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Lübecker Kolloquium zur Stadtarchäologie im Hanseraum V:

Das Handwerk

Für die großzügige Förderung bei der LÜBECKER
Publikation dieses Bandes danken wir dem BAUVEREIN 

Archaeological Evidence for Craft in Cork and Waterford 1100-1500 AD

by Maurice F. Hurley, Cork

Introduction

Craft is taken to mean an occupation or trade requiring a special skill, consequently all those who specialised in the trade are regarded as craftsmen, collectively referred to by the main product output, e.g. potters, coopers, smiths etc. From the archaeological evidence it is not always possible to know for sure whether an item was produced by a craftsman, i.e. as part of a developed craft, or merely a once-off item produced by the consumer for his own needs. This is especially true of some of the more mundane wooden and bone items. Some items may also be the product of craftsmen, but due to the commonplace nature of the object and limited level of modification they cannot be confidently attributed to a craftsman. This concern holds throughout the period under review. For example, long after coopering became an organised craft, servicing the brewing, distilling and food provisioning industries, rough coopering (or white coopering) was practised by men outside the regulated craft/industry to service the needs of farmers (Coleman 1944, 83). Solely from the archaeological perspective, looking at a limited sample of artefacts, the differences between one stave and another may be merely one of degree, and full implications of craft or non-craft are not appreciated.

Some criteria must be used when attributing artefacts to specialized crafts. Obviously, the complexity of the process, the possession or use of specialized tools and access to rare or highly valued raw materials are significant factors in identifying craft specialization. Similarly, in distinguishing locally produced items from imports, we tend to assume that it doesn't make sense to import objects that could be made from locally available raw materials. This assumption presupposes the existence of sufficient demand for the product and availability of the requisite skill and

technology. Ceramics are a case in point in medieval Ireland. Although the technology and raw materials were available, glazed ceramics were not produced in Ireland until the later 12th century. Prior to this, glazed wares were imported from Britain and France for over a 100 years and are common finds in all Irish port towns. Long after local ceramic centres were established imported ceramics continue to dominate the assemblages of Cork and Waterford.

It is necessary to outline the current state of archaeological evidence in any evaluation of the place of craft in medieval Irish cities. Environmental conditions are of singular importance. The preservation of organic material in many Irish cities is very good, while the evidence from Dublin is particularly spectacular. Anaerobic conditions occurred throughout much of the Viking Age and medieval levels and extensive excavations have taken place over many years (Wallace/Ó Floinn 1988. Simpson 2000).

Anaerobic conditions also prevail throughout most of the low-lying island city of Cork and in parts of Waterford where impermeable clays form the substratum. With the exception of crannogs (lake dwellings) and bogs these conditions rarely exist outside the cities. Consequently, it is difficult to undertake worthwhile comparative studies between the cities and their rural hinterlands. While we may assume that organic raw materials were utilized in all periods and in all environments, wood, bone, leather and textiles are generally not discussed by archaeologists when these materials are not represented in the excavated assemblages. Arising from the limitations of survival it may appear that the craft skills of medieval rural Ireland were limited and impoverished by comparison with the flourishing cities. Urban excavations have produced a bewilderingly rich assemblage of artefacts in every available raw material and diversity of form. The findings have fostered the view that Irish Viking Age and medieval cities were veritable trade and craft emporia isolated from their hinterland where each and every resident was a craftsman of some sort or another (DePaor 1976).

While the cities evidently fostered trade and commerce and served as conduits for foreign commodities and new ideas (Hurley forthcoming), they cannot be viewed in isolation from the



Fig. 1 Waterford. Iron tools, nails and roves from a mid-13th-century pit near Peter Street (Photo: Waterford City Council).

rural hinterland from whence their raw materials were obtained (Bradley 1988). Modern perceptions arising from environmentally determined factors based on preservation are compounded by historical evidence for political and ethnic distinctiveness of the Irish urban populations. Irish cities emerged in the context of Viking influences and all of the medieval Irish port cities, namely Dublin, Waterford, Wexford, Cork and Limerick, developed in a Hiberno-Norse milieu. Contemporary native Irish texts referred to the residents of the cities as foreigners (Lucas 1966). When the Anglo-Normans invaded Ireland in 1170, the cities, which had already emerged as regional admin-

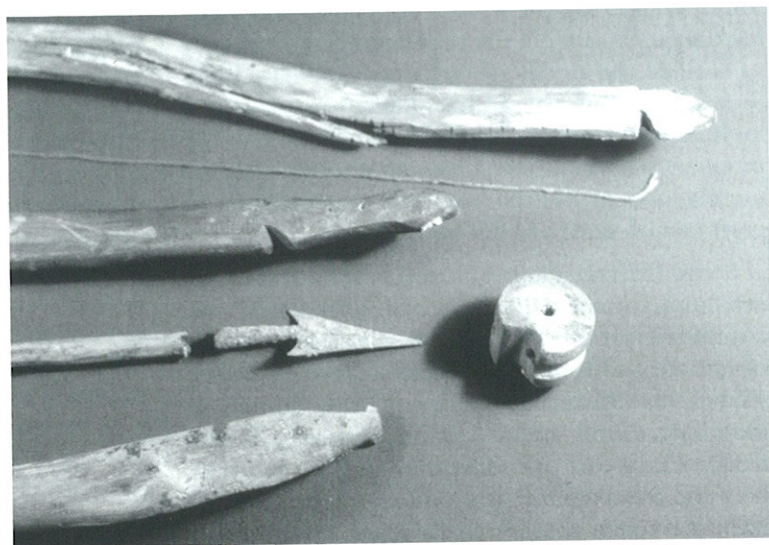


Fig. 2 Waterford. Archaeology material from medieval Waterford; ends of three wooden longbows, bow-string, bone crossbow-nut, arrowheads and shaft (Photo: Waterford City Council).

istrative foci, served as fortified bridgeheads and ideal command centres for colonial development. Nevertheless, the raw materials of rural Ireland formed the main export items of medieval Irish ports (Hurley 1999) and were essential for the subsistence of urban populations. Despite lack of archaeological evidence and irrespective of political allegiance and ethnicity, the cities could not have existed in isolation. Crafts, skills and purveyors of new technologies must have easily transcended political and ethnic boundaries.

Over a period of 500 years, many crafts, utilising a wide range of raw materials, are represented in the archaeological evidence. Some crafts were important and constant, some flourished briefly only to fade into obscurity while others were always marginal. The working of two raw materials will be taken to illustrate the various relevant aspects of craft; namely wood and bone/antler.

Woodworking

The raw material

Wood was the most common raw material in use in Hiberno-Norse and medieval Waterford and Cork. It was, in many forms, used extensively as a building material and the majority of household furnishings and many utensils were made of wood. Wood was also used in combination

with other materials and most iron implements and tools had wooden handles (Fig. 1). The earliest wooden artefacts from Waterford date to the mid 11th century, but the majority in both Cork and Waterford were found in 12th- and 13th-century contexts. The distribution of wooden objects is not indicative of a preference for wood by certain citizens, classes or even in certain periods, it simply reflects environmental conditions which enabled the survival of organic material.

Some of the wooden artefacts are single surviving examples of a type, but where examples of one category survived over a broad date range very little change in form or working technique is apparent. The most noteworthy example of preference or change is perhaps the occurrence of carved cylindrical churns in the late 11th to mid 12th century (Fig. 3) and the predominance of stave built vessels in the later 12th and 13th century (Fig. 7). Almost all the wood used for artefacts and structural purposes in Cork and Waterford was of native origin and was likely to have been felled locally. At least sixteen native species are represented in the Waterford assemblage (Hurley/McCutcheon 1997) and seven in Cork (Hurley 1997a, 275-78).

The only possible imported species represented are Scots pine, boxwood and cork. The Scots pine found in 11th-century Waterford may be from the remnants of native woodland, but it may equally be derived from reused ship timbers of Scandinavian origin. Similarly, the boxwood may be from introduced species grown in Ireland, but is more likely to represent a foreign made import as boxwood combs are known to have been

widely sought and imported over long distances (Kolchin 1989, 139). The cork represented as net floats was almost certainly imported to Cork (Hurley 1997a, 278) and Waterford from Iberia. Evidently, the woodworkers chose native species on the basis of suitability for technique of manufacture and the intended use. It is apparent from the consistent preferences for particular types of wood that the woodworkers and perhaps the majority of the population were familiar with the properties which characterise the native varieties of wood. Softer woods, predominately ash

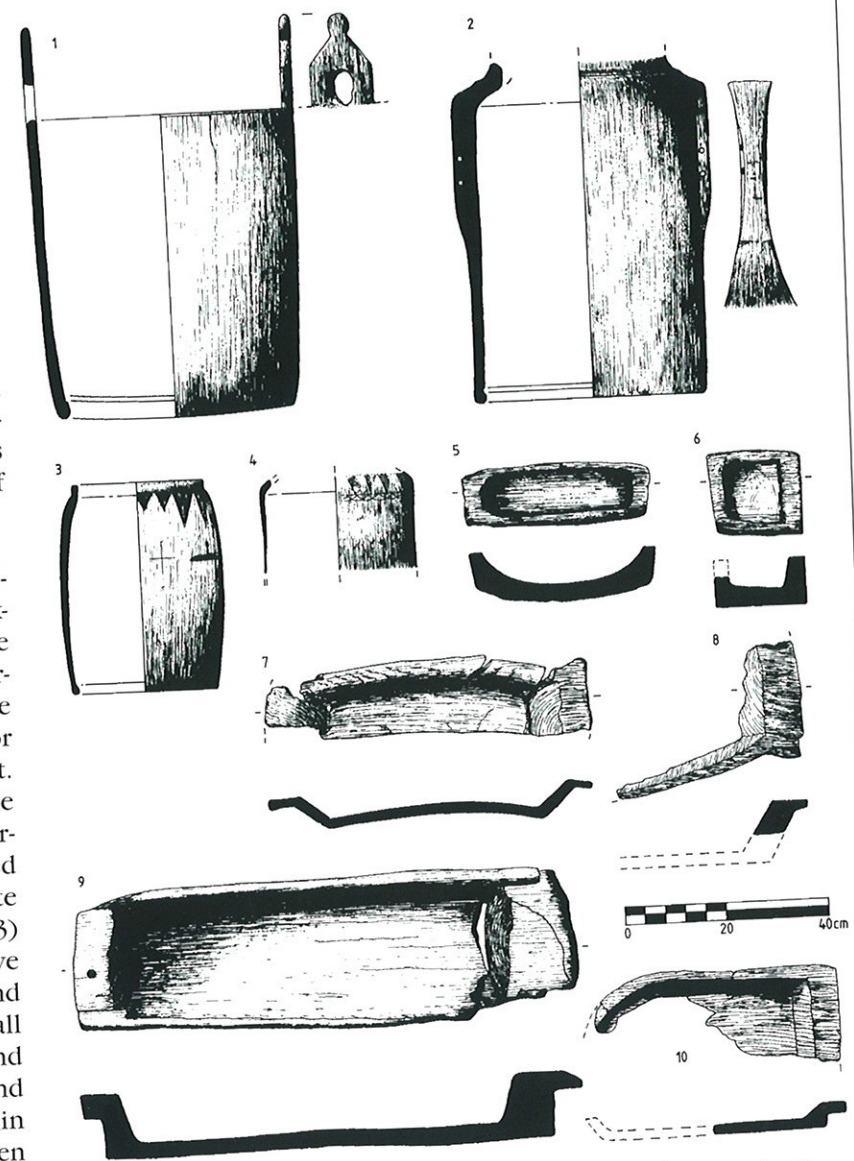


Fig. 3 Waterford. Churns 1-4, troughs 5-10, from 11th- and 12th-century levels.



Fig. 4 Waterford. Medieval carved spoons of yew wood (Photo: Waterford City Council).

and alder, were preferred for bowls which were lathe turned. Alder seems to have been preferred for vessels of high quality and significantly all the Waterford mazers (Fig. 5) of this wood were turned. The harder woods such as oak and yew were rarely used for turning.

The vast majority of carved objects, which were utilitarian and needed to be strong and durable, were made of yew. Yew was used because it has greater elasticity and strength than any other timber grown in this climate. Items made from yew rarely warp or crack and it was evidently chosen for archers' bows (Fig. 3) and other items requiring precision such as coin balances (Fig. 9). Similarly, spoons (Fig. 4), handles, tuning pegs, pins, spindles (Fig. 12), net-braiding needles, gaming pieces etc., all of which were in regular use and subject to shock or pressure, were predominantly made of yew. It is possible, however, that yew is disproportionately represented in the assemblages, as it is more likely to survive in conditions where preservation qualities in the ground are marginal, resulting in the decay of softer woods.

Other locally grown woods were used to a lesser extent. Oak was used for many of the larger wooden objects such as shovels, rakes, shingles, roof finials and furniture (Hurley 2001, fig.

14), and it predominated amongst the timbers used for structural purposes. Alder was frequently used for dowels because it was easily carved yet tough and water resistant.

Large carved vessels such as cylindrical churns and troughs were made from ash and alder (Fig. 3). These woods were easily carved and less liable than oak or yew to split when cut into thin-walled cylinders.

Smaller stave built vessels generally had yew side staves (Fig. 7), even though some were of

oak. The majority of their heads and bases were of oak. The hoops were generally split yew branches with the bark pared off, which was evidently done by choice because of the woods flexibility and elasticity. Most of the staves from the larger tubs and casks were made of oak. In the late 12th and early 13th century, withes of hazel, which were bound by willow twigs, wrapped these, but later yew hoops were used while iron hoops predominated on post-medieval and modern casks.

City or Rural Craft?

Of greater uncertainty is the question of where the wooden artefacts were produced. Was the wood brought into the cities as unworked logs where resident specialised craftsmen manufactured artefacts, or did country people trade their craftwork with the town folks in exchange for exotic imports? There is no definitive answer, but a combination of both seems likely. There is no means of quantifying the amount of rural produce traded as raw material or finished product, but we do know for certain that wood was worked in both Cork and Waterford as large amount of woodworking waste, including many cores from turned bowls, was recovered.

Much of the 12th- and 13th-century urban strata are largely compound of woodchip. At Christ

Church, Cork (Cleary 1997, 32) for example, a "reddish brown layer" of woodchips was almost one metre deep over much of the site. Strong native traditions are visible in the range of artefacts in all Irish cities. There are numerous parallels between items found in Cork and Waterford and those from contemporary levels of the crannogs in Gaelic dominated rural Ireland (Johnson 1999). Native elements are also strong in the styles of decoration on wooden artefacts (Hurley/McCutcheon 1997). Many artefacts, however, are also paralleled in other Irish, English and Continental port cities, but this is not conclusive evidence for importation. It must be assumed that local craftsmen working with native materials were in regular contact with all areas because Cork and Waterford had trading connections: that is, with hinterland and other seaport towns.

A number of techniques are apparent within woodworking: turning, coopering, basket making and carving. Of these crafts it is likely that turning and coopering were specialized, while basketry and carving may be largely domestic activities. It is possible that specializations were not exclusive and that the craftsmen were engaged in other pursuits such as house building, farming etc. in the 11th and 12th centuries and that the specialization gradually became more exclusive as the Middle Ages progressed.

Turning

The only items produced in large numbers were bowls (Fig. 6), but for these alone it is possible that a few craftsmen were working within or in the vicinity of each city. The mazers (Fig. 5) were probably used only by the nobility and wealthy mer-

chants. It seems likely that in the 12th and 13th centuries each household had more wooden vessels than ceramic ones, and there must have been considerable demand for these items. In addition to local woodturners there is the possibility that some itinerant craftsmen served the needs of a few large ports and the markets in several smaller towns. By analogy with modern usage, in the early part of the 20th century, the owner of the Borrisokane (Co. Tipperary) pole-lathe

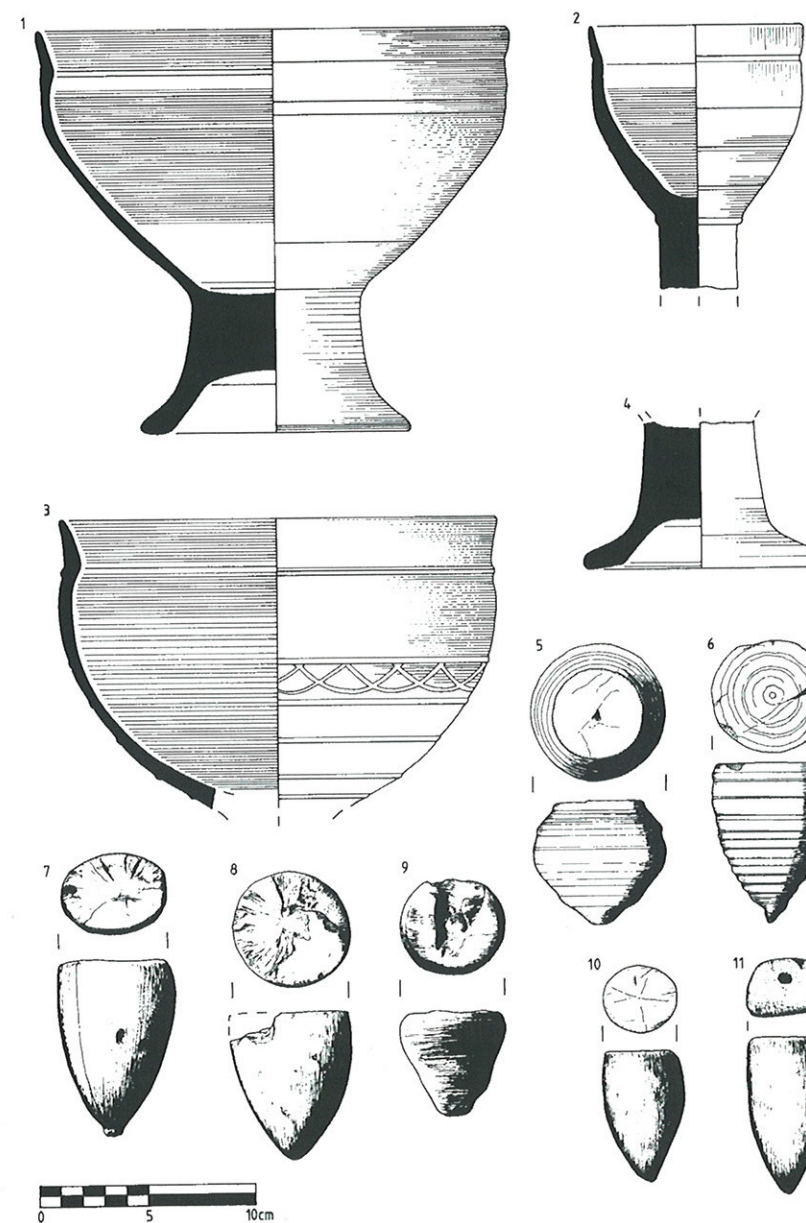


Fig. 5 Waterford. Mazers, hanaps and cores, evidence of lathe turning in the 12th and 13th century.

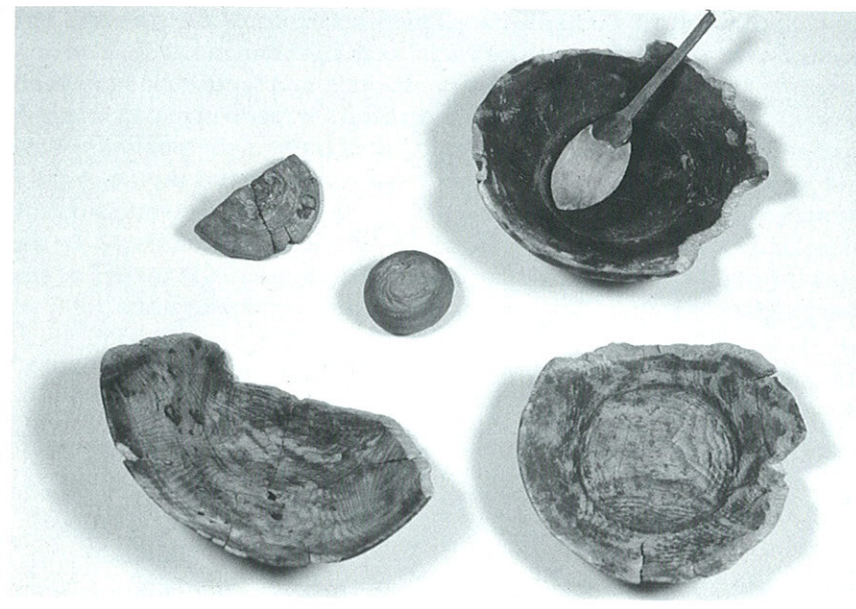


Fig. 6 Waterford. A group of wooden bowls and cores (woodturning waste) from 13th-century levels (Photo: Waterford City Council).

ing seems to have always remained a "folk craft" and the woodworkers never formed guilds. This may be largely due to the decline in demand for wooden table vessels in urban areas in the late medieval period at a time when many other craftsmen were forming guilds. The craft continued to flourish in rural Ireland (Ó Riordáin 1940).

Coopering

Coopering was well established in Ireland by the Early Christian Period as evidenced by the 9th-century stave-built vessels from Lis-sue Rath, Co. Antrim (Bersu 1947, 54). In Waterford,

very few staves were recovered from 11th century contexts, but the number increased dramatically from the mid 12th century onwards. In Cork the earliest staves are from the mid to late 12th century (Hurley 2003), while many staves are found in 13th-century contexts. There appears to have been a preference for the carved vessels in the late 11th and early 12th centuries. Several carved cylindrical churns and troughs were found in Waterford (Fig. 3) and recent comparable items have been found in 12th-century Cork (Hurley/Price in prep). Stave-built and carved vessels have also been found in association elsewhere in Ireland, e.g. Ballinderry (Hencken 1936, 135ff.) and in bogs (Ó Floinn 2002, 261, fig. 7:18). A wide variety of vessels of different sizes were coopered, i.e. the use of multiple jointed staves bound with hoops and fitted with a base which was either a single disc or multiple (end) staves. Coopering, which was still widely practised until the early 20th century, was a highly skilled craft (Coleman 1944, 79-88) and coopers had unions and guilds (Caulfield 1878, 289). The status to which coopering rose in the post-medieval period, by comparison with other wood crafts, was no doubt due to the significant use of casks for beer, spirits and salted meats as well as the trade and export of provisions such as butter, meat, fish etc. While the highly skilled coopering of casks was city based, a cruder form called

"not only supplied local needs and did business at fairs, but also did a considerable trade with wholesale firms in Dublin, Cork and Galway" (Ó Riordáin 1940, 30).

