessels than diners in the 13th and 14th centuries. In Last Supper scenes of Christ and the twelve disciples there are many examples with only three or four drinking glasses on the table. These include both goblets and beakers. For example, in a 13th century fresco of a Last Supper of the Spoletan School, a disciple

holds one of three glass beakers (McKearin 1952, 117). In a fresco of c. 1375-1397 by Justus of Padua in the Duomo at Padua, three glass beakers sit on the table (ibid., 118). In a feast scene from a 14th century miniature from the Bible of Pierre Comestor, there are three green stemmed finned goblets at intervals along the table, and another held by a guest (Foy and Sennequier 1989, No. 165, Pl. IX). Two colourless stemmed glasses with ribbed bowls, containing red wine, are seen on the table in a depiction of the Wedding at Cana, from a manuscript of 1393 (Harden 1975, 39, Fig. 12). An explanation for the limited number of drinking vessels can be found in the documentary evidence for medieval etiquette already discussed. Each glass was shared by two or more mess companions.

Goblets and beakers were both used communally in the 13th and 14th centuries, since they are illustrated in similar small quantities around the table. The communal use of other vessels shows therefore that it was not purely the chalice-like form of the goblet which determined its communal use, even though this feature may have added to the symbolic importance of the goblet. The sharing of drinking and other vessels and utensils at the table was not necessitated by a lack of wealth by medieval households. The vessels and utensils that were used could be extremely opulent. It was simply a practice which was not questioned. The sharing of table vessels suited medieval life with its social distinctions very well, allowing a gradation of rank in the order in which people were served and the number of companions with whom they had to share.

However, increased numbers of drinking vessels can be seen in the iconography of the late 14th and 15th centuries, as they become almost equal in quantity to the number of diners. A late 14th century miniature of the Wedding at Cana shows ten squat green glass beakers either on the table or being refilled from jugs, and approximately eleven guests (Foy and Sennequier 1989, No. 192, Pl. XIV). Fifteenth century depictions show colourless glass beakers in almost equal numbers to diners, implying that they were used individually, such as a Last Supper scene from the Sforza Hours (BL, Add. Ms. 34294, fol. 138v; Evans 1992). Another Last Supper of the Florence School, repainted in the late 15th century, shows nine colourless glass beakers and four colourless glass flasks with pedestal feet (Foy and Sennequier 1989, No. 298). A Last Supper from a late 15th century Book of Hours in the British Library shows seven beakers on the table (BL, Eg. 2125, fol. 142v.). Late 14th century archaeological evidence in Italy supports the use of 'sets' of glass tableware. In Tarquinia, a single deposit in a pit of c. 1390 contained at least fifteen glass beakers (Whitehouse 1987).

Whether this trend shown in the medieval iconographical evidence, from a communal to an individual use of vessels, can be relied upon to explain the use of glass drinking vessels in England is not certain. It is generally accepted that art styles became more realistic towards the 15th century. In the 13th century the 'expression of intense feeling' was 'more important to the artist than any attempt to make his figures lifelike, or

to represent a real scene', whereas by the later 14th century, 'the interest had gradually shifted, from the best way of telling a sacred story as clearly and impressively as possible, to the methods of representing a piece of nature in the most faithful way' (Gombrich 1989, 147 and 166). Thus, while it may be possible to take the 15th century illustrations as accurate and realistic, it is less certain whether the 13th and 14th century depictions are characteristic of the period, or purely stylistic representations.

However, the accuracy of the glass styles depicted in the 13th and 14th centuries suggests that the iconography is more realistic than it is given credit for. For example, the goblets shown in a 14th century French miniature, which are green in colour with fins around the bowl and flared bases, are strikingly close in appearance to archaeological finds of a common 14th century European potash glass goblet type (A1-5)(Foy and Sennequier 1989, No. 165, Pl. IX). The forms of the glass shown are also accurate. The archaeological evidence shows that goblets and beakers were in use simultaneously in the 13th and 14th centuries, while beakers predominate in the 15th century, corresponding with the iconographical evidence. The styles of the glasses always show a high degree of accuracy. An examination of beaker forms in Italian iconography shows both undecorated and prunted beakers, as well as flasks with long narrow necks, bulbous bodies, and pedestal feet, all of which have archaeological parallels (Ciappi 1991). It can therefore also be assumed that the change in the quantities of glass vessels shown in use on the table in these illustrations can be relied upon.

Nevertheless, most of these illustrations were Italian or French. A description of England written by a Venetian traveller in c. 1496, observes that the English were:

> very sparing of wine when they drink it at their own expense. And this, it is said, they do in order to induce their other English guests to drink wine in moderation also; not considering it any inconvenience for three or four persons to drink out of the same cup (*bicchiere*). (Sneyd 1847, 21)

The author's disdainful tone suggests that this practice of sharing the cup between three or four guests may have been unusual in Italy and suggests that Venice was by now accustomed to providing individual diners with their own drinking vessel. While many north Italian paintings show glass beakers present in equal numbers to diners by the 15th century, these are not necessarily representative of the whole of Europe. The sharing of drinking vessels may well still have prevailed in the rest of Europe in the 15th century. The instructions from books of etiquette concerning communal drinking are all from 15th century English manuscripts, although some were translations from 13th century

Latin copies. There is no direct evidence that the use of vessels had changed in England by the 15th century.

The individual use of beakers by the Italians appears to be the first evidence of this practice in medieval and post-medieval Europe. Italy was also the first European country believed to have supplied guests with dinner knives, rather than requiring them to bring their own (Henisch 1976, 178). In medieval Europe and the eastern Mediterranean there were often regional differences in the way in which utensils were used at the table. For example, when a Byzantine princess visited Venice in the 11th century, the residents were scandalised by the vulgarity of the fork which she used, rather than her fingers. The fork remained rare in European inventories throughout the medieval period, and remained uncommon in England and France as late as the 16th and 17th centuries (ibid., 186-8). Regional preferences were also perceptible in the choice of glass vessels in use in medieval Europe. In Provence the beaker was preferred to the stemmed goblet in the 13th and 14th centuries, for no apparent reason other than cultural taste (Foy and Sennequier 1989, 199).

The shift from the communal to the individual use of vessels in Italy can be compared with other periods, such as 18th century New England. The number of ceramic vessels found in sites dating from the 1760s onwards in New England are higher than in previous decades. This was partly a consequence of the mass-production of creamwares, which made them available at a lower price. But the increase would not have occurred without a change in social attitudes to material culture. Large sets of ceramic types have been found, implying that each form was used by an individual rather than shared. This was accompanied by, and can perhaps be interpreted as a consequence of, new attitudes to the importance of the individual (Deetz 1977, 52-60). Other factors which may control changes from communality to individuality may include a greater concern with hygiene, which is one of the most important arguments against sharing vessels in the modern world. The Italian Renaissance and its new 'sense of order' may also have stressed the importance of the individual, leading to the use of vessels on a scale of one to one. The change may have been prompted by, or possibly due to, changes in production methods, making vessels less espensive, as was the case in New England. However, this hypothesis requires further research. This change in attitudes remains unsubstantiated in England in the 15th century.

Conclusion

In conclusion, a study of the changes in the use of medieval glass vessels shows that while imported tablewares were dominant in England in the 13th and 14th centuries, these gave way to large quantities of utilitarian wares by the 15th century. Reasons for the change have been suggested and may be connected with changes in society, but remain uncertain. Glass in general appears to have become available to a

wider section of society by the 16th century, but there is no archaeological evidence to substantiate that this had occurred by the 15th century, other than the increase in quantity.

Glass tableware was given its high value by society for reasons other than its intrinsic value. This value was due to many factors which enabled it to be used as a symbol of power in society, such as its form which emulated precious metal vessels and chalices, and its decoration which was also adapted from the most prestigious art and artefacts of the period. Tableware vessels therefore had a role in the conspicuous consumption of the rural, ecclesiastical and urban elites of medieval society. Elements of the social use of glass can be reconstructed through surviving etiquette books of the period, and to some extent through archaeological evidence.