The reciprocating pole-lathe, which is very different from the modern rotary lathe, was in use from the Early Christian Period to Modern times and was a portable item.

"In essentials it consists merely of a wooden bench with adjustable headstocks. The place of the pole may be taken by a living branch of a tree and this was frequently done by the Welsh turners who were thus able to work in the open, at fairs and elsewhere, and so to produce goods to order of the costumers on the spot" (ibid.).

An early 19th-century account describes turners basing their activities in the wood:

"(they) generally build a hut in the wood that is being cut and reside there while the timber is felling, buying and working those kind of trees most suited to their purpose and paying for them as the manufactured goods are sold" (Thompson 1802, 253).

The importance of woodturning may have declined from the 14th century onwards with the more widespread use of ceramic tableware, metal cooking pots and storage containers. Woodturn-

"white coopering" (ibid., 82) was practised by semi-skilled men who were not regarded as craftsmen.

"The products are usually straight staved (without the characteristic barrel bulge) wash tubs, drip tubs and coal buckets; and for farm use, churns, noggins, butter tubs and cream butts" (ibid.).

Presumably stave vessels were made for all of these functions in cities in medieval times where economies were largely based on agricultural produce. In addition, stave-built vessels were probably used domestically for jugs or other table use (Fig. 7). Therefore, it is likely that the status of coopers in the medieval period was very similar to woodturners. Coopers may have done other carpentry, but they were certainly highly skilled and full-time woodworkers.

Basketry

This craft is of more dubious status, although the quality of baskets used in the cities is hardly reflected by the small number of finds (Fig. 8). Baskets and panniers must have been used to transport most raw materials and produce just as plastic and cardboard are used today. Fish, eggs and solid fuel have traditionally been carried in baskets (Evans 1957, 205-10). Judging from the late 19th-century photographs of markets in Cork (Hurley 1999, fig. 6), the basket was the ubiquitous container not only for carrying pre-

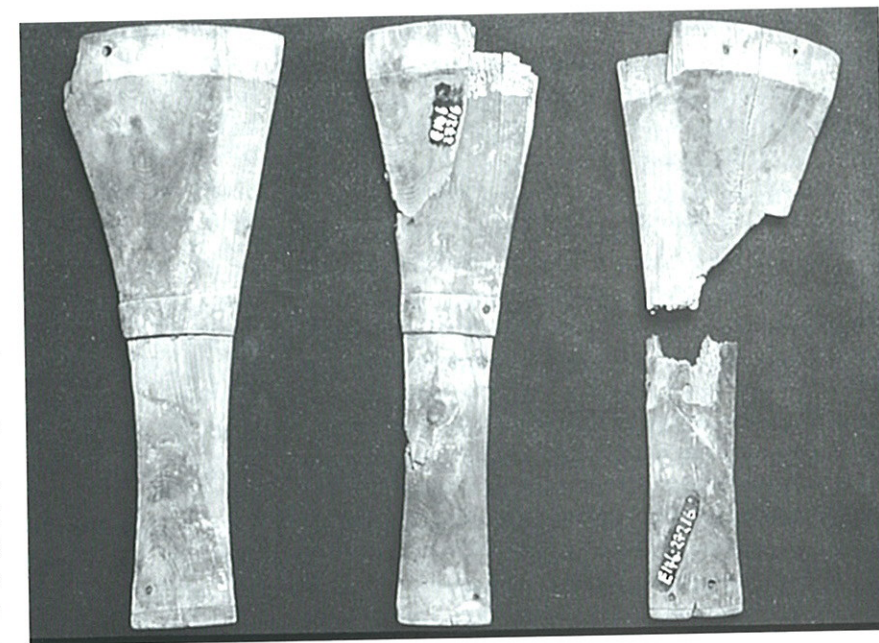


Fig. 7 Cork. Staves from a funnel-shaped table vessel from 13th-century context (Photo: P. Citting).

served items but also for trade and coinage. Professional basketmakers may have found sufficient demand for their wares in medieval cities the size of Cork and Waterford, but many types of baskets have traditionally "been made by country people or fishermen and never by professional basket makers" (Wright 1975, 342). Women may have produced baskets as a domestic craft.

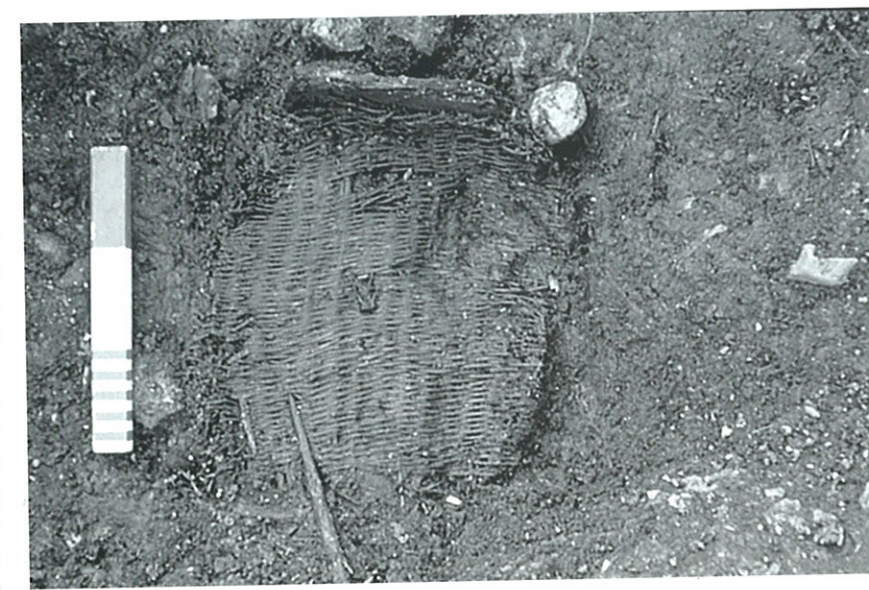


Fig. 8 Waterford. Part of a basket in situ, Peter Street (Photo: Waterford City Council).

Carving

Carved objects may have been made by any or all of the woodworkers discussed here, or may in many instances have been made by the people who were engaged in occupations, e.g. fishermen, farmers, weavers, musicians etc. Woodcarving was probably more often than not done by the user of the object. The technical knowledge possessed by non-professionals cannot be easily imagined by those of us accustomed to today's availability of mass-produced commodities. The embellishment of carved objects with design as well as the application of owners' marks was probably also done by the users. Some were no doubt better than others and in Ireland in the early historic period, masters in yew carving had a special social rank (Mitchell 1976, 178). It is likely that the more sophisticated gaming boards and chess-pieces as well as longbows, cross-bows and the coin balance (Fig. 9) were made by professionals who specialized almost exclusively in these items.

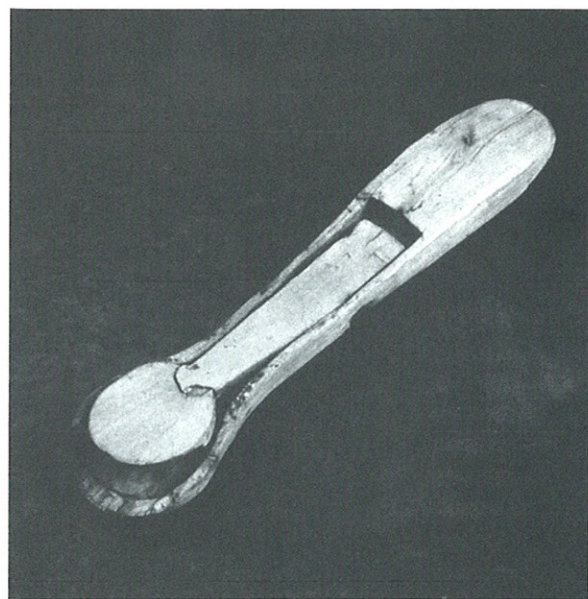


Fig. 9 A coin balance carved in yew wood (Photo: Waterford City Council).

Woodworking Tools

Most large woodworking tools were equally applicable to structural work or to the fashioning of artefacts. Few metal tools exclusively related to woodworking have been identified from medie-

val excavations (Fig. 1). There are, however, many tools which could have been used for woodworking but were probably multi-purpose, for example knives. Each stage of woodworking from felling to fine carving required different tools. Skilled crafts such as turning and coopering also needed their own specific range of tools.

The axe was predominantly used for felling and cutting trees. There is no evidence for the use of the saw for felling or cutting up wood until the 16th century (O' Sullivan 1994, 21). There is evidence for the use of an adze (i.e. a hollowing implement indicated by shallow, scallop-shaped depressions on the wood for shaping and dressing wood). There is no evidence that large planks were sawn but rather they were cleft radially, probably by wedges and mauls. Saws may have had a limited use in joinery for 12th-century timber-framed houses but there is no diagnostic evidence. Few artefacts were made with saws, notable exceptions being combs (Fig. 12) and small items.

Carving on larger timbers was generally done with chisels, e.g. for grooves, notches and mortises on timber-framed houses, thresholds, etc. Perforations may have been carved but were likely to have been drilled. Carving of all small artefacts was apparently done with knives. A specialised set of hollowing chisels with either hooked or straight blades must have been used for wood turned on a lathe. Specialised coopering irons have been identified in Waterford and Cork (Scully 1997a, 469-74; 1997b, 173ff.). Drilling was done with spoon-bits (*ibid.*) or with twist-bits. Twist-bits were found in 14th-century contexts in Cork (Hurley 1990, 67ff., figs. 14.5 and 15.3). Some holes were burned through the wood with pointed, red-hot irons. Small hooks and chisels must have been used to carve spoons etc.

"Owners" or "marker's marks" are common features on dishes and bowls. Even though the number of unmarked bowls shows that the marking was not a standard practice. When present, they are always located on the external base of the vessel. They were intended to denote ownership and may have been carved after manufacture. The elaborate rosettes on the other hand, may have been applied by the makers as decoration.

Skeletal Material

Preservation

In Waterford the largest number of bone and antler artefacts was recovered from house floors, associated backyards and pits of 12th- and early 13th-century date, while the date in Cork ranges somewhat from later-mid 12th to early 14th century. These contexts were in most cases sealed, and anaerobic conditions prevailed. The infrequent and fragmentary bone and antler artefacts from earlier and later levels largely reflect survival rates. Horn, that is the outer keratin layer of horns of cattle and goats, rarely survives even in the most favourable conditions. There is only one horn comb from Waterford (Hurley 1997b, 658) and two from Cork (Hurley 1997c, 243-50). The only other well-preserved horn artefact is part of a late 11th/early 12th century possible blast horn from Waterford (Hurley 1997b, 679ff.).

Red deer (*Cervus elaphus* L.) was the only native species present in Ireland in the Hiberno-Norse and medieval period and it would have found the semi-wooded environment an ideal habitat. Roe (*Capreolus capreolus* L.) and fallow (*Dama dama* L.) deer were native to Great Britain but absent from Ireland. There is evidence that fallow deer were introduced to Ireland in the Norman period. Venison played a very minor role in the diet of the inhabitants of 12th-century Waterford (McCormack 1997) and Cork (McCarthy 1997). It must be assumed that shed antler was collected in the hinterland. The high proportion of naturally ruptured burrs also testifies this. The antler had to be collected as soon as it was cast (March to May) because shed antler is frequently devoured by rodents or by the deer themselves. The collection was most likely done by country people familiar with the habitats of the deer. The antler may then

have been bartered with urban craftsmen. Alternatively, the craftsmen may have annually spent a season roaming the countryside collecting what they needed. In view of the scale of production in Waterford and Cork and the association of horn cores and antler, it seems more likely that an urban-based craft existed, in which the raw material was supplied on an organized basis.

The size and amount of discarded antler in the late 11th- and 12th-century contexts are very high. Complete antlers, large lengths of shafts adjacent to crowns, burrs and long tine offcuts, all of which contained usable portions of antler, were frequently discarded. In 13th-century contexts the use of antler was more economical with smaller proportions of waste (Fig. 10). The increased thrift apparent in the use of antler from the mid 13th century onwards may be a consequence of a diminished supply of the raw material.

Bone was more readily available within the towns as cattle were the principal source of meat in medieval Waterford (McCormick 1997) and Cork (McCarthy 1997). It is likely that the supply exceeded the demand at all times. Bone was generally used for objects where the natural shape of the material lent itself to minimum modification. The most obvious examples are the wide flat split ribs used for casket mounts, the proximal ends of mammal long bones for spindle whorls (Fig. 12)

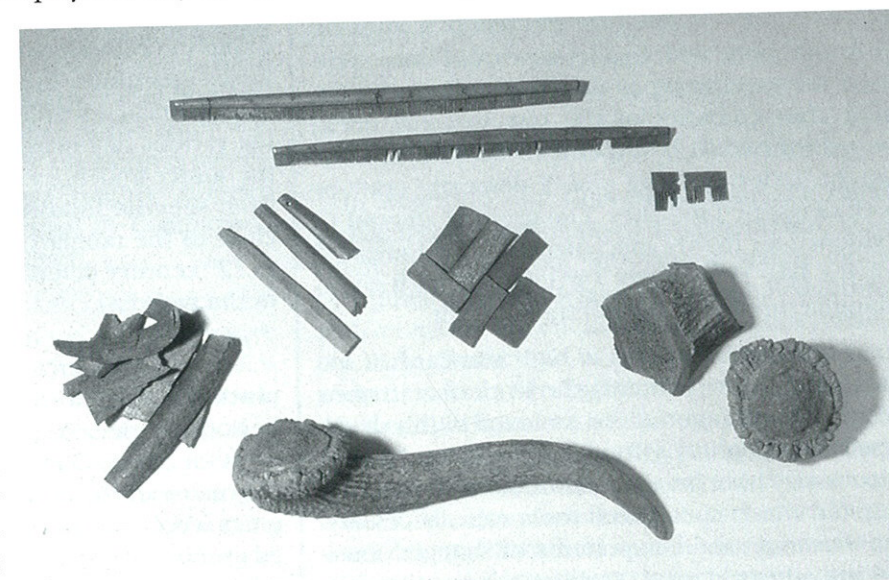


Fig. 10 Waterford. Evidence for the production of antler combs in the 13th century (Photo: Waterford City Council).

and pigs and sheep metapodials for toggles. Bird bones were ideal for whistles and flutes (Fig. 11), whereas tubes and needle cases (Fig. 12) could be made from long bones of small animals with little or no alteration. This meant that bone was more readily accessible and in a greater diversity of form for a wider range of objects than antler.

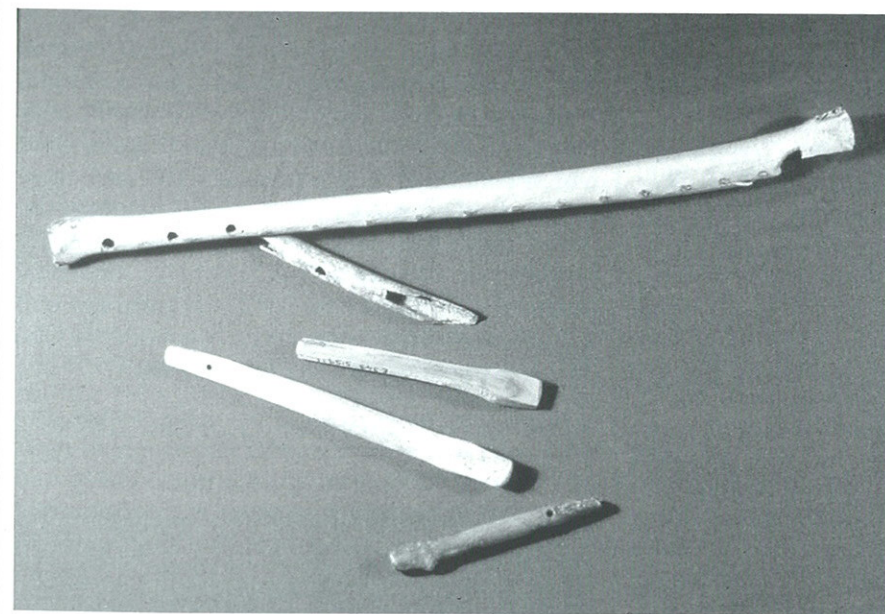


Fig. 11 Waterford. A flute and whistle made from bird bone (background) and tuning pegs for stringed musical instrument (foreground) (Photo: Waterford City Council).

The Working of Skeletal material

Antler, bone and, to a lesser extent horn were used for specific types of objects where the salient characteristics of the raw material could be maximised. It is difficult to be sure to what extent antler working was a domestic craft or well-developed industry. The greatest amount of evidence for highly specialized craft is indicated for the late 11th to early 13th century, with comb manufacture being the central element.

Antler combs exhibit a high standard of expertise and were certainly the work of craftsmen who possessed specialized tools and highly developed skills (Fig. 10). Other objects such as gaming pieces may have been a by-product of comb making, for which specialized tools were necessary. Furthermore, the components of stringed musical instruments (Fig. 11) and crossbows (Fig. 12), where precision was essential, were undoubtedly the work of professionals.

Bone objects may also have been professionally produced, but many required little skill and are frequently "no more than the adaptation of the natural feature of certain bones" (Adams/Sheppard 1990, 251). The use of proximal ends of mammal bone for spindle whorls (Fig. 12) and the bone and antler cylinders are a case in point.

Examples of an intermediate category of objects, either the work of specialists or that of skilled handymen, include flutes and whistles, needles and pin beaters (Figs. 12 and 13).

The antler and horn waste in the ditch fills and mid-12th-century extra mural dumping in Waterford probably derived from workshops. Particularly large concentrations of antler waste (burrs, tines, various off cuts and slices) were found in the early 12th-century habitation debris of two adjoining properties fronting Peter Street, Waterford

(Scully/McCutcheon 1997). Antler waste was also found in or adjacent to nearby houses, though in lesser quantities. In all of these cases, the antler was associated with bone and horn cores exhibiting various saw marks. It is also a possibility that the antler and horn waste in the ditch derived from specific industrial-type workshops located close to the rampart, perhaps outside of the 11th to 12th century defences in the unexcavated areas to the west.

There is little indication for the type of objects produced from horn, not until the post-medieval period with its extensive evidence for the use of horn for combs (Dunlevy 1988). It was only then that many of the crafts common in the medieval cities were formalised into guilds and documented (Jeayes 1905, 11-14). Interestingly, by the time the use of antler for combs had almost ceased, there was a joint guild of comb- and lanternmakers in Lübeck (Ambrosiani 1981, 162).

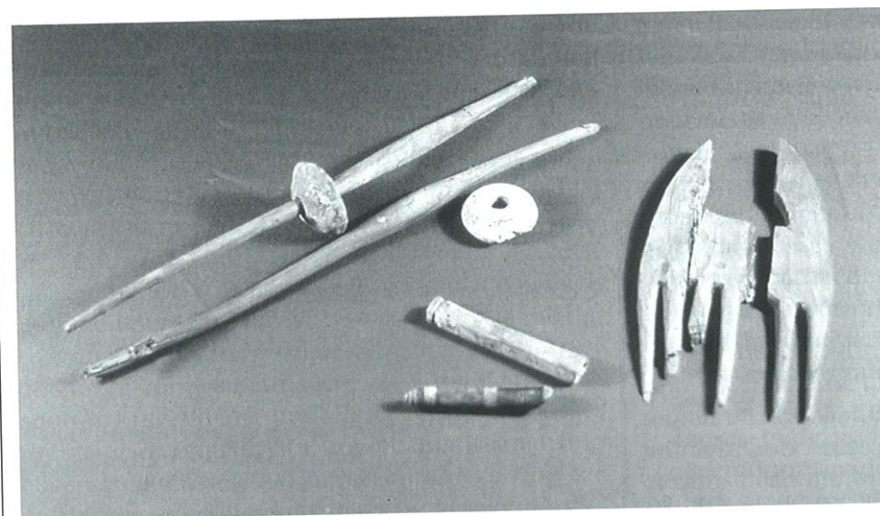


Fig. 12 Waterford. A wooden comb (liturgical?), wooden spindles with bone whorls, bone tubes and needle cores (Photo: Waterford City Council).

Working Methods and Tools

There is no direct evidence for the tools used in antler and bone working neither from the artefacts themselves nor from the waste. However, there is a considerable amount of evidence for the use of saws. Saws were used to cut bone and antler into appropriate lengths for further working. The teeth on all of the combs were sawn. The casket mounts, discoid gaming pieces, needle cases, the modified antler tines in their various forms and the bone and antler cylinders were all sawn. Other tools were used to shape the artefacts: drills, gouges and punches to perforate, knives to carve and shape and inscribing tools with a fixed or variable radius were used to decorate. The use of the latter was restricted and is evident only on gaming pieces. Some of the antler waste was roughly chopped with an axe but this is minimal by comparison with the number of sawn pieces.

Dot-in-circle rounded motifs rarely occur on the combs but are frequent on the decorative casket mounts in Waterford. This does not necessarily imply the existence of separate craft workshops or different craftsmen. The application of roundels to the flat surfaces of casket mounts was easily achieved with scribing bits of various radii, while the convex surfaces of comb connecting plates made use of this instrument impractical. Dot-in-circle roundels were also common on the flat surfaces of discoid gaming pieces but were not used on hemispherical pieces. The making

of gaming pieces from parts of antler, unsuitable for comb making due to the high proportion of spongy tissue, was particularly common in the assemblage from medieval Cork (Hurley 1997c, 250-53). This factor was less evident in the Waterford gaming pieces, where antler was obviously available in plentiful supply.

Most of the shaping of small bone and antler objects was done with a knife, examples include

needles and pin beaters, bone tubes and needle cases and the perforations in toggles. Perforations, however, were generally drilled, probably with spoon-bits and at a later date with twist-drills (Hurley 1990, 67). Files may have been used but none have been identified in Cork or Waterford.

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Zusammenfassung

In Waterford und Cork sind zahlreiche Handwerkszweige archäologisch nachgewiesen. Über einen Zeitraum von 500 Jahren waren einige von ihnen durchgehend von großer Bedeutung, andere hatten einen kurzfristigen Aufschwung, um dann gänzlich zu verschwinden, und wieder andere waren durchgehend von geringer Bedeutung. Bei letzteren ist es zuweilen schwierig, aus den archäologischen Ergebnissen abzulesen, ob es sich dabei um Handwerk oder Hauswerk handelt. Allerdings erhalten sich in den Schichten von Cork und Waterford sowohl anorganische als auch organische Funde. Vergleichbare Bedingungen gibt es in den ländlichen Regionen Irlands leider selten, so dass es schwierig ist, vergleichende

24 Untersuchungen zwischen dem Fundgut aus den Städten und demjenigen aus den ländlichen Regionen zu tätigen. Archäologen neigen dazu, nur das in ihre Diskussionen einzubeziehen, was sie auch selbst bei ihren eigenen Grabungen nachgewiesen haben. Auswertungen basieren somit immer auf dem Vergleich mit Ergebnissen aus anderen Städten. Deshalb haben diese eingeschränkten Untersuchungen auch die Auffassung verstärkt, dass Städte, die erfolgreich von den wikingschen und normannischen Kolonisten beherrscht wurden, von ihrem Hinterland isoliert waren.

Holz- und Knochenverarbeitung wurde herangezogen, um die Entwicklung und den Aufstieg bzw. Niedergang dieser handwerklichen Tätigkeit anhand dieser überall vorhandenen Rohmaterialien zu beleuchten. Es wurden fast ausschließlich heimische Holzarten benutzt. Im 13. Jahrhundert war das spezialisierte Handwerk wie das Drechseln und Böttchern von großer Bedeutung. Später scheint das Drechseln gegenüber dem Böttchern in den Hintergrund getreten zu sein.

Die Bedeutung des Böttcherhandwerks in Cork ist in Zusammenhang zu sehen mit der Bedeutung von Fässern für Bier, Whiskey, Butter und gepökeltes Fleisch. Dieses änderte sich nicht bis zum Beginn des 20. Jahrhunderts. Die Böttcher bildeten einflussreiche Gilden und später Gewerkschaften. Im Gegensatz dazu gab es durch die Zeit hindurch immer die Korbflechter, doch sie waren für die Wirtschaft unbedeutend. Obwohl Jedermann Körbe benötigte, und vieles in Körben transportiert wurde, war es ein Handwerk, für das keine qualitative Ausbildung vonnöten war, und so wurden die Körbe wahrscheinlich in Heimarbeit von Frauen gefertigt.

Von großer Bedeutung war im 12. und 13. Jahrhundert die Verarbeitung von Geweih. Das änderte sich, als Geweih immer seltener wurde, und die Käme aus Horn gefertigt wurden. Letztere erhalten sich selten im Boden. Hieran lässt sich erkennen, dass Handwerksarbeit immer eine heikle Balance zwischen dem Angebot des Rohmaterials, der Verfügbarkeit von Geschicklichkeit (Qualifikation)/Technologie und dem Bedarf / Vorliebe des Konsumenten war.

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Craft industry in Norwich from the 12th to the 18th century

by Brian S. Ayers, Norwich

About 1350, a monk at Norwich Cathedral Priory was so driven to distraction by the noise of metalworking smiths in the city that he scribbled a piece of doggerel verse into the margin of his manuscript:

*"Swart smoky smiths smirched with smoke
Drive me to death with the din of their dints
Such noise at nights heard no men never
Such crying of knaves and clattering of clops
The crooked codgers cry after 'Coal! Coal!'
And blow their bellows till their brains are all
bursting"* (Myers 1969, 1055).

This unusual documentary reference to a medieval craft, probably written in a northwest Norfolk dialect, is complemented by numerous other written sources from the rich archives of the city. This paper will concentrate upon archaeological evidence for craft industries in Norwich but it is worth outlining the range of information available in documentary sources as the very richness in the documents underlines the relative paucity of the excavated material.

To take just one set of documents, a remarkable group of property deeds dating from 1285 to 1311 and now referred to as the Enrolled Deeds. These deeds have been examined in detail for evidence of crafts and trades and, for metalworking alone, as well as the mention of sixteen smiths, there were nineteen goldsmiths, eight cutlers, five lorimers (makers of metalwork for horse harness), five latoners (thin metal- or brassworkers), two needlerers (makers of pins and needles), two furbishers (metalpolishers), two bell founders and one armourer (Kelly 1983, 27).

The range of occupations was clearly great: in addition to the metalworkers, examination of the Enrolled Deeds identified some ten other different trade groups (if one includes ecclesiastics) broken down as follows: leatherworkers, textile workers, those engaged in provisions such as fishermen or butchers, merchants, clothing trades, building trades, service trades, agricultural, and miscellaneous. This last group contained occupations such as *brevitor* or letter-writer, three barbers, three physicians and a surgeon.

Street names within Norwich, many now lost but preserved in the medieval and early post-medieval documentation, also indicate the extent of industry. Craft names relating to the textile, leather and metal industries in particular are noteworthy as can be seen from the following table, drawn from the street-names survey of Norwich compiled by Sandred and Lindström (Sandred/Lindström 1989).

Table 1: Craft names in Norwich street names.

<i>Street name</i>	<i>Meaning</i>	<i>Earliest reference</i>	<i>Craft group</i>	<i>Modern Name</i>
Aurifabria	Goldsmiths	1287	Metal	London Street
Blesterehole	Street of the bleachers	1292-1312	Textile	<i>lost</i>
Bridelsmethis row	Harness makers	1364	Leather / Metal	White Lion Street
Latonerowe	Lattenworkers	1334	Metal	London Street
Le Coteller Rowe	Knifemakers	1247	Metal	London Street
Le Fulleres holes	Fullers	1323	Textile	<i>lost</i>
Le Lorimers Rowe	Spurriers	1322	Metal	White Lion Street
Le Oserie	Stockingmakers	1223	Textile	London Street
Letestere Rowe	Dyers	1308	Textile	Westwick Street

Street name	Meaning	Earliest reference	Craft group	Modern Name
Parchemyners' Rowe	Parchment makers	1368	Leather	<i>lost</i>
Pottergate	Potters	12 th century	Ceramics	Pottergate
Madelmarkette	Dye market	1229	Textile	St. John Maddermarket
Sadelgate	Saddlers	1246-1378	Leather	White Lion Street
Sherershil (<i>Tonsoria</i>)	Shearmen	1286	Textile	Charing Cross
Smithes Row	Smiths	1357	Metal	Little London Street
Soutergate	Shoemakers	1323	Leather	St Mary's Plain / Muspole Street
Tentelane	Tenting ground (for drying cloth)	1383	Textile	<i>lost</i>

Similarly, the range of craft activity is also indicated by the rows and stalls known to have stood in the medieval Market Place. Once again, textile, leather and metal crafts dominate, often grouped in particular areas of the market. Thus, the cloth market seems to have been largely located to the

around the church of St. Peter Mancroft; shoemakers were on the east side of the Market Place, while horse-harness goods were sold around the corner in White Lion Street (indicating that the market, although occupying a large space, also utilised neighbouring streets as well).

Table 2: Craft rows and stalls in the medieval Market Place.

Market-name	Meaning	Earliest reference*	Craft group	Modern Name
Cobblers' Row	Menders of shoes	1287-1313	Leather	<i>lost</i>
Cordwainers' Row	Shoemakers	1278	Leather	Gentleman's Walk
Drapery	Cloth market	1256-1319	Textile	? Hay Hill
Girdlers' Stall	Harness makers	1292	Leather	<i>lost</i>
Glovers' Stalls	Glovemakers	1294	Leather	<i>lost</i>
Hatters' Row	Hatmakers	1313	Textile	Guildhall Hill
Ironmongers' Row	Metalworkers	1288	Metal	<i>lost</i>
Linen Drapery (1)	Cloth market	1286	Textile	? Hay Hill
Linen Drapery (2)	Cloth market	1263-1335	Textile	St. Peter's Street
Needlers' Row	Needlemakers	1288	Bone	<i>lost</i>
Omanseterow	'cloth made on a loom by one man'	1277	Textile	<i>lost</i>
Parmenter Row	Skinner	1285	Leather	Weavers' Lane
Skeppers' Row	Basketmakers	1480	Wood	<i>lost</i>
Soapers' Lane	Soapmakers	1223	Provisions	<i>lost</i>

Market-name	Meaning	Earliest reference*	Craft group	Modern Name
Souter Row	Shoemakers	1268	Leather	Gentleman's Walk
Tallowmarket	Tallow dealers	1315	Leather	<i>lost</i>
Tanners' Market	Tanners	1285-1360	Leather	<i>lost</i>
Whittawers' Market	White-leather workers	1298	Leather	<i>lost</i>
Woolmarket	Wool merchants	1298	Textile	<i>lost</i>
Worsted Row	Cloth market	1266	Textile	? Hay Hill

* includes Latin form, e.g. Soapers' Lane is recorded as *Seperia* in 1223 but then as *le Soperes Lane* in 1306.

By the 16th century, lists of freemen of the city survive and often include the occupations of freemen. In 1589, textile workers comprised feltmakers, hatters, hosiers and tailors, while leatherworkers included cobblers, collarmakers, cordwainers, tanners, curriers, glovers, leather dressers, parchmentmakers, saddlers and skinner (Pound 1981). Also in the 16th century, enrolments of Apprentice Indentures were made at the Guildhall from 1548 to 1562, and these record apprentices learning their craft as carpenters, coopers, cordwainers, coverlet and dornix weavers, fletchers, hatmakers, saddlers, silkwomen, smiths, tailors and worsted weavers (L'Estrange 1883). The enrolments also list the tools required by the apprentice: thus, a smith needed, amongst other tools, a smith's hammer weighing 10 pounds and "a *par of pin-sens*" (pincers).

Evidence for metalworkers can, of course, be recovered archaeologically and, indeed, a hammerhead and pincers were excavated at Pottergate in 1974 (Margeson 1993, fig. 125). In a city such as Norwich, one likely to have had a population of over 20,000 people before the Black Death, it is of course probable that much of the metalwork (such as the common metal pins located on excavations) was manufactured locally. It is rare, however, that proof of such manufacture is found. As an example, while carpenters are known to have been employed by the Cathedral Priory to work on its boats in the 1330s (Rutledge 2004), to date, the

closest archaeological evidence for boatbuilding or repair consists of material from just two small sites on King Street; at Cannon Wharf where timbers of a probable 11th-century craft were reused in a 12th-century revetment adjacent to the river (Fig. 1), and at Dragon Hall where an unfinished



Fig. 1 Norwich. Boat timbers excavated at King Street (Photo: B. Ayers).

set of rove plates for fixing boat timbers was recovered from backyard deposits. This is poor evidence for over a thousand years' usage of the river and its environs and, accordingly, it is often the documentary evidence which is best-placed to assist in shaping an understanding of the distribution of occupations and crafts around the city.

The documents can provide an "economic topography" which can then be refined by archaeological discoveries. Analysis of the late 13th-/early 14th-century evidence held within the Enrolled Deeds provides just such a topography for the medieval city. In broad terms, the proportional relationship of property holdings can be mapped by trade groups (Fig. 2). This provides an overall

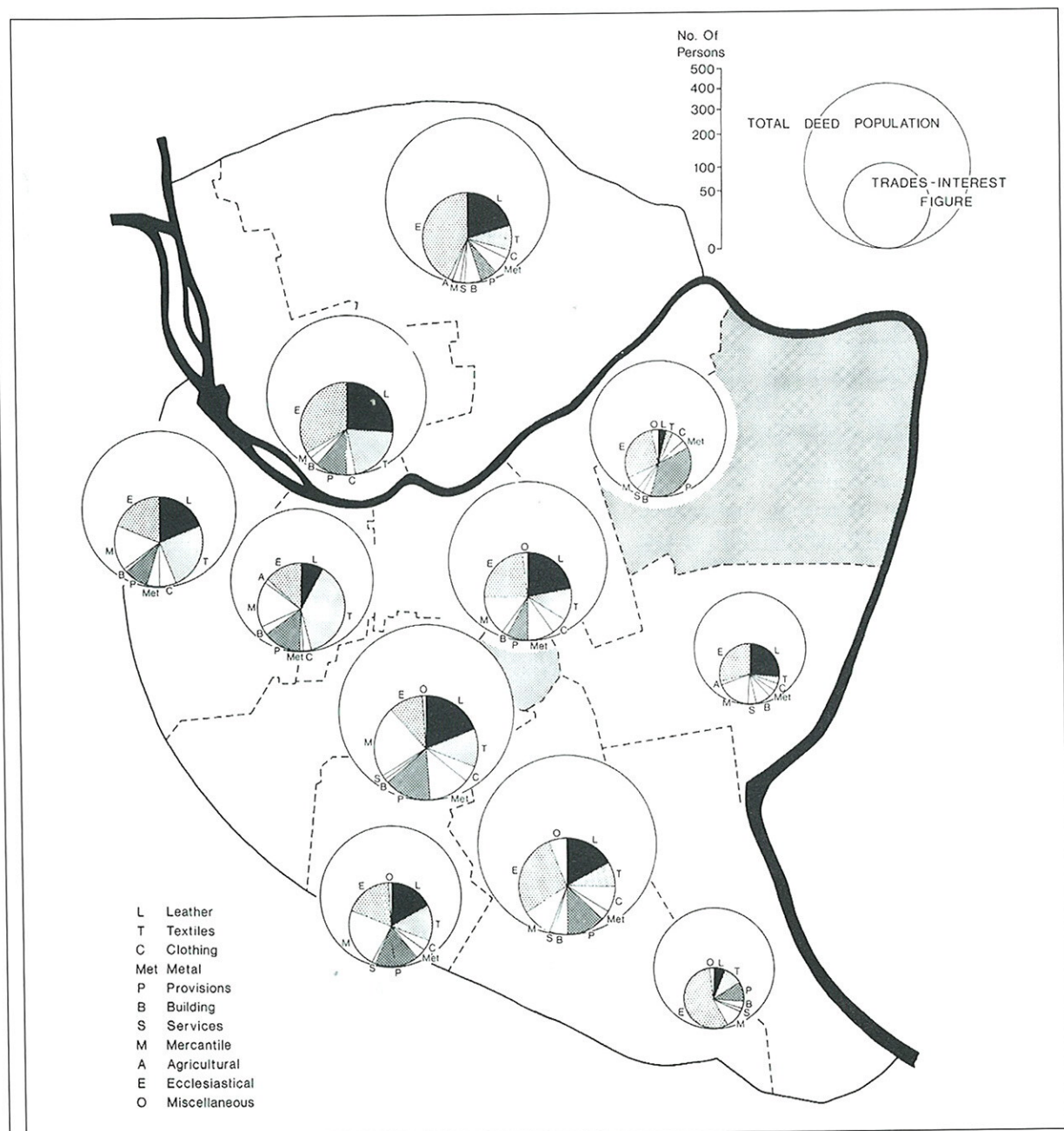


Fig. 2 Norwich. Property holdings mapped by trade group (after Kelly, 1983).

impression of trade activity although clearly it does not necessarily reflect actual practice in any one location - a weaver may have owned property in one part of the city but practised his craft elsewhere. Other documents and archaeological evidence can complement the broad picture by providing specific examples of craft industries, leading to a map of the city which indicates probable concentrations of industrial activity (below). The archaeological evidence is, of course, limited with survival of material also being different at different periods. It is informative to note that, archaeologically, medieval textile manufacture can generally only be evidenced from small artefacts - such as carding combs or spindle whorls - but, by the 17th and 18th centuries, buildings survive which were known textile manufactories (Fig. 3).

Physical evidence of craft industries is therefore varied and obviously depends upon an appropriate definition of *Handwerk*. Here it is taken to mean those craft groupings which were clearly related to technological production linked to commercial activity, the creation of goods for sale. It therefore excludes the provisioning trades - such as fishermen or bakers (but not brewers because of the technology involved in the production of ale and beer) - but includes the building trades where craftsmen are extracting raw materials and fashioning them into products, that is structures. Building workers are one of the broad craft industry groupings in Norwich which can be explored archaeologically; the others are textile workers, leatherworkers, metal-workers, woodworkers, bone, antler and horn workers, pottery manufacturers, and brewers.

Archaeologically-proved crafts

There is archaeological evidence from Norwich for each of these crafts. The city is well-served by

the publication in 1993 of a corpus of medieval and post-medieval finds from excavations in Norwich which organised objects into categories: dress and personal possessions, furnishings and



Fig. 3 Norwich. Textile workshop, Mountergate (Photo: B. Ayers).

household equipment, buildings, occupations, industry and crafts, and diversions, such as music and games (Margeson 1993). This is a structure which is now followed by other reports on excavations in the city. In consequence, it is possible to examine evidence of medieval metalworking, woodworking, stoneworking and plastering, textile manufacture and needlework, leatherworking and boneworking in the form of tools (such as leatherworkers' knives and awls) as well as excavated production sites and waste materials - a mandrel from the turning of a bowl was recovered from Whitefriars Street in 1979 (Ayers/Murphy 1983). The diverse nature of textile manufacture and finishing means that wool-combs, carding combs, tenterhooks, spindle whorls, needles and thimbles have all been found (Margeson 1993, 182-187). Metalworking is evident from quarrying for raw materials, through smithing and smelting waste to production sites and features (see below). The impact of building trades has been severe upon the urban topography with evidence surviving in relict quarries, extraction pits subsequently backfilled with rubbish and even mining galleries excavated to recover flint for building stone. Bone, antler and horn waste is known from

sites throughout the city but, especially in the case of horn, particularly from locations close to the river (or one of the streams, known as cockeys, that flowed into the river). Pottery manufacture started early in Norwich (probably in the 10th century), but ceased by about 1150. Kilns and wasters have been excavated (Atkin et al. 1983) while kiln furniture and wasters have also been recovered from a mid 16th century tinglazed workshop site (Ayers 2003, 145).

Principal crafts

Textiles

The most important industry in medieval and early post-medieval Norwich was that concerning textiles. The city seems to have been manufacturing cloth since at least the 12th century when, following a raid by the Flemings in which Norwich was ransacked, a French chronicler explained the failure of the citizens to protect the city adequately with the words that Norwich men were "for the most part ... weavers, they know not how to defend themselves in knightly wise" (Ayers 2003, 70). The city is recorded as trading in dyed cloth in 1202 (in the Pipe Rolls) with the earliest documentary reference to worsted weaving being in 1295 (Meeres 1998, 37ff.), although cloth finishing is implied in 1286 when an agreement was signed with merchants of Amiens and Corbeil in France for the provision of woad for dyeing (Hudson/Tingey 1910, 209-212). The fulling process was mechanised in 1429 with the construction of the New Mills (Walton 1991, 332), and the wealth of textile merchants can still be seen in buildings such as Dragon Hall or churches rebuilt with textile money. Textile work was undertaken by both men and women (Elizabeth Baret was enrolled as a *freeman* of the city in 1445/6 because she was a worsted weaver), although a decline in trade in the early 16th century led to a riot in 1511 when weavers complained that women were taking their work (Meeres 1998, 41). Fortunes revived later in the century, notably following an invitation to Dutch and Walloon refugees to settle in Norwich in order to revitalise the industry. This was ultimately so successful that, between 1660 and 1730, Norwich was known as the second city of England due to the wealth generated by the "New Draperies".

The best archaeological evidence for the medieval textile industry was uncovered off Westwick Street in the western part of the city in 1972. Here, next to the medieval Letestere Row (a *letester* or *lister* was a dyer), excavation uncovered a 15th-century dyeworker's workshop complete with furnaces, hearths, a water storage pit and a drain to take effluent water to the river (Atkin 2002a). It was situated on infilled land adjacent to the south bank of the River Wensum and was just one of several phases of activity on two adjacent tenements in the 14th and early 15th centuries. Indeed, the documentary evidence emphasises the strong connection of textile workers with the location - the property was held in the 13th century by Ranulf, son of Robert the Blekester (or bleacher), Hubert of Framlingham, dyer and, in 1298, Benedict Bert, also a dyer. It then passed to a chaplain Richard de Weston, who sold it to Robert le Weyder (*weyder* deriving from the blue dye woad). By the second half of the 14th century the tenement and that next to it were owned by a wealthy dyer called Reginald Cobb. His will of 1384 bequeathed the property to his wife Katherine, describing it as his "*capital messuage with appurtances in which I now live with all the lead vessels, tools for cloth making, goods and chattels*" (Sutermeister 2002, 133ff.). These are rare instances of documentary evidence supporting archaeological discoveries so closely.