Chapter 6: Conclusions, Evaluation and Suggestions for Further Research

6.1: Conclusions

The main purposes of this thesis were to survey the glass vessels in use in medieval England, and to evaluate the contributions that the study of glass can provide to understanding medieval society. A large and representative percentage of excavated glass was surveyed, from approximately two hundred sites across England. A number of different sources contributed to the thesis, including archaeological, documentary, pictorial and scientific evidence.

The glass forms, documentary and pictorial sources all contributed to demonstrating the functions of the glass vessels. These included drinking and eating, serving and storing food and drink, ornamental use, lighting which had a particularly liturgical importance, medical uses including uroscopy and medicine containers, and distilling to produce medicines, herbals, alcohol, and for alchemy (Chapter 3). The glass provided the material evidence for the discussion of different everyday activities and themes of medieval England, albeit restricted to the upper classes. An outline was provided of the regions in which the glass was produced, showing England's commercial links and other contacts with Europe and the Near East (Chapters 3 and 2).

An examination was made of the social groups who used glass vessels, by looking at the types of sites from which the glass was excavated (Chapter 4). These included castles, manor houses, monastic and other church-owned institutions, and the affluent areas of towns. There was a distinct absence of glass from the less wealthy areas of the town and country. This revealed that glass vessels were only used by the more wealthy, higher status sectors of society, including ecclesiastical figures, the urban elite and the aristocracy. Very few geographical variations across England could be detected, although there were slight differences in the distribution of lead, soda and potash glass. An influencing factor may have been the importation of glass from particular areas through different ports or at contrasting dates. More excavations have taken place in some regions than others, but it is likely that glass will eventually be found across the whole country.

Factors influencing the survival of glass were discussed, which demonstrated that only a very small proportion of the glass has survived burial and been excavated (Chapter 2). Medieval glass decays extremely severely; it is better represented in some conditions, such as rubbish deposits and waterlogged cesspits, than others such as the floor layers of rooms where it might have been lost during use. Other sources of evidence must be used to speculate on which area or room of a site the glass was used. The proportions of glass forms found on different types of sites showed some patterns, such as the predominance of tablewares in castles and manor houses, and that of utilitarian wares in monasteries (Chapter 4). However, all the statistics had to be

considered with extreme caution, because the methods of rubbish disposal and post-depositional activity distort the quantities of the surviving excavated glass compared to the proportions that were originally in use on the site. It was not possible to make meaningful comparisons between the different *rules* of monastic sites, since the sample was too small, although some features of the glass assemblages found within each *order* could be related to their lifestyle.

The changes in the use of glass vessels between 1200 and 1500 were examined (Chapter 5). A distinct pattern has emerged. The 13th and 14th centuries were dominated by imported tablewares, which declined in the later 14th and 15th centuries, with the rare exception of the very highly decorated Venetian vessels of the late 15th century. Contrasting with this, local utilitarian wares increased dramatically in the later 14th and 15th centuries, when new forms including distilling vessels were introduced. Glass vessels thus changed in their role and importance from being dominated by high-status vessels to utilitarian wares, which suggested a decline in the social value placed upon glass by 1500. The transformations in society which influenced this change were discussed. No conclusion was reached, but it was proposed that the economic difficulties experienced by the aristocracy between 1350 and 1500 may have forced them to reduce their consumption of luxury glass. Alternatively, the increased spending power of the middle classes following changes in land tenure may have prompted the upper classes to use alternatives such as metal vessels to maintain their class distinctions. The decline in tablewares may also have been affected by the fortunes of the glass producers themselves, of which very little is known.

The value of glass vessels was further explored in order to explain why their use was restricted to the wealthy classes. It was recognised that glass of all periods is not intrinsically valuable, but has value imposed upon it by society. Little information was available about the prices of medieval glass vessels. Many decorative vessels were imported and would have been expensive. Utilitarian local vessels may have been relatively cheap, but the archaeological evidence shows that they remained high-status merchandise. Perhaps the rest of society had no desire to use these glass vessels. The symbolic significance of different glass vessels was discussed. This included the distinction between 'decorative' vessels which had a social and practical purpose, and 'functional' vessels, which were used behind the scenes and had only a practical function.