The dyer's workshop was uncovered in an area that was obviously the centre of cloth-finishing in the city. The street names alone indicate as much. Letestere Rowe led up to Charing or Shearing Cross where the shearmen worked, trimming the nap on the cloth to make it smooth. From here, two lanes, Fullers' Hole and Bleksters' Hole for the fullers and the bleachers of cloth respectively, ran steeply down to the river. Around the corner stood Maddermarket, a specialist market selling dyestuffs (madder producing a strong red dye) and first recorded in 1229 (Sandred/Lindström 1989, 136). Up the hill, in the parish of St. Giles, were the tenting grounds where the fulled, bleached and dyed cloth was stretched on tenterhooks to dry; tenterhooks have been recovered from excavations in the city at Oak Street and Heigham Street (Margeson 1993, 238). Documentary evidence implies that tailors, making the cloth up into clothing, were concentrated in St.

Gregory's parish, at the heart of the area (comm. E. Rutledge).

Much medieval cloth manufacture clearly took place in the countryside around Norwich, the textile then being brought into the city to be finished. Weaving also took place in the city, however, with occasional finds of items used in manufacture such as three near-complete iron wool combs from Pottergate (Margeson 1993, 182, fig. 134), while a rare English find of a bone comb from a group known as *Langzinkenämme* was found at Whitefriars in 1992 and may have been used for carding wool (Huddle 1999, 283, fig. 6).

The city was anxious to maintain the quality of its cloth. It acquired a property for use as the cloth *seld* or market at the north end of the main provisions market in 1384 (a 16th-century fragment of this building survives). Cloth merchants were affluent members of the city's ruling oligarchy. One of the most significant in the 15th century was Robert Toppes who owned extensive estates in the cloth-producing area of northeast Norfolk. He built himself a great trading hall on King Street in 1427, was both mayor and member of parliament for the city, and was buried in the principal parish church of St. Peter Mancroft where he and his wife are still commemorated in surviving medieval painted glass.

It is likely that considerable physical evidence for the textile trade remains to be discovered. Fulling was undertaken in mills by the 15th century and, while the largest of these seems to have been located at New Mills, now the site of a 19th-century pumping station, a further mill is documented next to the Duke of Norfolk's Palace in the centre of the city in the 17th century and others no doubt existed. Revitalisation of the cloth industry in the 16th century led to considerably greater manufacture of cloth in Norwich but much of this was undertaken by weavers working in their own homes, making identification of distinctive workshops difficult. It is often held that many of the 17th- and 18th-century dormer windows notable in post-medieval buildings in Norwich represent the need for light into attics where weavers worked. While this is certainly true in some cases, analysis of late 17th-century inventories has illustrated that, of use of attic space that can be inferred from listed contents, over 50% of such rooms were used for sleeping

in 1655, in 1679 with as few as 14% for working, a proportion which increased later in the century but still barely rose above 30% (Priestley/Corfield 1982, 119).

By the 18th century, purpose-built cloth manufactories were being constructed, one of these surviving on Mountergate together with the grand house of its owner (other merchant houses still stand elsewhere in the city such as those of the Ives and Harvey families on Colegate or the Patteson family in Surrey Street). Norwich textile merchants travelled Europe with pattern books depicting the range of cloth available (many of these survive, e.g. Priestley 1990, 21ff.) while buyers also came to Norwich from overseas to buy cloth. For instance, Philip Stannard, a major cloth merchant recorded in his journal for 1751 that he had received "*visitors from Cadiz, Venice, Leipzig, Weimar, Zurich, Frankfurt, Cologne, Bremen, Lübeck, Copenhagen, Oslo, and Stockholm*" (Priestley 1990, 34). Textile merchants are commemorated in many of the parish churches of Norwich (such as that to Timothy Balderstone in the church of St. George Colegate or that to John Patteson in St. Peter Mancroft). Cloth seals identifying bolts of Norwich cloth are relatively common finds in London, while two groups of such 17th-century seals were recovered from sites on Fishergate (Fig. 4) and Palace Street in Norwich in 1999 and 2000 respectively.

The relative paucity of physical evidence for the textile industry, however, is marked when considered against the documentary record. Manufacture was clearly diverse, records making it clear that Norwich was important not only for worsted cloth but also for linens, dornix (probably introduced from Doornijk or Tournai in Belgium and used for beds and hangings), felts (including the making of felt hats - there was a Hatters Row in the Market Place), russels (perhaps brought from Ryssel or Lille) and, in the 17th and 18th centuries, patterned cloths, calicoes and shawls. The city even provided "*bewpers*" or bunting for flags - Samuel Pepys in his celebrated diary recorded on 16th June 1664 that he had discussed with his cousin "*about supplying us with Bewpers from Norwich; which I should be glad of, if cheap*" (Latham/Matthews 1971).

It was stated in 1547 that "*almost all the poor inhabitants of ... Norwich gained their living*



Fig. 4 Cloth seal showing the arms of Norwich and the name of the city (Photo: G. Egan).

by spinning wool" (Walton 1991, 352) and the city staged a tableau showing girls spinning yarn and making hose when Queen Elizabeth I visited Norwich in 1578 (Roberts 1990, 95). If promotion in front of royalty were not enough, the increase in the significance of the trade can be seen in the numbers of city freeman linked to textiles: these rose from 1 in 7 in the 1590s, to 1 in 3 in the 1620s, and an extraordinary 1 in 2 in the 1670s (Meeres 1998, 73). Indeed by the early 18th century, Daniel Defoe could write that

"If a stranger was only to ride through or view the City of Norwich for a day, he would have much more reason to think there was a town without inhabitants ... but the case is this; the inhabitants being all busy at their manufactures, dwell in their garrets at their

looms and in their combing-shops ... and other work-houses ..." (Defoe 1724, 86-7).

Leatherworkers

The largest trade group in the late 13th-century Enrolled Deeds concerned the leatherworkers. A range of crafts existed, starting with the butchers who bought cattle and other animals in the market and took them to the edge of the city for slaughter (many butchers being located in the parish of St. John de Sepulchre around Ber Street, an area that remained associated with them into the 20th century and was known locally as "*blood and guts street*"). The cattle hides were then taken back to the market for sale - although thirteen butchers were fined in 1300 for trying to sell hides from their houses (comm. E. Rutledge) - where tanners alone had right of purchase.

Tanners worked throughout the city but were nevertheless located near convenient water supplies. They formed the largest number of leatherworkers and were often prominent local families, some with shops in the market (where there was a *forum tannatorum*) and serving as bailiffs in the city. This prominence had decreased, however, by the end of the 14th century and, indeed, by the end of the 15th century, only three tanners were property holders. This decrease was probably due to a combination of changing markets, the increased availability of hides and skins from outside the city and general diversification of the leather trade (Kowaleski 1990, 67). Both documentary and archaeological evidence combine to identify tanning locations.

An example of the relative wealth of medieval tanners can be seen at St. Martin's Lane on the north bank of the river. Here excavation took place in 1977 of a site known to have been owned in 1300 by Thomas de Lincoln, a tanner. Located away from the river, this property did not have an adequate water supply for a tannery so it is likely that he also owned a tannery near to the river and that the building on St. Martin's Lane "*may well have been used as accommodation and workshop for [his] employees*" (Atkin/Sutermeister 1978, 39ff.). Tanning pits - where soaked hides that had been treated with lime were placed with oak bark for a year - have been uncovered by excavation and reveal the extent of tanning activity: such features of medieval date have been found

in recent years at New Mills Yard, Oak Street, Westwick Street and Magdalen Street (Gurney/Penn 2001; 2002), while work outside the walls in the suburb of Heigham in 2000 uncovered similar pits on the site of a known 17th-century tannery (Gurney/Penn 2001, 721). Nearly all of these sites are close to the river and the importance of a good water supply is also emphasised by the name given to one of the streams which flowed into the river, Barkeres Fleet - a *barker* being a tanner (Atkin 1993, 44).

Tanned hides were returned to the market for sale where some passed to the small number of curriers who dressed them with tallow - nearly all of these craftsmen seemed to be located centrally in the parish of St. Peter Mancroft in the medieval period. The skins of sheep, horses, deer, pig and possibly dog were treated with alum and oil by tawyers, the Latin term for whom (*allutarius*) was also used for the fine leather workers or cordwainers, many of whom were concentrated in Cordwainers Row at the east side of the market place. Shoemakers also had their *forum sutorum* at this location although there was another concentration of shoemakers on the north bank of the river in the area of Soutergate or "*shoemakers' street*" (now St. Mary's Plain/Muspole Street), close to many of the tanners. While no obvious shoemakers' workshops have been uncovered by archaeological excavation, it is a reasonable assumption that the growth of shops and *selds* along the east side of the market, occasionally with undercrofts and cellars, is an indication of the increased need for the security of finished leather goods (comm. E. Rutledge).

Sadelgate (now White Lion Street) ran towards the castle from Cordwainers Row and was, as its name suggests, the centre for saddlers in the city. Glovers generally occupied properties south and northwest of the castle. Leather offcuts were recovered in 1991 from 15th-century deposits used to infill a well within the castle, while further such offcuts have been excavated recently from sites next to the river off King Street at the Cannon Wharf and Read's Flour Mill sites. Parchmentmakers were grouped in the parish of St. Michael at Pleas, between the castle and cathedral precincts, well-placed to serve both institutions - a parchment fragment, used to detail the Prior's landgable rents and dat-

ing to the late 13th century may well have been sourced from these craftsmen.

Metalworkers

Medieval documentation is once again of considerable assistance when considering the wide range of metalworkers, although archaeological evidence here is also more plentiful. Excavation has revealed 11th- to early 13th-century attempts to extract and smelt iron from river gravels, notably in the Botolph Street/St. George's Street area on the north bank of the river; discoveries include roasting hearths (Evans/Atkin 2002, 239). The product was clearly for use in local industry. Smiths are known to have worked in the parishes of St. Augustine, St. Martin-at-Oak, St. Swithin, St. Giles, St. Stephen, St. Bartholomew and St. John de Sepulchre - all peripheral parishes within the city walls - as well as in the extramural areas of south Conesford and Heigham. Smelting debris of 12th-century date was uncovered at Coslany Street in 1996 (Gurney/Penn 1997, 557), iron-working waste at sites on Oak Street in 1999 and 2000 (Gurney/Penn 2000; 2001) while in 1997/8 slag discovered at Dragon Hall on King Street provided evidence of smithing with coal or coke (Doonan forthcoming).

The iron produced in the city was made into a range of objects by craftsmen such as John Bush, who, between 1432 and 1467, rented a property in Holme Street (now Bishopgate) and provided the brethren of St. Giles Hospital "*with large quantities of wrought iron for bolts, locks and keys*" (Rawcliffe 1999, 39). No workshops for such iron goods have been excavated but several sites have produced evidence of a major metalworking industry in Norwich, that of bellfounding. The city was a centre for bell production, numerous medieval bells manufactured in Norwich still surviving in churches in Norfolk and Suffolk (Cattermole 1990, 141). The earliest recorded bell founder is Godfrey de Belleyetere, who was working about 1220 with numerous others known thereafter, notably the Brasyer family, which, from the first half of the 15th century, with properties south and south-west of the castle, was the principal manufacturer. It is appropriate, therefore, that a well-preserved bell-pit was excavated in this area off Timberhill in 1989. This feature is dated to the late 14th/early 15th century, but continuity of



Fig. 5 Norwich. Bell-casting pit, Franciscan Friary (Norfolk Archaeological Unit).

activity can be seen in evidence recovered only some 100m away off Ber Street in late 2003. Here large quantities of bell-founding waste were used in the 16th century to help to infill quarries which had been dug into the hillside for chalk extraction.

The evidence for bell-casting is surprisingly widespread. Early 13th-century waste has been located at Ten Bell Lane in the west of the city, bell mould fragments were found at Bacon House north of the river, a further bell-pit was uncovered on Bishopgate north of the cathedral, together with a wooden shovel blade, "probably used for puddling the clay during bell-making" (Margeson 1993, 174), and an exceptionally well-preserved bell-pit was excavated at the site of the Franciscan Friary (Emery forthcoming). The latter dated to the late 15th/early 16th century and contained *in situ* remains of a ring-shaped pedestal foundation of brick, topped with roof tiles (Fig. 5). The pedestal supported an inner loam mould or core which was fired after which an outer mould or cope was built so that the bell

could be cast between the two. A surviving circular hole at the centre of the pit held the carbonised remains of a post that pivoted the spindle or stickle, a revolving wooden template cut to the shape of the intended inner and outer profile of the bell.

Bell founders or *brasyers* often made metal pots as well as bells. A well-preserved skillet from Pottergate may be an example of such work (Evans/Carter 1985, fig. 40). A further group of metalworkers making vessels and other objects were goldsmiths. There is archaeological evidence that goldsmiths have practised in Norwich since the 10th century. Excavation in 1999 uncovered a gold ingot together with fragments of a goldworker's crucible and litharge (Hutcheson 2000, 66). The site lay immediately east of the church of St. Peter Mancroft which, although it was not founded until the 1070s, became the parish where medieval goldsmiths were centred. Nineteen goldsmiths are mentioned in the Enrolled Deeds of 1285-1311 with details such as the fact that they occupied "four shops under one roof", "three shops

under one roof" and *selds* furnished with yards (Kelly 1983, 28). Gold and silver manufacture in Norwich was recognised in 1423 when the city became an assay town by statute with its own "touch" mark to mark plate. Enamelling of silver was taking place in 1426/7 when a Norwich goldsmith charged 34d per ounce for "amelying" silver (Campbell 1991, 141, 128).

Gold- and silversmithing continued to be important crafts in Norwich into the post-medieval period; civic plate was made in the city, the most significant object to survive being the Reade Salt of 1568/69, which not only bears the maker's mark of the Norwich goldsmith William Cobbold but is considered to be the "most important piece of Elizabethan plate made outside London" (Emmerson 1984, 8). The Goldsmiths' Hall, on the north side of the Market Place and immediately east of the Guildhall, has recently been recognised (Fig. 6). It consists of a front range of c.1700, a courtyard and the principal hall building of c.1720 (comm. C. Garibaldi).



Fig. 6 Norwich. Goldsmiths' Hall, Guildhall Hill (Photo: B. Ayers).

The casting of copper-alloy objects was a further metalworking industry within Norwich. Again, the locations of workshops have proved elusive but the discovery of moulds, such as that from the area of the castle for the manufacture of belt chapes (Fig. 7) (Shepherd-Popescu forthcoming) or that dated to c.1245-57 and used to cast a repoussé plaque depicting the Massacre of the Innocents for a book cover, altarpiece or shrine (Alexander/Binski 1987, cat. 447) indicate a sophisticated medieval industry. Post-medieval moulds have also been found, both in stone and lead alloy (Margeson 1993, fig. 127). The recovery of a 12th- to 13th-century copper alloy metalworking crucible from St. Benedict's Street (Atkin 2002b, 114), late 14th-century copper alloy waste at Castle Mall and late 15th-century copper-alloy offcuts from Pottergate (Atkin/Evans 2002, 239) indicate that metalworking activity was widespread. Specialist manufacture is also evidenced - an armourer is recorded in the Enrolled Deeds (Kelly 1983, 27) while chain and plate armour (Fig. 8), presumably from the castle's armoury,



Fig. 7 Norwich. Mould for casting belt chapes found at Castle Mall (Norfolk Archaeological Unit).

was located in 15th-century deposits infilling a well together with spurs, spur fittings, horse harness fittings and quantities of goose wing tips. Geese were bred extensively in Norfolk and their quills were valued by fletchers for making arrows (Shepherd-Popescu forthcoming).

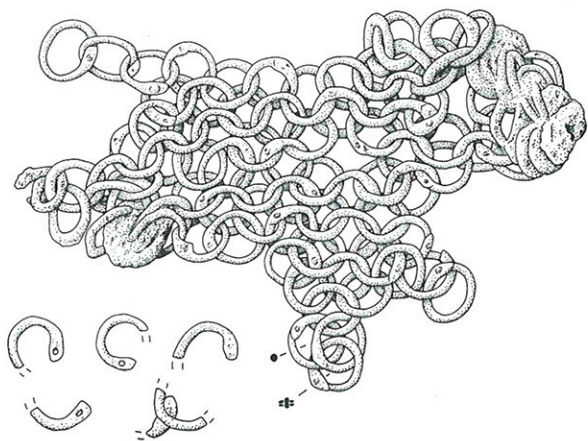


Fig. 8 Norwich. Chain mail from Castle Mall excavations (Norfolk Archaeological Unit).

Building crafts

Other metalworking industries, such as plumbing, providing lead for windows, roofing or pipes were perhaps frequently practised on building

sites: leadworking waste has been uncovered at Dragon Hall for instance. The building crafts were particularly important in Norwich, partly because it was an exceptionally large city with its population needing to be housed but also because of its castle, cathedral, ecclesiastical houses and large numbers of churches. It was also a city without a local supply of good building stone and which therefore had to import freestone and to exploit local materials as fully as possible (Ayers 1990).

Quarrying for chalk, which was burnt to make

lime, has left evidence across Norwich, both within the walls of the medieval city and outside. The scarped slopes off Ber Street are testimony to the extraction which took place throughout the medieval period until the 16th century. Lime kilns were frequently constructed within these quarries, the lime then often being distributed *via* wharves on King Street. Lime kilns were also established on building sites, and one such was excavated east of St. Peter's Street in 1999 (Fig. 9) (Hutcheson 2000, 68). Walls, prior to the 14th century, were largely constructed of flint, a stone which was recovered within the chalk quarries but for which mining adits were also driven into the hillside. The locations of some of these are known (Fig. 10) (Atkin 1983), others are now lost and, on occasion, collapse, causing damage to property and infrastructure.

Freestone, being imported, was expensive, but both the *donjon* of the castle and the cathedral church were dressed in Caen stone from Normandy in the early 12th century with masons' marks being recorded at both (Marner 2002, 219ff., fig. 15). By the 13th century, masons working in Norwich are recorded by name: Base the mason went to Caen for stone on behalf of the cathedral in 1274 (Fernie/Whittingham 1972, 28). A masons' yard was uncovered by excavation at the cathe-

dral in 1988. It was located in the angle of the north nave aisle and the north transept, bounded to the west by the bishop's palace – a dark, out-of-the-way place. Fragments of limestone were recovered together with a working floor surface covered with a thick deposit of limestone dust (Bown 1997, 436ff.).

The medieval masons who worked at Norwich included William Harvey, sometimes called the "father of English perpendicular architecture" and more famous for his work in Canterbury. The sculpture surviving on the cathedral roof bosses illustrates the quality of the local craftsmanship (Rose/Hedgecoe 1997) and a "Guillaume de Norriche", who worked in Paris between 1297 and 1330, may have trained in the city; there is a sculpture attributed to him in the Musée de Cluny (Alexander/Binski 1987, cat. 501).

Bricks were in use in Norwich by the 14th century. No medieval brickyards are known although



Fig. 9 Norwich. Excavation of a limekiln at the Forum site (Norfolk Archaeological Unit).

there was a post-medieval brickyard outside the city wall to the west. This coincides with the only clay source within Norwich, one which excavation in 2002 indicated had been exploited from the late 11th to the 16th centuries (Whitmore 2004), perhaps initially for use in clay-walled buildings

(a survey of the archaeological evidence for which was published by Malcolm Atkin in 1991). Numerous brick structures of late medieval and post-medieval date survive, including the Cow Tower of 1398/9 – documentary evidence for which indicates that the bricks were delivered by water (Ayers et al. 1988, 197), perhaps suggesting that they were sourced from outside Norwich – the cathedral spire of around 1480 (clad in a stone facing), the early 17th-century Howard House, the Independent Meeting House of 1693 and 18th-century merchants' houses.

Increasingly, archaeological evidence is being recovered for the decoration of buildings. A rare painter's palette, fashioned out of an oyster shell, was uncovered at the site of the Franciscan Friary – it contained traces of the pigments vermilion (red), azurite (blue) and calcium carbonate (white), presumably all used to paint walls or statues (Howard/Park forthcoming). Two other such palettes have been excavated from the St.

Peter's Street site (with a red pigment) and from the cathedral (with a green pigment).

Norwich painters were part of the gild of St. Luke together with bell founders, pewterers, plumbers and glass painters. The city had an important school of glass painting with at least seventy glaziers being known from the city between 1280 and 1570 (Marks 1991, 275). Although much of the glass was destroyed in the 16th and 17th centuries, significant quantities still survive in the east window of St. Peter Mancroft (King forthcoming)

and within the Guildhall. In addition, glass is also being recovered from excavations. Painted glass of 13th-century date was found at the site of the cathedral and on the site of the Carmelite Friary. Mid 14th-century glass has been recovered from the site of the Franciscan Friary, while, on



Fig. 10 Norwich. Subsidence due to flint mining, Earlam Road (Norwich City Council).

King Street opposite the church of St. Peter Parmentergate, glass dateable to between 1370 and 1390 may have formed debris from a glazier's workshop, although it could as easily have been material from either the church or the Augustinian Friary (King 2004, 124). It should be noted that not all glaziers were men: Helen Moudeforde stated that she too was a glazier in her will of 1458 (Meeres 1998, 41).

Woodworkers

The survival of organic material in archaeological deposits within Norwich is the exception rather than the norm and therefore the number of wooden artefacts recovered is small. Woodworking must have been a major industry within the city, particularly with regard to construction, but also for the production of everyday items. The mandrel recovered from work at St. Martin-at-Palace Plain (above) came from the turning of a bowl, and other small objects re-

covered include pegs (Ayers 1994, 29), bungs, a spoon and a wooden shingle or roofing tile (Ayers 1987, fig. 85).

The greatest use of wood surviving within the archaeological record, however, is that extant within buildings. The earliest structural timbers to be recovered probably dated from the 10th century and formed a causeway across the river, recorded in 1896 (Hudson 1898). Oak timbers within a building on Upper St. Giles Street may date to the 13th century, but the earliest timbers to be dated dendrochronologically are those within Dragon Hall on King Street which are now known to have a felling date of 1427. Numerous buildings show evidence of woodworkers' activity, notably in the numbering of timbers which often survives. This numbering can indicate where timbers have been reused: at the Music House and also on King Street; the roof is one taken from a larger building and adapted for its new function, the numbering system becoming confused in the process.