The role played by glass vessels in the context of the medieval banquet was discussed in detail, to illustrate the symbolic importance of glass (Chapter 5). Glass vessels, as well as other goods, were actively used as symbols of power in 'conspicuous consumption', to maintain or enforce their owner's high social position. It was considered that the medieval hall emulated the church to create an impression of power. The medieval hall and banquet had many symbolic parallels with the Christian church

and communion service. For example, there were similarities between the form of the goblet and chalice, and the way in which they were used communally. However, it was noted that drinking vessels began to be used by individual guests rather than communally by the late 14th and 15th centuries in Italy. It is uncertain whether any similar change had occurred in England by 1500. The symbolic features of glass and references and illustrations from medieval sources therefore illuminated the attitudes of medieval society, from the 'inside', to the glass around them. This interpretation differs from the way in which modern society classifies archaeological artefacts from the 'outside'.

6.2: Contributions made by the thesis

As a result of this research, a number of aspects of medieval glass can be viewed differently. In Chapter 1 it was noted that previous publications have inadvertently given the impression that imported glass tablewares were more common than English utilitarian wares in medieval England (see p. 10-11). This thesis has systematically analysed the proportions of different types of glass found in England for the first time, and has shown that, in fact, English utilitarian wares were much more common overall. Imported tablewares were less numerous, although the varieties of individual styles were greater. Past surveys of medieval glass referred to some of the types of sites where glass was found, including castles, monasteries and substantial town houses. The thesis confirmed this pattern, showing that glass was indeed *only* found on high-status sites, through a systematic investigation of the glass found in England, while also taking account of the negative evidence from low-status sites.

This thesis brings England up to date with the research on medieval glass that has been carried out in other parts of Europe (see p. 10). Britain has been shown to be a major consumer of glass in medieval Europe. Some glass types are uniquely found in England. A number of new discoveries and current issues concerning medieval glass have been discussed, which were not until now included in a general survey on medieval glass in England. For example, the existence and the current state of research into high-lead glass vessels has been examined. The distinction between soda and potash glass vessels has been shown to be independent of the colour of the glass, from which it was previously assumed that the type of glass could be determined. Colourless glass is now known to have been made in a number of European regions such as southern France and southern Germany, contrary to earlier surveys which always attributed colourless glass to Italy or Venice.

The survey of the glass is valuable as a reference catalogue for archaeologists and curators to consult when new discoveries of glass are made. It is hoped that this study will benefit both, giving them a greater appreciation of the significance of medieval glass vessels and the information which it can provide about medieval society.

Glass illustrates many different aspects of medieval life, including banquets, lighting, medicine, alchemy, as well as trade, production and symbols of power.

The recent trend towards studying the symbolic features of artefacts offers tremendous potential for archaeologists. It provides a closer understanding of how personal possessions were viewed and used to convey messages by medieval society.

6.3: Limitations of the thesis

Some problems were encountered during the research. One of the initial aims of the thesis was to examine the archaeological contexts of the glass. It was hoped that spatial analysis would provide clues about where on the site the glass was used, and that any associated artefacts found with the glass would show the activity in which the glass had been involved. However, this proved to be impossible in most cases, since the vast majority of the glass excavated was from rubbish deposits, such as pits and cesspits. These contained rubbish representing a great number of activities that would have taken place throughout the site. Only a few fragments were from areas where they were likely to have been lost during use or storage, such as the kitchen area of a house in Pottergate, Norwich, that was destroyed by fire in 1507. Although it was expected that a large percentage of the glass would come from rubbish deposits, it was not anticipated that it would be quite this high. One reason for this result may be that glass survives best in anaerobic conditions such as cesspits, whereas it is more likely to decay and crumble in more 'open' contexts such as floor layers (see pp. 21-2). Nevertheless, the quantity of vessel glass found in rubbish deposits has raised questions concerning the nature of rubbish and its disposal. It is not known what period of time the artefacts found in a large cesspit represent, i.e. whether they built up over a long period of time, or were deposited together. It is also important to ask why large deposits of glass and other tablewares were disposed of together, since it is unlikely that they all broke accidentally at the same time.