Woodworkers occur within the medieval documentation - in the same year that the Cathedral Priory sent Base the mason to Caen it also sent John the carpenter to Hamburg to buy timber (Fernie/Whittingham 1972, 28). Workshops are difficult to locate although much woodworking must have been done on site while it is known that Robert Everard, a master mason in 1440, had a sawing pit in front of his house for which he was ordered to pay 4d *per annum* at the Prior's Leet (Tillyard 1987, 146). Woodworkers' tools have been recovered from a number of sites. Chisels, spoon bits, twist bits, reamers, callipers and "a sturdy, general purpose axe" have been published, many of the objects being located in the well-dated 1507 fire deposits at Pottergate (Margeson 1993, fig. 130).

Bone, antler and horn working

There is extensive evidence for bone, antler and horn working across the city. Horn fragments and waste of 11th- and 12th-century date have been recovered from Westwick Street (Atkin 2002a, 150), 14th-century examples from Fishergate (Ayers 1994, 11) and late 15th-century material from Castle Mall (Huddle forthcoming). Some of this activity was probably associated with tanning or tawing of leather, but, at Castle Mall, careful excavation is now revealing interesting data: the excavation seems to have provided "the first archaeological confirmation of the historically known phenomenon of leaving cranial and foot bones attached to the skin".

Antler was worked to make knife handles and combs, a good Anglo-Scandinavian comb found in 1979 clearly shows how the teeth of the comb were cut after assembly (Ayers/Murphy 1983, fig. 19, no. 4). Antler waste for the manufacture of combs was located at Fishergate (Ayers 1994). Further antler manufacturing waste has been recovered from King Street (Shelley forthcoming), while antler waste from Castle Mall implies knife handle manufacture in the 15th century. As late as the 17th century, rough-outs and offcuts for the manufacture of knife handles are known from 1973 excavations on St. Benedict's Street (Atkin 2002b, 114).

Bone working is also attested from rough-outs and waste material. A common waste product

is a bone strip perforated with holes from the manufacture of buttons or counters. An example of the 15th/16th century was recovered from Botoolph Street (Margeson 1993, 191, fig. 143) while rough-outs for probable handles have been recovered from medieval deposits of 12th- to 13th-century date at Alms Lane (Atkin 1985, 240) and 15th-century date at Oak Street (Margeson 1993, 191).

Pottery and clay pipe manufacture

Pottery was manufactured in Norwich from the 10th century until the middle of the 12th century. It was concentrated on the eastern end of Pottergate (now Bedford Street/Lobster Lane). The products were largely jars of Thetford-type ware and a well-preserved kiln was excavated in 1980. An assessment of the industry has been published (Atkin et al. 1983). Pottery production moved to rural areas in the 12th century, but Norwich is important for a further kiln which was established in the city by two refugees from Antwerp, Jasper Andries and Jacob Janson, in 1567. They introduced tin-glazed manufacture, the earliest such production in England. The location of the kiln (on Ber Street) is known and waster sherds and kiln furniture have been recovered (Ayers 2003, 145). However, the site of the kiln itself seems to have been destroyed without record in 1948; excavation in 2003 found no trace of the structure.

Clay pipe manufacturers are recorded in Norwich, such as William Symonds in 1693. A stamped pedestal base probably attributable to Symonds was excavated at Castle Mall. The ditches of the castle were largely infilled in the first half of the 18th century and quantities of possible waste clay pipe material from a kiln were recovered from the deposits within one of these ditches (Atkin forthcoming).

Brewing and distilling

While this survey of archaeological evidence for industries in Norwich cannot include evidence for the provisioning of the city with foodstuffs - although it is worth noting in passing that excavation at Pottergate on houses that collapsed in a fire of 1507 has uncovered one of the best assemblages of late medieval kitchen equipment

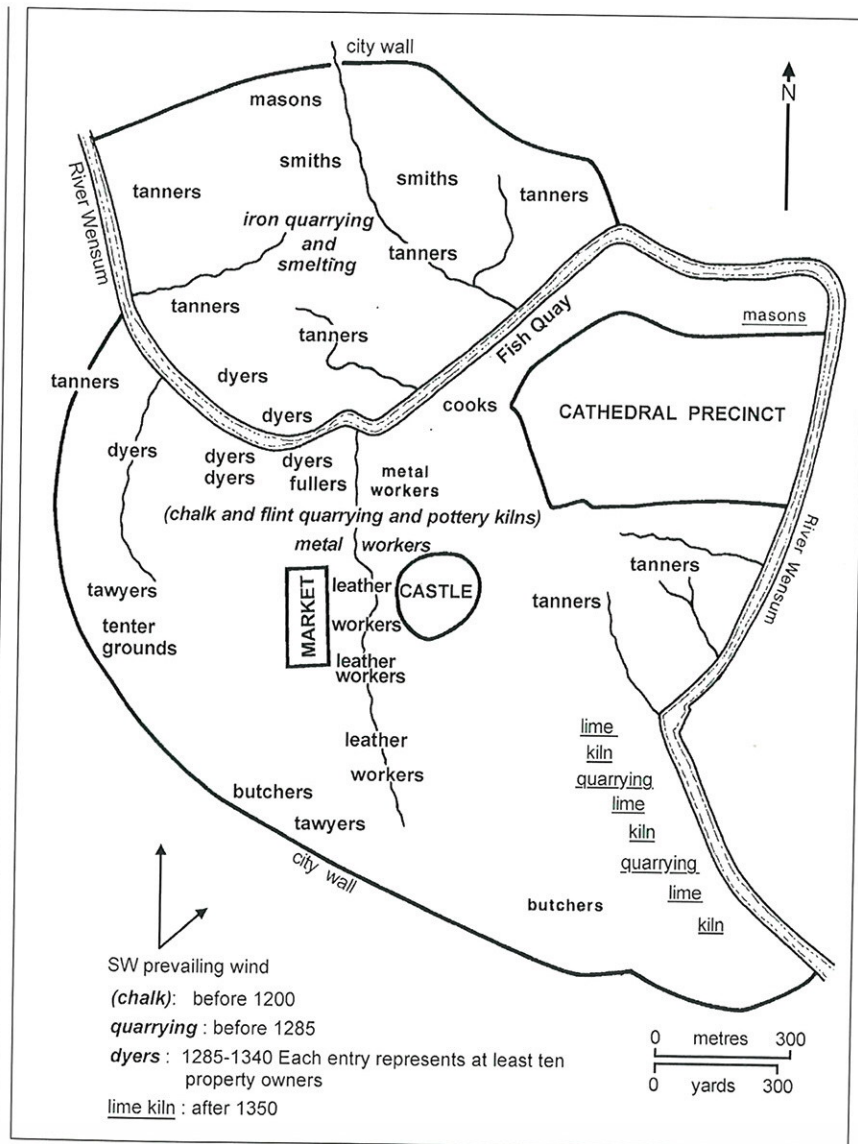


Fig. 11 Norwich. Medieval industrial activity (after Rutledge 2004. Drawing: P. Judge).

in England (Evans/Carter 1985) - it does need to consider the technology of one important craft, that of brewing. The evidence for this is surprisingly diverse. Environmental analysis has revealed hops in soil samples dating from the 11th century, an early but important occurrence in England as, without hops, one can only brew ale not beer (Ayers 1987). Malting ovens have been found of 13th-century date at Alms Lane (Atkin 1985, 152) and of late 16th- to early 17th-century date at Castle Mall (Shepherd-Popescu forthcoming). A building adjacent to the Alms Lane oven had a large hearth with

industries and, accordingly, the concentration of cloth-finishers in the north-western part of the city along the River Wensum is marked. Tanners likewise required ready sources of water and the documents indicate that they were to be found working along all the streams away from the city centre, although, interestingly, not along the Great Cockey, the stream which separated the market place from the castle. The steep breaks of slope in the southeast made quarrying here more straightforward and thus a concentration of lime kilns can also be found in this locality.

finds of germinated barley, implying that it could have been a malthouse. Large pottery cisterns for ale or beer, found in the 1507 fire levels at Pottergate, had traces of sediment adhering to their bases and sides, while germinating barley and hops were located as well (Evans/Carter 1985, 83). Hops were also used medicinally and it is possible that glass distilling vessels from the 17th century, found in London Street, were associated with the preparation of medicines (Margeson 1993, 235).

Topography of craft

Although much of the archaeological evidence is necessarily fragmentary, it is clear that craft industries existed throughout Norwich. The documentary evidence is particularly helpful in assisting an understanding of the broad zones of activity for the medieval period and recently an attempt has been made by Elizabeth Rutledge to map both medieval industry and pollution (Fig. 11) (Rutledge 2004, 162). The river and its several tributary streams were obvious foci for many in-

While, therefore, particular locations can be identified for certain industries, it is also possible to generalise about the broad economic topography of the entire walled city. It seems clear that a commercial area lay to the west and north-west of the castle, centred on the Market Place. A location with considerable retail trade, it was nevertheless one with some craft manufacturing industry. Antisocial industries, however, those exemplified by the stench of tanning and the noise of smithing, were largely confined to the peripheries of the walled area, the margins of the river and the streams or cockeys, together with some extramural areas such as Heigham Street to the west. The locally important industry of bellfounding was also at the margins but distributed across the city until a concentration of activity - and perhaps capital - led to a centre of founding being established south and southwest of the castle.

Such relatively large-scale manufacturing industries were complemented by small-scale craft activities such as bone and woodworking. These and others, in a densely populated city, were undoubtedly practised upon many properties in most if not all neighbourhoods. Hence the frequent finds of evidence for such ancillary work as carding, hand spinning and leatherworking with discoveries of heckles, spindle whorls and leather offcuts (Atkin/Evans 2002, 239). Excavation of such material continues to uncover new evidence, complementing the rich historical sources, and also perhaps indicating the contribution of women to the economy in a manner only rarely found in the written sources.

The impact of the various industries in the form of pollution cannot be quantified but it can certainly be inferred. The water pollution caused by the dyers, bleachers and fullers, concentrated upstream of most of the city on the banks of the river, must have been very great. The smell too would have been profound - in 1681, Thomas Baskerville, visiting the Duke's Palace a short distance downstream, stated that it was "seated in a dung-hole place ..." (Ayers 2003, 143). Water pollution probably worsened in later centuries; by 1850, when a dyeworks still existed in the area, it was found that the river water "was coloured according to the dye being used. People found brown coloured water the best" - it was said that

the black and scarlet coloured water spoiled the tea (Meeres 1998, 154).

Medieval and early post-medieval Norwich was an industrially diverse city. Much remains to be discovered and understood about the importance of its manufacturing base, both to its own commercial well-being as well as to its influence upon its region. Both documentary and archaeological research will assist investigation. Evidence continues to accumulate but it must be recognised that there are some crafts for which it may prove difficult to locate archaeologically; as an example, it is known that an organ-maker was working in Norwich in 1440. Bone flutes, a bone whistle and a ceramic bird whistle have all been found in the city but, to date, no trace of an organ pipe.

Zusammenfassung

In Norwich stehen die archäologischen Nachweise für Handwerk im Missverhältnis zu den schriftlichen Quellen. So enthalten die so genannten Enrolled Deeds von 1285 bis 1311 sehr viele Hinweise auf Handwerk und Handel. Es werden allein zum Metall verarbeitenden Gewerbe über 60 Handwerker aufgeführt, doch ist noch keine Werkstatt ergraben worden. Allerdings gibt es archäologische Hinweise auf Glockenguss, und im Mittelalter war die Stadt das Zentrum der Glockenherstellung.

Die Straßennamen in Norwich, von denen allerdings viele nur durch mittelalterliche und frühneuzeitliche Quellen überliefert sind, weisen auf den Umfang der handwerklichen Tätigkeit. Auch die im 16. Jahrhundert von den Gilden angefertigten Ausbildungsverträge geben einen Einblick, da sie nicht nur die verschiedenen Handwerke, sondern auch die dazugehörigen Werkzeuge auführen.

Der archäologische Nachweis ist begrenzt, weil die Erhaltungsbedingungen im Boden nicht für alle Materialien gleich gut sind, so kann das Textilgewerbe nur durch wenige Funde wie Webkämme oder Spinnwirtel nachgewiesen werden. Der beste Nachweis handwerklicher Tätigkeit war mit der Freilegung einer Färberwerkstatt gegeben.

Auch wenn viele der archäologischen Nachweise fragmentarisch sind, wird deutlich, dass Handwerker in Norwich produziert haben. Die schriftlichen Quellen sind auch hilfreich, um die Handwerkstopographie zu erkennen. Doch müssen archäologische und schriftliche Quellen zusammengeführt werden, um zu bestmöglichen Ergebnissen zu kommen. So haben wir in Norwich folgende Handwerker archäologisch nachgewiesen: Textilproduktion, Textilverarbeitung, Lederherstellung und -bearbeitung wie Gerber, Sattler und Schuhmacher. Das Bauhandwerk ist durch Kalkgruben und -öfen nachgewiesen und unter den Holz verarbeitenden Handwerkern – allerdings ist organisches Material in Norwich nur schlecht nachzuweisen – sind die Drechsler zu nennen. Die Handwerker des Knochen-, Geweih- und Hornmaterials konnten durch ihre Abfallmaterialien und ihren Ausschuss nachgewiesen werden. Auch Töpferei und Tonpfeifenproduktion sind für Norwich belegt.

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Archaeological evidence for craft working in London c.1100-1800

by Geoff Egan, London

Introduction

London is exceptionally well furnished with both historical and archaeological evidence for a wide range of medieval and later crafts. One hundred and eleven different craft guilds, most concerned with production, were listed in 1423 (Unwin 1963, 370ff.; a few of these organisations seem to have been in existence prior to the period considered in this paper, but definition of which of them began when is highly complex). There were a number of amalgamations, guilds for new crafts and the complete failure of some of these organisations throughout the later Middle Ages; similar developments continue today. Several crafts have left extensive legacies of documentary material. Excavations particularly over the past thirty years have furnished exceptionally rich assemblages of finds, including workshop and factory waste groups, and occasional industrial plant. Some but by no means all of this material has been published, while other aspects are virtually unassimilated. There will doubtless be some excavated material that includes branches of production, the significance of which is currently completely unrecognised.

This paper cannot hope to cover all of the pertinent excavated material available for production in London over the entire eight-century period under consideration. It will concentrate on the manufacture of individually hand-crafted articles, material products and sometimes industrial plants where associated evidence has survived in the soil well enough for detailed commentary. The terms "craft" and "handcraft" can (but need not necessarily) imply products which include some measure of artistic as well as routine standard production skills. Some of the products considered below fall into both categories, but several arguably come under the second only.

Many guilds were concerned with occupations that have left no recognisable trace - therefore the Bakers, the Salters, the Gardeners and the Parish Clerks, for example, do not figure here. A few occupations, like the goldsmiths and the dyers, are represented obliquely, despite the absence or near absence of their actual products. Routine building materials are not included, though sculpture is. Trades represented in excavated assemblages only by tools have generally been omitted. There is an emphasis on textile industries and metalworking since these have furnished extremely detailed data relating to several different aspects (this exceptionally full evidence should prove relevant to that from other towns). Space does not permit extensive discussion of the great amount of excavated evidence for ceramics (in London this is almost entirely post-medieval); it has a very strong archaeological lobby and so is well covered by a continuing, detailed literature. The same is true, to a lesser extent, of glassware production, selected aspects of which are presented below. A few of the archaeologically less obvious crafts are also mentioned briefly.

The centuries under consideration saw London become established not only as the unsailable political and commercial capital of England, with the greatest concentration and variety of crafts and guild regulation in the realm, but also, from the 17th century, the main city of a developing world-wide empire. A sustained centre of conspicuous consumption through the period of industrial revolution (to use an unfashionable term), several traditional manufactures were moving out of the metropolitan centre to the suburbs and other regions by the end of the period considered here. All these developments are reflected in the archaeological record, in some aspects very clearly, in others much more subtly.

The general point should be remembered that workshop discards (often the most readily identified evidence for craftworking) can emphasise the occasions when things went so wrong that the product became unusable, but they do not necessarily give an accurate indication of what percentage of the total output ended up as waste (which could represent part of a single day's output, just the discards from apprentices still learning the trade, or the errors of several work-

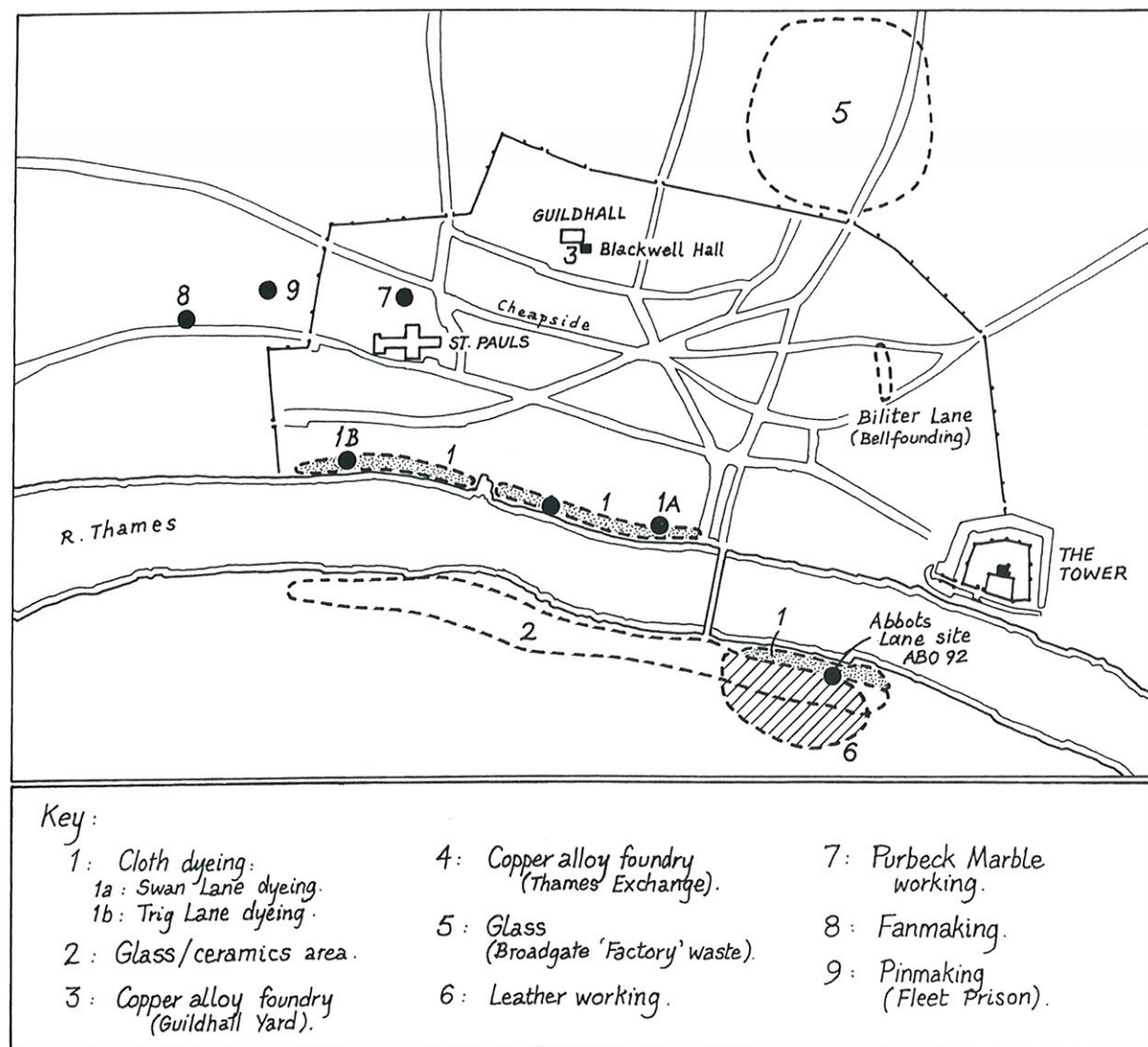


Fig. 1 London. Locations of some archaeologically attested craft industries, c.1100-1800 (Drawing: N. Griffiths).

ers over a season of output, or possibly even an individual's working life's activity). It is very difficult to extrapolate an accurate idea of the level of skill and competence of the workers represented from recovered waste.

The post-medieval evidence from c.1550 onwards is generally very different from that of the Middle Ages in terms of the actual industries represented. For example, ceramic and glassware manufacture became prominent for the first time in central London, and new crafts like ivory working and tobacco-pipe manufacture emerged with new materials imported from beyond Europe.

Textiles

This fundamental product has an exceptionally detailed, if incomplete, archaeological legacy in London. It is the only branch of production that accurately reflects in some detail the main developments of the capital's historical significance in the archaeological record over the eight centuries. The Thames waterfront was the focus of extensive investigations in the 1970s and 1980s. Here, at the Swan Lane site, the obvious resource, the water, was exploited in at least four adjacent properties, in each of which several industrial hearths dating to the late 12th/early 13th centuries

operated in cloth finishing, probably dyeing. A clay imported from Surrey, the cleansing agent fuller's earth, was found around the hearths. It was probably used here for cleaning cloths that were to be dyed in the workshop, rather than for fulling, which seems from documents to have happened on property inland from the river's edge. The most extensively excavated of the properties had a capacity of perhaps upwards of eight large-scale hearths in operation at any one time, apparently as the first use of new land reclaimed from the River. This intensive industry saw up to six superimposed hearths in direct succession at one point as replacement became necessary over a couple of generations, with over fifty hearths recorded in this one property. It is possible that this key industry, feeding the city's cloth market which was located a few hundred metres directly inland as the crow flies, at Candlewick Street (modern Cannon Street), actually provided the impetus for the land expansion, rather than the other way round. Like the later evidence, this remarkably intensive enterprise probably related to woollens rather than linens (most of which were imported into England) or silks (which were entirely imports in the Middle Ages).

The same site provides more scattered evidence for cloth finishing - including more fuller's earth - up to the mid 17th century, when a well fill produced not only this, but half a dozen of the objects which make up the other major strand of evidence for textile finishing, regulatory lead seals put on each traded cloth. These particular seals indicate the presence of textiles woven outside the Capital - four from Lancashire in the north-west and one from Colchester in eastern England (Egan forthcoming b). They are among over twenty thousand of these cloth seals now recorded from London, spanning the 14th to early 19th centuries (cf. Egan 1995a). The great concentration along the Thames now evident is not simply because the waterlogged deposits here favour the survival of these documentary items in legible condition (whereas further inland lead is usually very corroded), but the distribution is itself substantially a legacy of the riverside finishing industries, particularly dyeing (Egan 1991). This first became clear from a small assemblage of seals probably from the 1610s, excavated in a brick drain leading down to the River at the TL74 site, east of

the city. Here, regulatory tax seals from cloths woven in Yorkshire and Devon (the north and south of the country) in the reign of James I were accompanied by several others with the initials of a dyer - IW - on one side and indications of different dyes - cochineal and woad in combination with various colourants - on the other. This is a group of seals accidentally detached from cloths being coloured at the Thames-side dyehouse of Mr. IW which went down the drain that led to the River. Similar evidence comes from seals of similar date found on the present foreshore at Swan Lane, where the local dyer's seals have a stamp with a Swan to refer unequivocally to the location (Hollar's view of London, published in the 1640s, includes a representation of cloths drying in the riverside breeze after dyeing at a riverside dyehouse in this area, which he labels "the Old Swan"). What was dropping off these cloths onto the foreshore was a random series of seals that give an idea of the range of cloths being coloured. Riverside excavations at six sites on both banks of the river are being analysed. Along with finds on the foreshore, the seals provide a remarkably detailed picture of this particular facet of London's cloth trade through almost half a millennium - the finishing process of dyeing (taking this to be the activity represented in the early period up to the 16th century when there were no dyers' seals; Egan forthcoming b). Right up to the early 19th century, when Devon cloths were being dyed on the south bank prior to export by the United East India Company to China (Egan 1990). The evidence of seals is specific enough to pick up all these details independent of the written records, which indicate the particular part of the Far East the trade was serving.

Spinning and Embroidery

Tools for these activities, both of which had a strong domestic base, have been excavated across the city. Wool combs seem to have been in use throughout the urban settlement (e.g. a medieval pair from a pit at the BPL95 site) and wool cards (with iron or copper-alloy wires) have turned up where the soil has favoured survival of organic materials (e.g. a pair dating to the 16th century from the BC72 site). Medieval spindle whorls of stone, and of lead for coarser thread, are relatively common finds. Stoneware versions from the

late 15th/early 16th century marked the end of this universal domestic task.

Although none of the large shears for trimming the nap of newly woven cloths has been found, the double-ended hooks (havettes/habicks) for holding the textile in place on a padded bench during shearing have turned up, mainly along the waterfront (e.g. Egan 1979).

Needles and thimbles were presumably in the main for domestic work, though some could be from the commercial side where the product would have been for sale - the famous *opus Anglicanum* was produced in medieval London (King 1963, Fitch 1976). Specialised forms of needle include robust ones with curved points, including one with a hole near the tip, thought to be for couching, and a double-ended form was for making women's hair nets (Crowfoot et al. 2001, 147, 149, fig. 118).

Metalworking

Most medieval and later sites produce waste from at least one branch of metalworking. The greatest amount of this material is casting waste or sheet offcuts that are non-specific of a definable product. There is also widespread evidence of tinker-level repairs with casting or rivets that may well have been carried out in any household or by itinerant workers. Small pieces of waste tend not only to travel some distance from the site where the industry took place, they also linger in the soil to appear in deposits centuries later than their origin.

Metalworking in medieval London is fortunate to have received specific attention (Keene 1996). A major conclusion drawn in this paper is that several trades tended to be located close to their particular markets, rather than because of issues of pollution (including noise) and status. The comprehensive documentary surveys of several parishes undertaken by the Survey of London have revealed some of the complexity of street and locality names relating to trades. For metals, the manufacture in question was presumably taking place at Ironmonger Lane, Billeter (bellmaker) Street etc. when the placename was established, but trades occasionally migrated within the city, sometimes from generation to generation, some-

times over longer periods. The point is a general one: however clear a placename or archaeological evidence appears to be, it will not mean that any particular manufacture will have been practised at the location throughout the medieval period, let alone into the early-modern era.

Copper-alloy Manufactures

Of the metal trades copper-alloy manufactures are archaeologically the widest recognised. The specific evidence ranges from single items, like a spur with excess metal untrimmed from the casting, to tens of different products representing at some level the original repertoire of a particular workshop, in one case from the foundry site itself. The spurriers were a separate guild, though spurs may well have been produced among a range of goods by other founders (and ironsmiths) at large workshops.

A copper-alloy block with the negative form in Romanesque style of a lion, for hammering sheet mounts against, has been found in London (Egan 1996a, 86, fig. 2A; this block could have been used for sheet metal or perhaps for leather). Casting copper alloys in the medieval period was usually in moulds of clay that could only be used once. Two extensive, and to some extent complementary assemblages of waste from late 13th/early 14th-century dress-accessory producing foundries have been recovered (Egan 2003). One from right in front of the guildhall at the heart of the city (GYE92 site) was recovered from the actual foundry. The soil conditions at this site allowed the preservation of clay mould, an almost complete one of which was found inside the best preserved of nine furnaces, having had apparently developed a leak when the metal was poured in. Reconstruction shows that at least 144 identical buckle frames would have been produced at each casting, using about a kilogram of metal. As well as this remarkable, informative survival, some twenty different waster discards were found, including several groups of items still joined from the moulds, as well as crucibles, wire and sheeting for buckle plates and a variety of mounts, and their rivets. The repertoire of products - various buckles, mounts, strap loops, strap ends and a finger ring - brings together many of the most commonly encountered accessories as the prod-

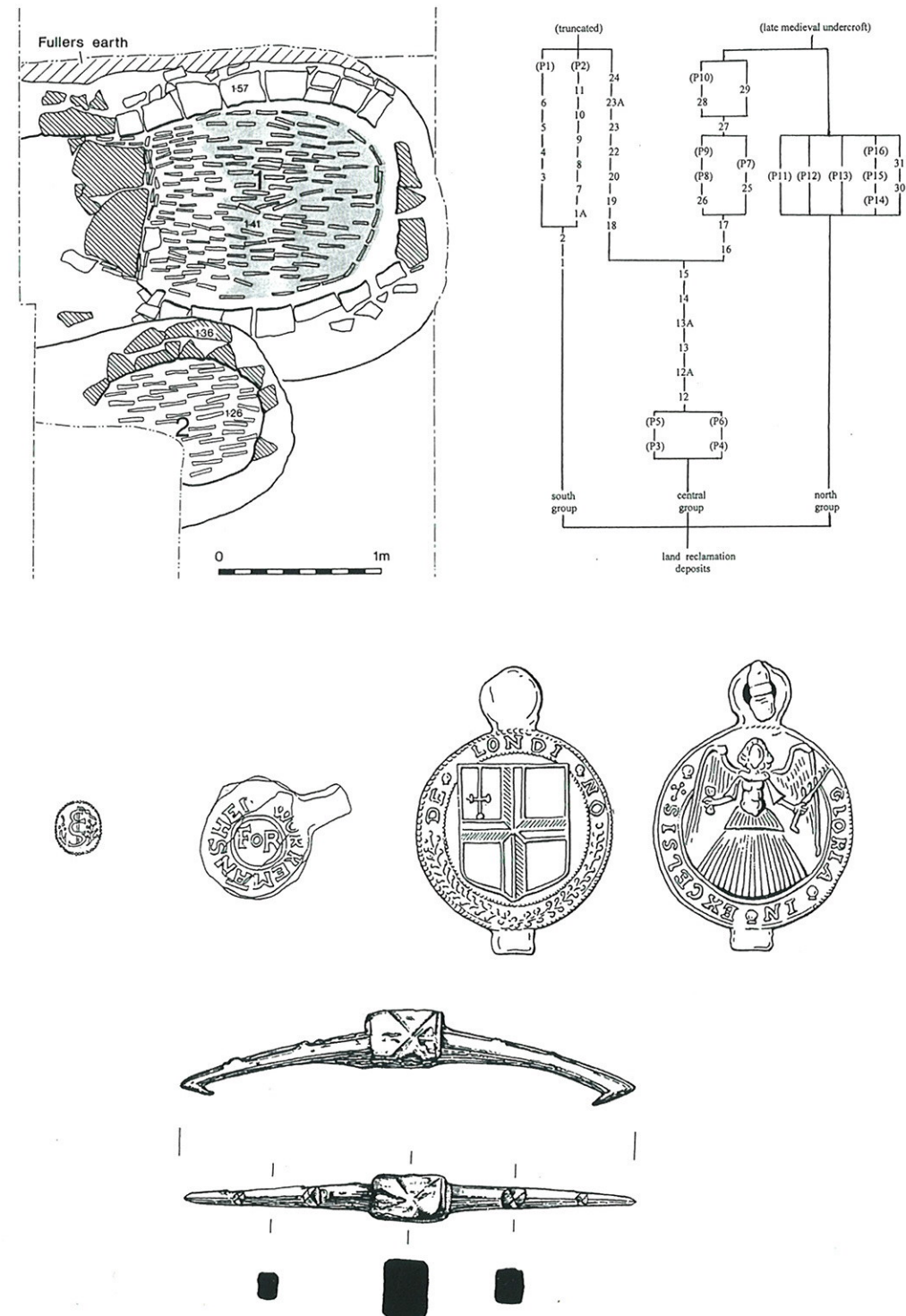


Fig. 2 London. Above: Excavation of a (?) dyers' workshop (SWA81 site) - one of the hearths and the archaeological matrix of a sequence of more than fifty hearths found in one waterfront property, late 12th/early 13th centuries (Egan 1991); Below: Lead cloth seals: ES with graintree - dyer's late 16th century seal for (?) grain-dyed red cloth; "for workmanshipe" 17th century; de Londino - 17th century London seal with worldwide distribution; havette (shearman's hook) probably 16th century (Drawing: K. Hayes. Egan 1979).

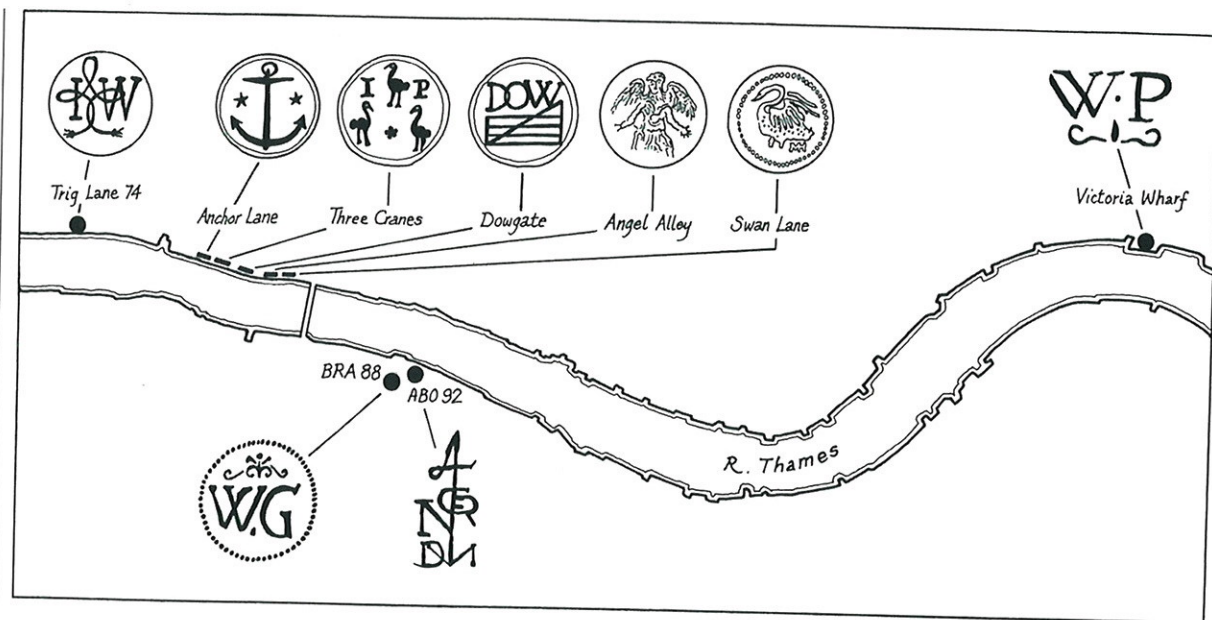


Fig. 3 London. Location of dyers' premises in the early 17th century, as indicated by finds of dyers' Guild cloth seals (Drawing: N. Griffiths).

ucts of a single enterprise. The other major assemblage (TEX88 site), perhaps slightly later in date, comprises some thirty similar, or to all intents and purposes identical, accessories. This is dumped material from an unknown workshop. The cast items include some deficient in metal where the flow was restricted, others where the mould parts were slightly apart allowing the metal to form unwanted fringes at the edges and across apertures, and several in which the castings seem perfectly satisfactory. The moulds have not survived in the ground but the metal is far better preserved, to the extent that a number of satisfactorily cast items are identifiable as workshop discards from the roughness of their surfaces - they have not been file-finished (a necessary final stage prior to sale) and others which have been filed remain so sharp at their corners that they seem unlikely to have been used at all. The last point would be difficult to identify in individual items, but here the numbers found in this condition alongside definite workshop waste is strongly suggestive. The assemblage also includes sheet offcuts from producing roundels, sexfoils, bars and other mounts (Egan 1996a, 87ff., figs. 2C, 3A-B). Other sites have produced more limited evidence of a similar character (Armitage et al. 1981). Several details of working practices are evident among all this material. In general,

labour-intensive methods were used rather than short cuts that might be employed today - for example, the outlines of complex sheet mounts were cut in one operation, then any three-dimensional details were added by stamping (a single shaped tool might have been devised to carry out both operations in one action (Egan 1996a, 89, fig. 4A). A similar range of common accessories was probably made in every major town, as smaller groups of waste from other centres suggest. Limited waste material from other sites in London include part of a clay mould for making rings from the site of Bermondsey Abbey, presumably representing production within the religious institution. A couple of isolated finds from the west side of the city of mould discards in the form of a pair of conjoined buckles and a pair of conjoined brooches, in which both pairs are of different forms, show diversity of products within moulds for multiple production as in Fig. 4, presumably from a smaller workshop than the ones producing identical accessories in dozens (Egan 1996a, 88, fig. 3C). There are a few hints of a slightly earlier foundry, perhaps late 12th/early 13th century, from the POM79 site. Here, at the Guildhall Yard area, a cast item like a half-section of a buckle frame (or in the present case, possibly of a purse suspender) set into a sheet, with the centre roughly cut out, may be a master

form pressed repeatedly into the unfired clay of the moulds to register the shapes to be cast in that part. These objects do not seem to have been recognised elsewhere.

From c.1500, an assemblage found in a well in a property just off Cheapside (Clark 1991, 11, fig. 1.6. Schofield/Maloney 1998, 36ff. - site GM20) of primarily sheet buckles, ingeniously folded to produce reasonably robust frames as well as decoratively stamped plates, represents a new development at that time which obviated the need for a workshop with a furnace and fuel. Presumably, at the time when so many trades were developing in new ways, a new group of manufacturers (possibly from among the many immigrants from across England to the capital), who could not afford to set up a foundry, discovered a much cheaper means of manufacturing these basic dress accessories. Similar products are known across the country (Norwich, Salisbury, the Isle of Man) but this is the only production waste so far identified, raising the question of trade versus production in local centres.

Separate investigations very close to that site produced a couple of moulds of similar date for casting very ornate knife handles, one with renaissance motifs, the other with the head of a jester ("Blossoms Inn" site). The products of both these moulds would probably have been regarded as Continental imports had they been found without the evidence of manufacture in London. Also isolated is a piece of ring money made, presumably in London, for use in West Africa (Museum

of London acc. no. 85.59/44). See below under Stoneworking for a possible tomb-inscription letter-casting industry operating alongside a specialised tomb-mason's yard within one of London's religious institutions.

There is a surprising amount of evidence from London for the casting of 16th-century candlesticks using the same technology of clay moulds as above for dress accessories. This ranges from an extensive dump of used mould fragments found dumped within the guildhall complex (GYE92 site - the actual workshop seems to have been located elsewhere), through a much smaller group of similar material (Egan forthcoming c; 1996a, 90, fig. 5B), to a single stick in which the central mould piece, to make the column hollow, was misplaced, producing an irregular hole down part of the side - this probably made the stick unusable as the hole connects with the cup at the top, found south side of the River (Egan forthcoming a, no. 337). The large group from the guildhall catered for a variety of drum and dish bases, all separately cast from the stick and cup. Other vessels, possibly ornate salts, appear to be represented by a few mould fragments, but the restricted material has not so far allowed certain identification.

Bellfounding

A large amount of waste, mainly clay mould fragments - presumably including some from bell production, has been unearthed in the area of Billeter Lane, where it was used to make up the medieval road (FEN83 site, 14th/15th century). This material needs to be examined in detail, since an assemblage of moulds from c.1500 excavated at Whitechapel (WCE01 site - Egan forthcoming g), renowned as the centre of this industry in London (with one factory still in operation after several centuries of production), proved from detailed analysis against expectations to be entirely for making domestic kitchen vessels and candlesticks.

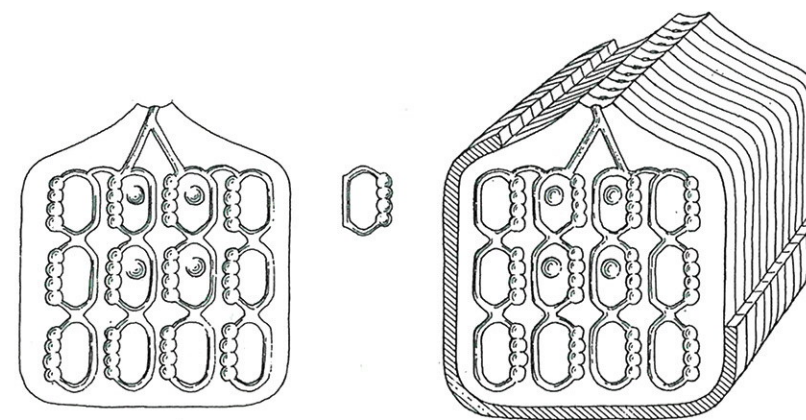


Fig. 4 London. Clay mould for 144 buckle frames from a copper-alloy foundry; GYE92 site with some of the 13th/14th centuries' foundry's repertoire of cast accessories (Drawing: N. Harriss and F. Vardy).

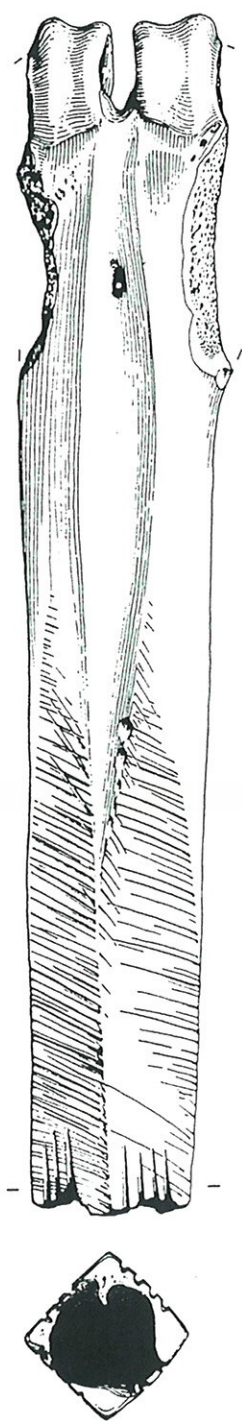


Fig. 5 London. Bone tool thought to have been used in wire pin manufacture, early 16th century from the ABO92 site (Drawing: F. Vardy. Egan forthcoming a).

Pinmaking

The production of pins, using copper-alloy wire, seems to have been a specialised trade. It is represented in London by assemblages from three main sites and there is a scatter of less coherent evidence from across the city. From just outside the south-western corner comes a late 15th/early 16th-century waste group, and from within the precinct of the former Bermondsey Abbey in Southwark is one from the mid/late 16th century, just after the Reformation. These groups both have discards from several stages of manufacture, which include heads of the standard wound-wire form set on shafts that had not been sharpened (Egan 1996a, 90, fig. 4C). In contrast, a later, 18th century, assemblage from the site of Newgate Prison within the city at the southwest (presumably one of the low-tech occupations carried out by the prisoners, who appear by this date to have used a drop hammer to form and attach the heads) produced exactly the same form of pins including several sharpened shafts without heads. This all suggests a radical change in manufacturing practice for this humble product. A special bone tool thought to have been used in the late 15th/early 16th century by pinmakers in several towns in England, but apparently not noted elsewhere, has been found in some numbers right across London, often on the sites of former religious houses by the new inhabitants. The metapodials of cattle or horses were trimmed, at one end presumably to allow them to be held in a vice, and at the other end to give four surfaces lozenge-wise into which lengthways grooves were cut to rest the pin shaft in firmly while the point was being filed sharp (Fig. 5). The origin of this curious but widespread practice is as obscure as its demise, but in the long term it was apparently not successful, following an initial enthusiasm, perhaps among a new set of inexperienced workers.