The variable response to the survey of the glass has been noted. Clearly not every fragment which has been excavated in England has been included. Since many published vessel fragments have now disappeared without trace, it is certain that many more unpublished fragments will have also been lost. Nevertheless, the quantity of glass found was larger than originally anticipated, and provides a representative sample of the glass in use in medieval England. There are some geographical gaps, but it is likely that glass vessels were used on high-status sites in these areas, since this pattern of use is consistent across the rest of the country.

The three year duration of the research imposed limits on the depth to which the research could be undertaken. Consequently there are areas on which more research could be carried out.

6.4: Suggestions for further research

A great deal of research on the date and production areas of most medieval glass vessels has been carried out since the first fragments were excavated. Many glass vessels can be confidently attributed to a general area and date, but there are still some styles whose origins remain a mystery. For example, the blue glass vessels with painted decorative roundels are of a style which may be French Gothic, but there are no direct glass parallels found outside England (Types C8, D21, H1). Particular areas of Europe have been researched less than others. For example, although documentary references show that glass was made in Spain in the medieval period, examples of Spanish products are not known earlier than a few examples of late 15th century *façon de Venise* glass from Barcelona. Very little information is available about glass from the Byzantine Empire after the early 13th century. More information is likely to become available from Russia and Eastern Europe as academic contacts increase in the future. More foreign publications could be scanned for parallels and archaeological information. The refinement and attribution of the dates and production areas of glass vessels will continue as new glass is excavated. The type-series included in the appendix is purely provisional, created to structure this particular assemblage of glass. As new types of glass are discovered, it will probably require reorganisation.

In the wider perspective of medieval society a number of questions remain unanswered, which require further research from documentary sources. One of the most interesting areas concerns what happens to the vessel between its production at the glass furnace, and acquisition by its subsequent owner. Questions remain concerning the marketing strategy of the glassmakers, the distribution and transport of the glass, and where and how it was sold or if it was commissioned. This thesis has examined why glass was only owned by the upper classes, and no conclusive answer has been reached, although reasons have been suggested. It is not known if glass was available to anyone with a disposable income, or whether there were written or unwritten rules which prevented certain classes from buying it. This may become clearer if it was known where and how it was sold. The lack of glass from any low-status sites suggested the restriction of its use to the upper classes. This situation needs to be monitored, with low-status sites carefully checked for any glass fragments.

Experimental archaeology has been used to some extent in establishing the techniques used to make and decorate medieval and other periods of glass, particularly by William Gudenrath for the Corning Museum of Glass in New York (Gudenrath 1991). However, it could be put to greater use to investigate the logistics of the use of glass. It is not known how effective different types of oil were in hanging lamps, how long they burnt for, and whether the whole lamp was filled with oil, or whether they contained water with a layer of oil or candles floating on the top. These questions are necessary to compare the efficiency and cost of glass lamps to other methods of lighting,

such as candles or wick lamps. An experiment was conducted by the British School of Archaeology in Jerusalem and the Yale University expedition of 1928-9 to Jerash in Transjordania, using early Byzantine hanging lamps suspended in chandeliers. However, the full description and results of the experiment were not published (Crowfoot and Harden 1931, 207).

The production of glass in England has not been researched in detail here. Nevertheless, it is clear that a great deal of work needs to be carried out to investigate this industry in all parts of Britain, to shift the focus from the Surrey/Sussex Weald, to include other areas where references to glassmaking are more sparse.

There is a need to publish parts of this thesis. The lack of a synthesis of excavated glass from England has been commented on, and it gives the impression that England was a minor consumer of vessel glass. It is hoped that archaeologists, glass scholars and museum curators will appreciate the information provided by the survey of a large number and wide variety of glass vessels. The survey may become a standard reference work for the glass found in England. It provides information on all the known uses for glass vessels, and the places and circumstances in which it was used in medieval England. It should be possible for those with no previous experience of glass to use the survey to identify fragments and put them into their social context. Continental archaeologists will be particularly interested in the glass found in England which may have been made in their own local areas.

This thesis was not intended as a final word on the subject of medieval glass in England. It was designed as an introduction to the available evidence, and as a discussion of the potential themes on which glass vessels can provide information about medieval society.

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