Ironworking

Although some ironworking evidence must be unrecognised because of poor preservation of the recovered metal, there is still a considerable range that has been assimilated. Iron slag is common across the city, but no smithy has yet been identified from the period considered. Occasional isolated, unfinished items have turned

up, and there are also a few offcuts of late-medieval tin-coated sheeting (e.g. specialised buckle, Egan/Pritchard 2002, 109ff., fig. 71 no. 496, 239-49, fig. 153 nos. 1291-2).

Knives and scabbards were regularly supplied to central London markets in the medieval era from Thaxted in Essex, where this manufacture flourished (Keene 1995, 234ff.). It is not clear just how this arrangement, which worked satisfactorily over a sustained period, originated, and how the capital's cutlers' guild may have administered it (blades were marked under guild regulation from immediately after c.1300 in London, but did these include the Essex ones?).

A range of early 16th-century dumped discards, some of which apparently broke on the anvil, have been uncovered in Southwark (Egan forthcoming a). It includes knives (some with maker's

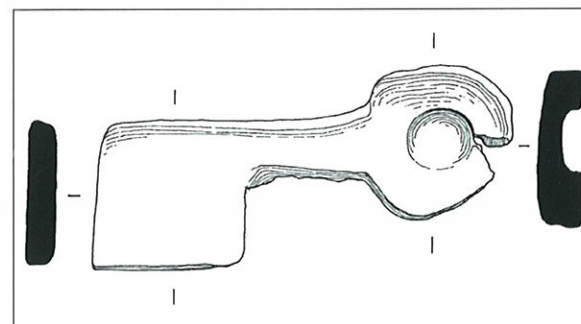


Fig. 6 London. Unfinished iron key broken during smithing on the anvil, early 16th century from the ABO92 site (Drawing: F. Vardy. Egan forthcoming a).

marks even though manufacture was not completed), a horseshoe, a key and several robust washers. X-rays have revealed faults in the metal in some knives from the same deposits that have no visually obvious defects but are broken. It is likely that further iron items that have not been recognised as such among all the others in the extensive dumps are workshop discards. The assemblage of defective ironwork, from south of the River, where guild control was arguably not as effective as within the city itself at this period, is most readily taken as the products of a single workshop, and is notable for its diversity. This somewhat at odds with its comprising products that at this date might be expected to come from several specialised smiths (cutler, blacksmith and locksmith) rather than a single smith (the evi-

dence is not definitive on this point but it is the fullest so far recovered).

From the same site are a series of pieces of wire waste in different gauges, among which is a simple round buckle frame of wire (the standard form of shoe buckle from the late 14th to the early 16th century) with the pin of a thinner wire that had not been snipped off its roll when discarded (ibid., no. 774). It seems likely that other shoe buckles found along with this remarkable survival would be discards or losses from the same producer, but identification is difficult among the general background of finds, which inevitably include similar accessories which were used.

Lead/Tin Manufactures

Although pewter (lead/tin) was one of England's most significant products due to rich deposits of the raw materials (it is regularly noted as an export in customs lists of the early-modern period but never as an import – a most unusual polarisation among all the goods noted; e.g. Wilan 1962). London was the main centre for the manufacture throughout the medieval and early-modern periods, even though no pewter workshop has been identified archaeologically. Lead sheet waste and runnels are ubiquitous from window-lead and drain manufacture and repairs. Three pieces of the lead *ore galena* (which occurs naturally only in the Highland Zone in England) recovered from deposits dating to the start of the period considered here at the Guildhall Yard site may be evidence of primary processing in the capital at this date. This practice has produced no later evidence at all in London, the ore presumably subsequently going through this process at the extraction sites rather than being transported across the country in bulk. Evidence for specific manufactures comes in the form of moulds, usually of stone in the medieval period, and as discarded wasters and sprues (the latter are not always recognisable as relating to specific products).

Moulds are known for window comes, brooches, spoons (Homer 1991, 66, fig. 21; this is published as medieval but it may be 16th century), hexagonal lids, and from the waterfront, where so many were used (see Textiles above), come two for cloth seals (Egan 1995a). A lead/tin

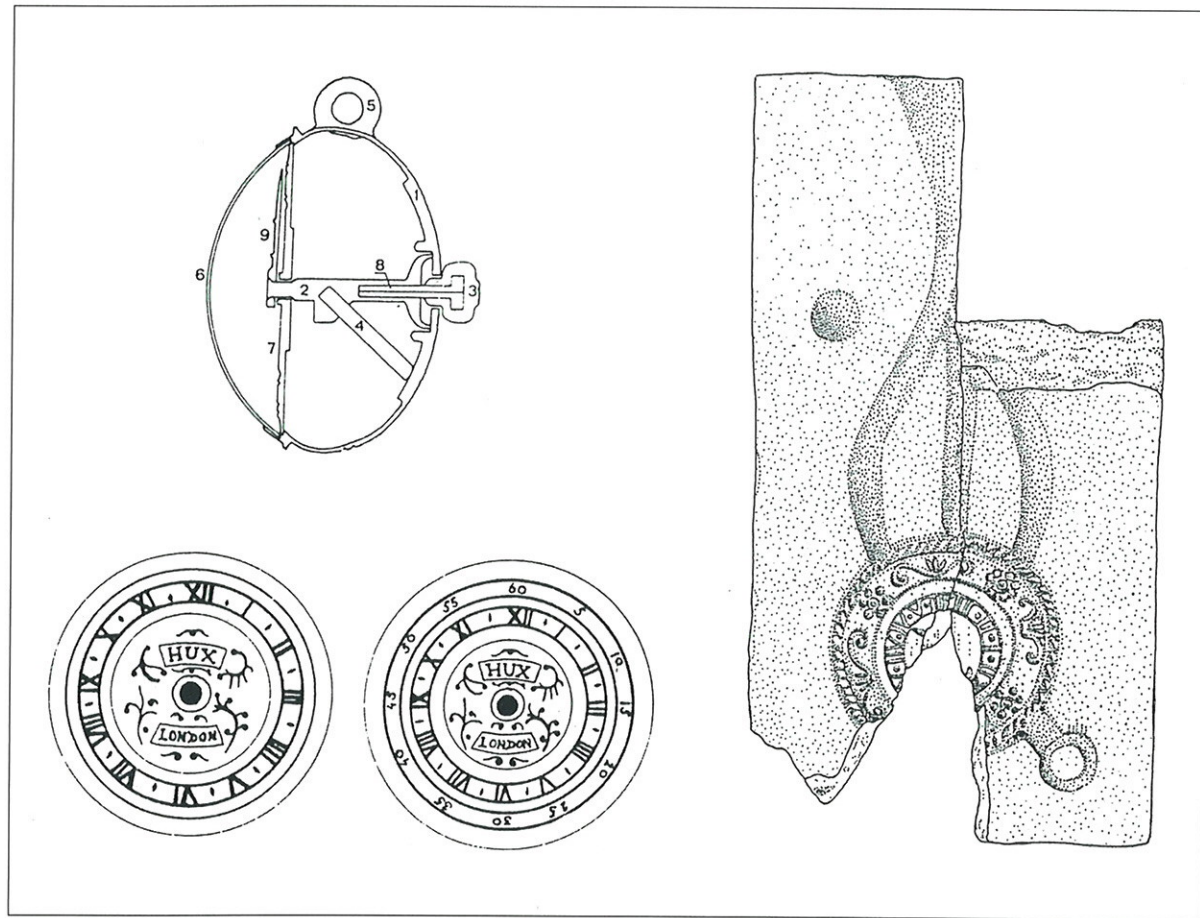


Fig. 7 London. Early 18th century pewter toy watches. Left: two sizes of watches with strut for "tick" made by the pewterer Hux (exports excavated in the Netherlands. Van der Horst 1985). Right: stone mould found in London for a different type.

brooch that failed to pick up all the green-glass stones put in its mould because there was too little metal to fill the mould was discarded with its sprue still in place, and also with its pin attached (Egan 1996a, 84, fig. 1B). The presence of both the last features together suggests a very rapid regime of mass production, in which even serious faults might go unnoticed until one or more further stages of manufacture had been carried out.

An unusual trade, a sideline of some pewterers, was toy manufacturing, which was probably active from the 14th century. The only direct indication of manufacture in the city is a stone mould for casting pewter watches, from the early 18th century, and a documented maker, a Mr. Hux, was making more sophisticated ones in the city at this time - he is documented as having had his toy watches plagiarised by a Mr. "Beasley" in

1714/15 and went to law to protect his interest; although the outcome of the case is not known virtually identical timepieces with both names as maker have been excavated (Egan 1996b, 13). A range of miniature pieces of furniture from the 16th century and playthings have the arms of London to indicate their origin. Two moulds for crude lead/tin tokens that circulated as unofficial, fractional pence in medieval and later times have been unearthed (e.g. (?)PWB88 site - Egan 1995a). Several other parts of moulds for unidentified products have been found across London. It looks as if lead-working, a low-temperature operation which needed little more than an open fire and the moulds, was readily carried out virtually anywhere it was required.

Part of a tin ingot found in the Thames is stamped with an angel holding a balance, part of

the arms of the plumbers' guild (Egan 1996a, 84, fig. 1A). This was presumably raw material that had been analysed and by means of the stamp officially attested as being good metal.

The quality-control marking of lead products turns up on milled window leads from the mid 17th to the early 19th centuries as well (Egan et al. 1986). The full name or the initials of the maker of the vice, through which the cast lead was turned to extrude the metal, and the year date appear on perhaps as many as four out of ten leads found in the capital from parts of this period. The reason seems to have been to indicate the trade was controlled, to reassure customers that the milling to make a particular amount of lead go further did not result in a product so weak that the window might collapse during strong winds. Over one hundred of these marks are now known from London, by far the greatest concentration anywhere in the country (as arguably befits the capital as the principle centre of guild regulation).

Precious Metals

Because of the inherent value of the material, great efforts were made by workers not to lose any, and so archaeological evidence for gold and silver smithing tends to be oblique. Fragments of litharge cake - lumps of waste products including lead from the refining of silver in the Middle Ages - have been found in the area of the future guildhall, and a complete cake was recovered at Poultry (Rowsome 2000). Lead patrons - master forms made from the easily worked metal to act as re-usable reservoirs of skill by pressing them into clay moulds to produce negatives in which precious metal products could be cast - have occasionally been identified (Egan 1996a, 92, fig. 6). One in the form of a relatively elaborate buckle frame from the 13th century (a time when lead was not used for buckles intended to be worn) was excavated at the TEX88 site, another in the form of an element of elaborate openwork cresting, appropriate for secular cups of the 15th or 16th century, was found in the Thames), and three accomplished human hands tapered at the wrists for fitting the products into figurines were found at the site of Bermondsey Abbey - here the context implies the production of religious figurines

(the use of soft lead would have allowed the fingers to be bent into different attitudes for pointing, blessing etc.; Fig 8. Egan forthcoming f). A mould of cuttlefish bone, a soft material still used by silversmiths today as it readily takes a detailed impression of an object, for producing crowned, blackletter "M" mounts (for the late-medieval cult of Mary) was excavated at the waterfront (Clark 1991, 11, fig 1.5).

The discovery at Foster Lane in the goldsmith's area of London around Cheapside of at least eight highly prestigious early 14th-century, enamelled Venetian drinking glasses is probably indirect evidence for precious metalworking. The glasses were probably awaiting mounts of gold or silver to enhance their value when they were accidentally broken and had to be thrown away (Clark 1983). This suggestion is to some extent supported by the discovery of a crucible with silver-working residues in the same pit as the glass fragments.

At the official end of the scale, a surprising number of coin dies have been found in London (Archibald et al. 1995). Two of the four dies, which are the subject of this paper, both from the early 12th century, belong to the period currently under consideration, those for Henry I, Southwark mint, and King Stephen, Northampton mint. It has been suggested from these finds that the cutting of coin dies was carried out by goldsmiths based somewhere in the Thames-Street area. The capital's mint was from the later medieval period located for security within the Tower of London. This makes the discovery of two 17th-century coin dies in the Thames near the centre of the city waterfront the more inexplicable (Besly 1988. Museum of London). A sizeable lump, (ca. 3kg) apparently of corroded copper alloy found at St. Thomas Street in Southwark (Egan 1996a, 92), has proved, on investigation of a small part of its constituents, to be a mass of hundreds of counterfeit medieval pennies (of Henry I?), many of them partly melted. Analysis shows that there was enough silver to have made them plausible in everyday dealings, while their copper-alloy component meant they were made of much cheaper metal than the real thing. One can only speculate as to the circumstances in which they were abandoned, but this looks like an aborted attempt to recycle the metal to extract the silver. Further hoards of counterfeit coins have been found bur-

ied in the Thames foreshore - a hoard again of base silver pennies imitating issues of Edward IV, and dated to c. 1490-1500 (Archibald 1980, 60ff. Williams 1996, 170 no. 328).

At Legge's Mount in the Tower, a furnace in a cramped workshop dating to the mid 16th century was uncovered along with crucibles from cop-

per-alloy working and cupels - small dishes made of bone ash, which were used in refining silver by absorbing lead from natural alloys (Parnell 1993, 59ff. Bayley 1990, 4, fig. 2.4). This curious combination of metalworking material in this secure location probably relates to experiments carried out in preparation for what has become known to numismatists as "the great debasement" of the coinage under Henry VIII in the 1540s - in 1546 two thirds of the metal content of the mint's "silver" products was copper alloy rather than the traditional, relatively pure precious metal.

Dumped crucibles and distillation equipment at other sites (Sewart/Blackmore 1996) has also been interpreted as precious metal refining evidence, the distillation vessels being for the production of nitric acid, which was used in purifying gold.

Arms and Armour

Hints of cutting up jack plates may be evidence of refurbishing in Southwark (Egan forthcoming a).

Copper-alloy hand-gun parts found in the foreshore immediately in front of the Tower of London are probably discards from the workshops located inside the institution. Lead shot and fragments of armour from Artillery Yard to the east of the city are probably from testing the quality of the latter in the 16th and 17th centuries (Thomas 2004, 68ff.).

Leatherworking

The noxious-processing industries were banished to the fringes of London and by the 16th century they were becoming established in Bermondsey south of the Thames, where the trade flourished through to the early 1900s. Plant-complexes of tanning pits and several tools

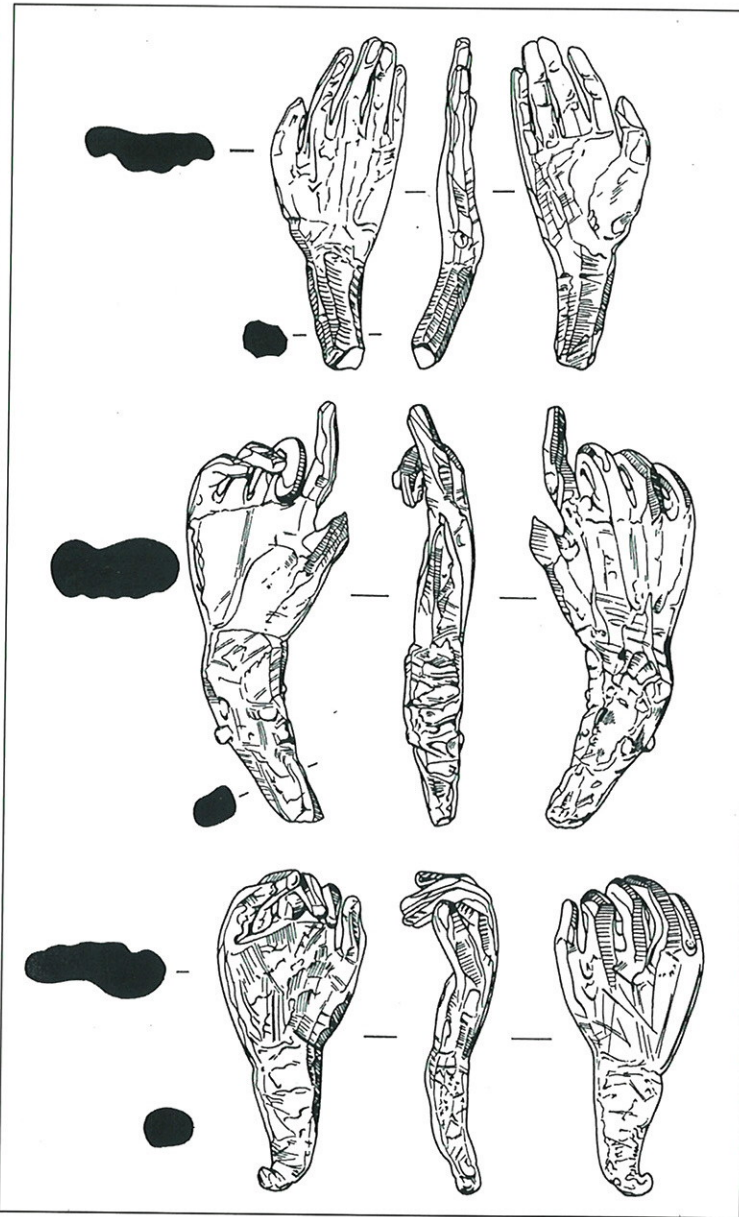


Fig. 8 London. Lead hands - master forms, manipulable into different gestures, for making clay moulds for copper-alloy or silver religious figurines, from medieval levels at Bermondsey Abbey (Drawing: S. Rowntree. Egan forthcoming f).

have been found there, but not at the same sites (the fullest complex uncovered is from the 19th century, appropriately at Tanner Street - TAN87 site). The tools recovered at one site on the south bank of the Thames include almost the entire standard range from the 16th century (Egan forthcoming a, nos. 790ff.). The same site produced a number of extremely worn horseshoes and possible skinning knives, suggesting that this unpleasant part of London also included a knacker's yard (ibid., 1028-32).

Many of the extensive medieval waterfront dumps where leather has been well preserved have produced shoes and other scraps of leather in some numbers that had been cut up for recycling as patches and replacement parts. Similar material has also come from the late 15th/16th-century extramural dumps at Moorfields and elsewhere along the north side of the city. Awls of the type that would have been used in sewing shoes and other leatherwork have been found at several waterfront sites, but as yet there is no assemblage that can definitely be associated with a shoemaker.

Small Industries

Bead-making

The popularity of rosaries in the late-medieval period, i.e. the 14th to early 16th centuries, is reflected in manufacturing evidence from across the city. Amber (quite possibly shipped from the Baltic through Lübeck) has been found in several assemblages of production waste dumped at the city waterfront, though no specific workshop site has been identified. The fullest evidence comes from the TL74 site, where the different stages of rough cutting with a blade, turning and polishing are all represented (Egan/Pritchard 2002, 305-17. cf. Mead 1977 for similar evidence from the BC75 site). The stage when the rough bead was first turned on the lathe seems to have been the most difficult in that it has produced the most waste as the bead broke under the strain. The TL74 assemblage also included an unfinished jet bead and a small natural pearl, all pointing to a modest industry catering for those who could afford exotic materials but not the most expensive fine jewels. A small amount of amber-bead working waste has also been found at a couple of other waterfront

sites and at the POM79 site which comprised the precinct of Christchurch Greyfriars. So far none at all has been recovered from Paternoster Row (just to the north of St. Pauls Cathedral) allegedly the eponymous street of the paternoster-makers. By far the greatest amount of waste from bead-making is in the form of bone panels from which very cheap products had been turned. Several kilograms of this waste came from the BOY86 site right at the south-west corner of the city. Documentary evidence suggests that bone beads were produced particularly for children (see also under Glassworking).

Jewellery

Perhaps from the very start of the period considered here is a small assemblage of waste offcuts from the manufacture of finger rings of shale from a pit at Wood Street, which also produced waste from making bone finger rings (Pritchard 1991, 123, 154ff., pl 3.38, 175ff.). The workshop did not make use of a lathe, even though the stone material it was working had to be imported a considerable distance from the west or north of Britain. These particular accessories seem to be from the end of the respective fashions in London and no later examples have been traced.

The celebrated early 17th-century Cheapside Hoard of jewellery includes a small cache of uncut turquoise from Sinai and other unmounted stones, an indication that the owner of the hoard was involved in the manufacture of some items (Forsyth 2003, 35-42). No one has yet determined which specific pieces among the rest of the material (which includes ancient gems and several other exotic items) might have been made by this individual, or how many other workers in London might have been involved in manufacturing the contemporary pieces.

Knife-handle Making

Hafters - those who set newly made knife blades with their handles - were a separate guild in medieval London. Knife handles could be made of or incorporate an extremely wide range of metal, organic and mineral materials. A pit of waste from the 14th century relates to this trade. Most of the waste is offcuts from cattle bones used to make the scales for the iron

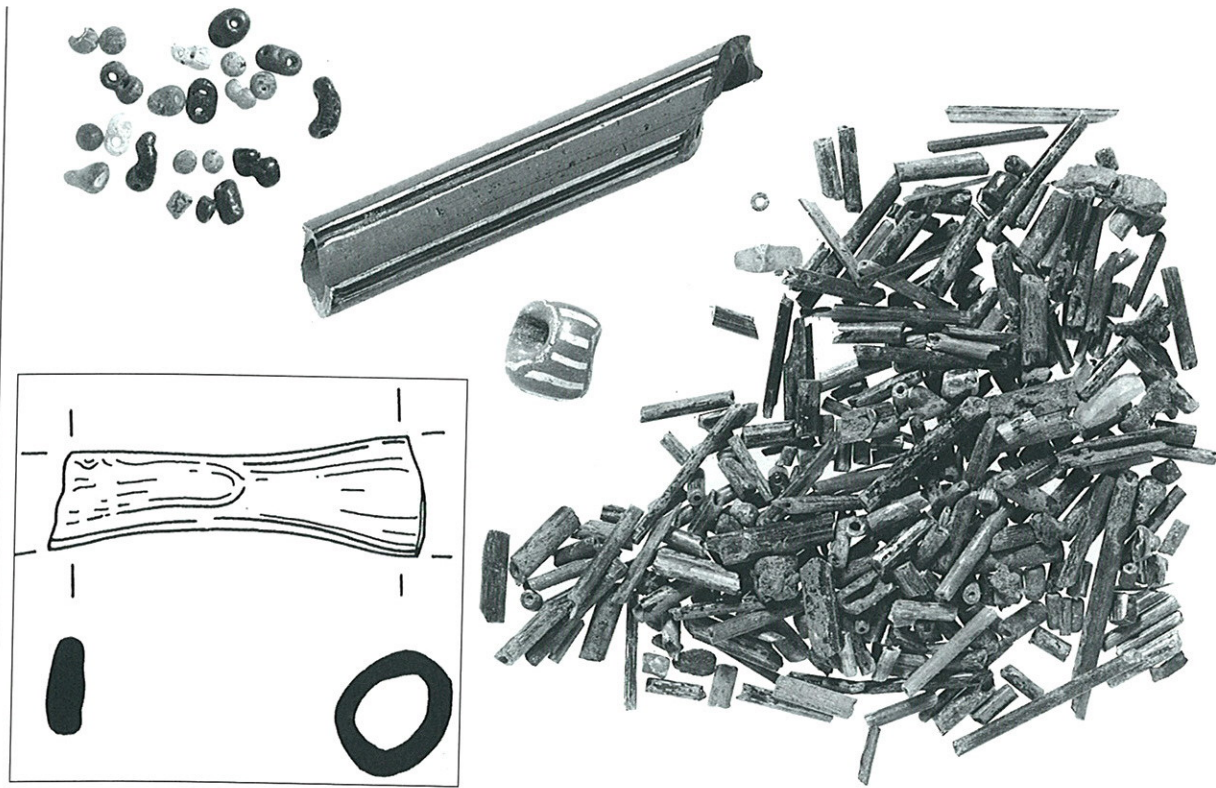


Fig. 9 London. Late 17th century crystal glassmaking waste; Above: blowing tube; from Bankside (Drawing: F. Vardy. Egan 2000); Opposite page: variety of waste from the manufacture of glass beads at Hammersmith - canes, individually formed beads etc., from west London, probably for export to Africa, mid 17th century (Photo: A. Chopping).

blades (which are completely absent from the assemblage). There are also sheet copper-alloy offcuts and discarded fragments from relatively simple, openwork covers which showed not only the white of the bone, but also orange and black from small inserts respectively of amber and jet set into slots. Here the amber and jet appear to have been sawn to shape, rather than knife-trimmed as for the beads noted above. Although several much simpler versions, in one or two materials only, of the ogival-ended form of knife handle represented by this waste have been found in London, not one of the ingenious, multicoloured (one might say gaudy) examples from this particular industry has been noted, raising the question of just how successful the product was at the market.

A couple of fragments of clay moulds used for casting ornate knife handles, probably in copper alloy, with renaissance scrolling and a jester's head have been unearthed near Cheapside. If any

products from the latter at least had turned up they would have been unlikely to have been considered English work without this clear evidence showing where they were made.

There are many post-medieval sites, particularly from the 18th century, with turning waste from bone- and ivory-handle production (often with waste from counters and other bone implements). In fact, from the archaeological evidence this seems to have become one of the most widespread of all crafts, requiring little skill, in the case of bone using a readily available material, though the use of a lathe would have meant it was not quite at the bottom of the social scale. A small amount of post-medieval antler-working evidence in a scatter of peripheral sites (e.g. the ABP94 site at Clerkenwell) may well represent knife-handle manufacture, the last vestige of a major industry in the Saxo-Norman period, when combs and pins were routinely made of what was then a common material.

Painting

Oyster shells used as pallets with small amounts of rich pigments have turned up on the sites of several religious houses in London and at the guildhall, where they may relate to the chapel or the secular part of the institution. It is uncertain in any instance whether the colours were for murals, glass windows or even manuscripts. Conveniently shaped stones and pebbles are sometimes identifiable as having been used for mixing and crushing pigments. At Bermondsey Abbey one of these tools has the remains of a vivid orange powder still adhering on and around a flat surface (Egan forthcoming f, no. S101). Shells with pigment from the 17th century at the LBY85 site are probably connected with decorating the fans being made there.

Dice Production

Tiny dice made of bone with drilled spots to indicate the numbers were being made in the early post-medieval period by prisoners in jail to sell to supplement the meals they could afford. In the areas of both the Marshalsea and Newgate Prisons (respectively at Southwark in south London and just outside the city's western wall) waste and miscut dice have been found, sometimes together with curious bone rods carved with human heads (Townend 1988. Turner/Orton 1979, 19, Pls. 1-4). This seems to have been a kind of low-level scrimshaw, analogous to that produced in a later century by Napoleonic prisoners of war from meat bones.

Fulham, to the west of the city, was apparently renowned in the 16th century as the location for the manufacture of false dice used illicitly in gambling in London. A small group of false dice, some with only high numbers and some with only low ones, was found in the Thames in the centre of the city and these may be products of that area (Spencer 1985).

Comb Making

No excavated evidence is known for manufacturing combs of wood, the main material used for these implements in London up to the late 16th century. From the 17th century, when elephant ivory began to come into the capital in huge quantities as the African and Indian trades opened up,

this exotic material dominated the comb industry. A small amount of scattered waste from this specialised trade (some of it recovered alongside other categories of ivory waste like turned offcuts, even though there was a separate comb-makers' guild) has come to light right across the city. Thin panels with teeth cut by the special saws needed but misplaced or broken before completion characterise the evidence for manufacture (BEV80 site. Sewart/Blackmore 1996, fig. 21, no. 23). Despite these finds, it has not proved possible to define any particular area in which production took place.

Fan Making

This highly specialised trade, which had its own guild, has a couple of waste assemblages in the city. The largest, dating from the late 17th century, is from the LBY85 site at the west of the walled area. Here, tens of the characteristic long struts, made of bone, ivory and tortoise-shell have been found (Fig. 10). The reason for discarding these particular pieces seems to have been over- or under-cutting the delicate struts. While most of this material is plain, a couple of decorated pieces relate to a fan in the Victoria and Albert Museum.

Woodworking, including Boat Building

The extensive survival of waterfront wharf structures on upwards of a dozen sites has allowed a separate timber-construction tradition from the one evident in land buildings to be charted in detail from the 12th to the 14th centuries. Several timbers in these structures have proved to be reused from boats (Goodburn 1999). A variety of early carpentry tools have been recovered, especially 16th-century ones from the ABO92 site; notably a Continental form of adze, which permitted close cutting not possible with traditional English implements (Egan forthcoming a, no. 797). A range of evidence for different crafts involved in shipbuilding have been recorded alongside the Thames to the west of the city (Pitt et al. 2003).

Sculpture/Stoneworking

Virtually all building stone in London had to be imported. While most evidence excavated in London for masons is better discussed in the con-



Fig. 10 London. Fan-making waste - bone, ivory and tortoise shell, late 17th century from the LBY86 site (Photo: A. Chopping).

text of specific buildings, one assemblage is arguably more appropriately noted as a craft. A scatter of Purbeck marble waste at Christchurch Greyfriars precinct (Schofield/Maloney 1998, 160) was found close to several large hearths or furnaces. It seems possible that this was what was left from an upmarket tombstone-production industry somewhere in the precinct of Christchurch, at which the individual copper-alloy letters for inscriptions may also have been cast. The stone chippings imply a marbler's yard where the stone imported from Dorset was dressed on commission to make the monuments into which these would be set, as attested in London from the late 13th to early 14th century. One of the known locations of historically attested marbler's workshops

is in St. Paul's churchyard to the north of the cathedral (Badham/Norris 1999, 27), and just over the road from the Greyfriars. Note that apart from the hearth structures, the preceding interpretation of field observations by the writer on an extensive site that was not fully excavated is not reflected in the archived archaeological records made during formal fieldwork - the suggested identification is consistent with a thesis proposed independent of the archaeological observations (*ibid.*, 35), as well as the coincidence of documented Purbeck-marble working to the north of St. Pauls Cathedral. This draws together the unexcavated scatter of chippings of this material and medieval copper-alloy casting evidence - some apparently relating to dress accessories, along with a single tomb letter and a possible stop in the excavated assem-

blage - it has not been possible to check if these are all contemporary; an inscribed tomb of appropriate category was recorded in Christchurch Greyfriars (*ibid.*, 34, fig. 5.5).

Glassworking

English glass making was restricted in the medieval period to rural potassium-formula utilitarian vessels as opposed to display tableware. From the 16th century, the manufacture of colourless crystal glass, a technology brought in from Venice via Antwerp, became established with a series of factories and a highly complex set of licenses or patents. Documentary sources relating to this industry have been studied in detail from c.1576

to 1640, apparently furnishing a firm background against which the archaeological evidence can be gauged (Godfrey 1975). The archaeological picture, although far from complete, already shows that the historical commentary is itself not the whole story. A small number of awkwardly isolated discoveries of crystal waste in Southwark long before any attested workshop was established there in the early 17th century raise the probability that the historical evidence is incomplete. A couple of sites at the northeast of the city in the area of Mansell's Broad Street factory have produced sizeable assemblages of crystal waste from the early 17th century (at Aldgate and in the Broad Street area itself, discussed with scientific analyses in: de Raedt et al. 2002; it is not certain that the Aldgate material derives from Mansell's enterprise). Other factories producing crystal and traditional green glass on the south bank are represented by waste groups and possible plant (Egan 2000. BAK00 sites). Parts of kiln superstructure and other waste from the Falcon Stairs factory a little further to the west on the south bank of the Thames, also producing both categories of glass, have been recovered both from excavation on a redevelopment site and from material from the present river foreshore.

Lead glassware made by Ravenscroft and others in the late 17th century is recognisable from its weight and characteristic mode of decay in soil (crizzling) as well as from the makers' seals of glass added to the products. While there is nothing so far from the production site, several vessels are known from pit groups across the capital. At Ratcliff to the east (BLU90) and Vauxhall to the west, slightly later waste primarily from the same period but manufacturing traditional green bottles and window glass and potash finewares has been excavated. The latter site furnishes particularly detailed evidence for the structure of the furnace because the remains survived to an unusually high level, and what is thought to be the only excavated 17th-century fritting oven, from its associated deposits of glass-making materials and fragments of glass with the same composition as the products (Willmott/Tyler forthcoming).

Waste from a completely unexpected industry was uncovered at Hammersmith (west London, Winslow Road; HWR99 site) in the form of an early 17th-century kiln and large, colourful beads

intended for sale or barter to natives in the colonies as well as smaller beads that may have been for the home market (Fig 9). The kiln seems to have been a private enterprise on the land of one of the main backers of the Africa Company, and so West Africa is the most likely destination, though provisional parallels have been traced in the Americas (perhaps because of present familiarity with work there, whereas there have been few links with archaeology in Africa so far).

Enamel Production

Enamel was probably made in London in the medieval period (harness pendants often had enamelled heraldry) and it must have been a familiar craft at least by the time of the early 17th-century Cheapside Hoard, which includes gold finger rings and neck chains covered with it (Wheeler 1928). The misleadingly named "Surrey enamels" of the mid 17th century have occasionally been found in the form of brass buttons, but the factory site has not been investigated (Egan forthcoming d).

It is not until the mid 1700s that enamel production has been recognised among archaeological material. Excavations at the site of the famous Battersea enamel factory of 1753-56 produced some waste material and a few items of production equipment. Here enamelling with transfer printing on a white tinglazed field was developed. A couple of discards show that hand-painted subjects from tiny insects to landscape scenes were part of the factory's repertoire as well as contemporary pastoral prints, altering the received art-historical view. Some pieces of copper-alloy picture frames, including ones awaiting gilding, were also recovered (Gaimster forthcoming).

Ceramics

There is no clear evidence for local production of medieval ceramics in central London for the post-medieval period, so only an outline account is presented here.

All of the nineteen known tinglazed-ware factories operating in the metropolitan area between the mid 16th to early 19th centuries (Britton 1987) are now represented at least by waste assemblages, while some of them, like Norfolk House and Rotherhithe, have had the kilns inves-

tigated in detail (Bloice 1971. Tyler forthcoming). Some of the waster assemblages comprise tons of material (Edwards 1984).

The remarkably inventive John Dwight's late 17th/early 18th-century factory at Fulham not only produced very fine stonewares, some of which have not been matched for delicacy, the recovered assemblage also includes a range of very early experimental porcelain vessels that were not a commercial success (Green 1999). Also to the west of the city, stoneware factories in Lambeth, right up to the Doulton enterprise with its large-scale sanitary products like sewer pipes, have been investigated.

In contrast, despite early interest on the part of collectors, not all of the early porcelain factories from the 1740s onwards have been satisfactorily investigated, notably the renowned one at Chelsea. The products of the short-lived Limehouse factory in east London were not certain until the site itself was excavated. This resulted in considerable interest on the part of the salerooms, who funded a somewhat hasty hard-back publication (Drakard 1993); this nevertheless had the effect of raising the price of now authenticated Limehouse pieces ten-fold at subsequent auctions. A subsequent publication provides more considered perspective on the factory (Tyler/Stevenson 2000).

Brick and Tile

Ceramic building materials are generally not a craft by the definition suggested at the beginning of this paper, apart from decorative floor tiles in the medieval period, joined by ornately painted tinglazed floor and wall tiles in early-modern times. A medieval floor tile kiln was found at Faringdon in the mid 1800s (Price 1870).

Clay Tobacco Pipes

This trade has produced more makers' marks on excavated products than any other single manufacture, not least in London, though only a relatively small proportion of the pipes found there were actually made in the city or its suburbs. There was a guild from 1619, inevitably based in the city, which was presumably responsible in the first instance for this marking, which in this particular trade seems to have become something of

a necessary obsession wherever the manufacture was carried out.

A well-preserved kiln was excavated in Southwark (Dean 1980, 371. Townend 1988. Turner/Orton 1979) and another less complete was uncovered near the waterfront (MoLAS 1996, 31); both were of 17th-century date. More intriguing perhaps is an apparently clandestine kiln from the early 18th century, the base of which was found in a tenement in a very poor area just outside the city walls at Aldgate (Thompson 1981. Thompson et al. 1984). This makeshift industry was certainly manufacturing pipes and it may well have been recycling used ones by re-firing them to bring back the original white colour. There are several scattered fragments from unidentified kilns elsewhere across central London.

The Craft of Medicine

It has so far proved difficult in the extreme to recognise medical equipment, as the commonest tools of this trade regularly resemble similar utensils from other spheres of activity. Medical interventions are, however, occasionally evident in a limited number of human burials, where they have left their marks on skeletal remains (Thomas 2004. Egan forthcoming e). Apart from settings of broken bones and occasional trepanations (operations involving drilling holes in the patients' skulls) a small number of burials have sheet-metal plates apparently to hold plant and perhaps other medicinal preparations against the site of wounds that were proving difficult to heal. The sample of over ten thousand burials now being investigated from the cemetery of the hospital of St. Mary Spital provides preliminary figures of <0.05% each for burials with trepanations and for those with recognised medicinal sheet patches. A great many plant remains of species routinely used for medicinal purposes have also been identified among excavated material, but any indisputable link with medicine is virtually always elusive.

An exceptional isolated find seems to relate to folklore medicine; this is an early 15th century bowl made of jet - a material traditionally associated with women's health. It is possible that this water drunk from this vessel was thought to have the power to ease the pain of childbirth (Egan 1998, 297ff., no. 972).

Other Production, Including "Missing" or Virtually Absent Ones

While the term "*handcraft*" may possibly be stretched to include elaborate cooking and baking, the products in the form that would have been consumed have inevitably disappeared. All that is left from the soil of culinary efforts apart from bones and seeds are a few ceramic moulds thought to be for small pastries. One probably 16th-century mould with the form of a possibly haloed head may relate to the provision of snacks for religious festivals at Bermondsey Abbey, where it was excavated (Egan forthcoming f). There are several from the 16th century with various abstract patterns (Nenk 1992, fig. 1, nos. 1 and 2) and a 17th-century one has the form of a mermaid (Museum of London archaeological archive, site BRV98 acc. no. 21).

Handwriting as such is surprisingly elusive in the excavated material from medieval London (a contrast to the plentiful runic inscriptions on many Scandinavian sites). There are styli, pencils and pens and a few wooden tablets from before the Reformation, like the evidences for reading in the form of book mounts and early spectacles, usually found on the sites of religious houses, where an assemblage of clerical items repeatedly turn up.

Apart from these crafts where the products themselves rarely survive in the archaeological record, some branches of metalworking have yet to figure. Sheet-copper-alloy ("*battery*") and pewterware vessels are common enough, but no specific waste from their actual manufacture has been identified. The same is true of furniture making, whether joined or turned. Evidence for the manufacture of stave vessels, too, has not been identified, having presumably gone the way of most wooden waste, recycled as fuel, though an isolated piece of waste taken to be from turning wooden vessels has been identified (Egan 1998).

Conclusions

The evidence for industrial production in London is extremely rich and diverse. It is also frequently potentially misleading in that single aspects or particular fashions may be massively over-represented by waste assemblages. This is

true of 14th-century knife handles, where a composite, gaudy form so far completely absent from finds representing used products is extensively represented by a large pit group, and within the London textile making and finishing trades by the dyers, whose plant at beginning of the period happens to have loomed spectacularly large at one excavation and whose dyehouses towards the later end are disproportionately emphasised by the thousands of cloth seals along specific areas of the Thames waterfront. A similar over-emphasis may be true for fans, where expensive materials like tortoise-shell are represented as much as bone at the main site where they occur. There is a danger that waste will highlight too much the failures of a given workshop - possibly this is the case with the same group of fan-making waste where many pieces were cut to the wrong thickness. Does what was recovered represent years of effort or even a working lifetime's errors by one or more workers, or was this group the result of routine, profligate carelessness from just one session of manufacture on the part of a single individual who simply lacked aptitude for this skilled craft. The main amber-bead production assemblage, too, features failings in manufacture very prominently, again this is not necessarily a true indication of the skills brought to production of the fairly small beads that dominate this particular group, but otherwise remain virtually absent from the recovered record.

There are a few possible hints of sharp practice in the counterfeit cloth seals of the later 16th century and a small group of weighted bone dice with exclusively high or low numbers - apparently a specialised product of one of London's suburbs (Spencer 1985). Guild and governmental controls were evident from the late 14th century in the complex systems of product marking which developed in several crafts. In pewter spoons, there seems to have been a relatively swift effect following the introduction of quality-control stamps, in that the proportion of lead used in the alloy falls dramatically. It is not possible at this stage to compare congruent manufacturing assemblages from the city with ones from Southwark in order to establish whether guild control might have been weaker on the south bank as one moved further from the central control.

Improving standards of finishing a product as basic and simple as iron hinges seems to be evident between the 12th and 15th centuries. There are many points where working practice appears labour intensive compared with latter-day expectations. Health and safety at work were not the issues they have recently become, but this aspect is better served by documentary studies of specific cases and perhaps by examination of aspects of health that should be evident from burials of local populations.

Understanding craft production in the Middle Ages and early-modern times is central to understanding the societies of those periods. The more pertinent excavated material that is examined, the more the diversity of urban daily living by our ancestors becomes evident.

Zusammenfassung

Der Nachweis handwerklicher Produktion in London ist äußerst umfangreich und mannigfaltig. Besonders die Ausgrabungen der letzten dreißig Jahre haben viele Funde und Befunde hervorgebracht, einschließlich Werkstätten.

In dem Zeitraum, der im Vorliegenden untersucht wurde, etablierte sich London als politische und wirtschaftliche Hauptstadt Englands, in der sich natürlich auch das Handwerk konzentrierte, was z. B. an den 111 schriftlich für das Jahr 1423 nachgewiesenen Gilden erkennbar ist.

Es ergab sich auch, dass viele Straßen und Plätzen nach Handwerken benannt waren, allerdings kann nicht der Schluss gezogen werden, dass die Handwerker hier dann Jahrhunderte hindurch ihre Werkstätten hatten, sondern durch Wanderungen kam es schnell zu einer Gemengelage.

Die Textilherstellung und -verarbeitung kann archäologisch sehr detailliert nachgewiesen werden. Weitere Handwerkszweige im mittelalterlichen London waren u. a. Spinnerei und Stickerei, Produktion von Kupferlegierungen, Glockenguss, Nadelherstellung, Eisenverarbeitung, Blei- und Zinnfabrikation, Edelmetallverarbeitung, Waffen- und Rüstungsherstellung, Lederverarbeitung, Perlenherstellung, Kammproduktion, Holzbearbeitung und Steinbearbeitung.

Es ist möglicherweise häufig irreführend, wenn besondere Formen im Abfall stark überrepräsentiert sind, wie z. B. die falsch zurechtgeschnittenen Stücke eines Fächers. Hier stellt sich die Frage, ob der Abfall den Querschnitt jahrelanger Arbeit repräsentiert oder die Nachlässigkeit bzw. Unfähigkeit eines Einzelnen zu einem bestimmten Zeitpunkt oder den alltäglichen Ausschuss.

Durch die Untersuchung der handwerklichen Produktion im Mittelalter und in der Frühen Neuzeit erschließt sich uns das Wesen der Gesellschaft dieser Zeit. Je mehr archäologisches Material untersucht wird, um so mehr wird die Vielfältigkeit des Lebens unserer Vorfahren deutlich.

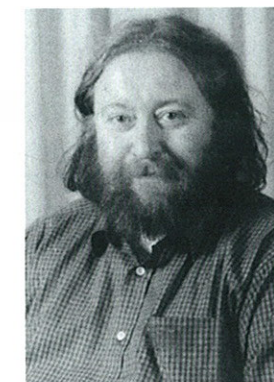
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