THE MUSEUM OF LONDON

KNIVES AND SCABBARDS

MEDIEVAL FINDS FROM EXCAVATIONS IN LONDON

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KNIVES AND SCABBARDS

J. Cowgill, M. de Neergaard and N. Griffiths

with contributions by

F. O. Grew, A. G. Vince, T. Wilmott and P. Wilthew

LONDON · HER MAJESTY'S STATIONERY OFFICE

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Introduction

F O Grew

Blades from knives or shears are among the most common and varied metalwork finds on medieval sites. This fact, together with the evident skill with which many were forged and hafted, reflects their importance as tools for work or in the home, while the elaborately decorated scabbards in which they were sometimes sheathed are of intrinsic fascination besides being indicators of the popular artistic tastes of the time. It is appropriate, therefore, that they should be the subject of the first fascicule in a series dealing with all medieval objects recovered from London sites by the Department of Urban Archaeology of the Museum of London during the past decade.

The catalogue contains nearly 500 items. It includes shears, scissors, knives and small scabbards of all kinds, but apart from two sheaths which are illustrated for comparison of their ornament it excludes daggers, swords and their fittings; in fact, very few of these have been found on recent sites, although there is a magnificent short sword from Billingsgate and several fragments, all of which will be published separately. The objects described here are mainly from six major excavations along the waterfront (Table 1), and they are mostly dated with unusual accuracy by the peculiar circumstances of their disposal, in vast tips of refuse thrown behind timber revetments at the time of construction. A collection of this size has the value of permitting some statistical analysis – of alloys or handle types, for example – although here the chronological patterns are obscured to some extent by the fact that almost half the finds belong to a period of just half a century (*c.*1350–1400). The preservation of both metal and organic parts is in general outstanding, and this has made it possible to identify the types of leather used and all the alloys used for decoration or as inlay in makers' marks. At the same time, since the collection is so well preserved and it must be the policy of a museum to preserve objects intact for future generations, destructive examination has been limited to no more than a dozen blades; and these, inevitably, cannot be representative of the whole range. Ironically, if the collection had consisted of corroded metalwork, incapable of conservation, there would have been no objection to the destructive analysis of every blade.

The first knives and scabbards in the catalogue belong to a time just before *c.*1140, the date of the first reclamation dump and revetment at Seal House; earlier finds, ranging from the 10th to the mid 12th centuries and mainly from rubbish pits in the central parts of the City, are published elsewhere, with the other Saxon objects recently recovered from London (Pritchard, forthcoming). As might be expected, several of the knives in the first Seal House group belong firmly to the Saxon tradition, with an angular 'hump' on the back of the blade and pattern-welding. This type did not persist long beyond mid century, however, and the knives of the later 12th and 13th centuries mainly have simple triangular blades. Yet it is with these rather plain knives of the early 13th century that we may associate a series of scabbards marvellously decorated with fantastic animal scenes – hares, hounds, boars and birds with elaborate, elongated tails – which it is tempting to see as part of the final flowering of early medieval zoomorphic art in England and which might be compared with marginal illustrations on manuscripts of the same period. In the later 13th and 14th centuries more sober designs, often a combination of debased heraldic motifs, were to become the fashion.

As is especially clear from the present collection, fundamental changes took place during the course of the 14th century. Before *c.*1300 all knives had solid handles fixed on a spiked 'whittle' tang, whereas after *c.*1360 over half had a composite handle consisting of plates riveted to a flat 'scale' tang. With this development went a tendency towards longer, more slender blades with more metal fittings – end caps and shoulder plates – which often provided striking decorative effects. At the same time, that is, in the years immediately after *c.*1300, makers' marks first

Table 1.

Date	Site	Knives	Folding Knives	Shears	Scissors	Scabbards
Late 12th	BIG	2				
	SH	2				
	SWA	6		1		1
Early–mid 13th	BIG	3		1		4
	LH					1
	SH	7		2		8
	SWA	4		1		1
Late 13th	BIG					2
	SWA	18	1	2		13
	TL					3
Early–mid 14th	BC	9		1		22
	BIS	1				
	CUS	7		1		13
	LH					1
	LUD					7
	PCD					3
	SWA	1				
	TL	9		4	1	1
Late 14th	BC	62		12	1	4
	BWB	100	1	21		1
	CUS	1				3
	DUK	1				1
	FLE	1				
	OPT	1				
	SH	2				
	SWA	3				
	TL	12		1		3
Early–mid 15th	BWB	1				
	SWA	13				
	TL	14		4		1
Unstratified	BC	2		1		5
	BIG	3				6
	BWB	2			1	3
	CUS	1				2
	LH					1
	POM	4				
	SH	2				1
	SWA	8		1		2
	TL	1		1		1
	TUD					1
	Total	303	2	54	3	115

became widespread, presumably reflecting the increased sophistication and self-consciousness of the craftsmen themselves – a self-consciousness that also found expression in the craft companies which developed at roughly the same time. And, finally, it seems that after *c.* 1350 fewer and fewer knives were carried in scabbards; whereas over twice as many early 14th-century scabbards as knives have been recovered, the figures for the end of the century are only 11 scabbards compared with 173 knives. As for the early 15th century, only one scabbard has been found, alongside 28 knives and a huge collection of other leatherwork, demonstrating that this change is not related to poorer preservation of leather in the later deposits. These late medieval knives must have been stored where they were needed – in some cases, perhaps, specifically for use at the table – not regularly carried by their owners. Such changes, themselves suggestive of corresponding changes in social organisation, look forward to the Tudor and later periods – stages which regrettably are not represented in the present collection, since the construction of a stone wall along at least part of the Thames bank in the mid 15th century brought to an end the process of steady reclamation with rubbish-laden deposits.

The present volume contains a comprehensively illustrated catalogue of the whole excavated collection. This is preceded by a discussion of the dating evidence, essays on technology and decoration, and on the types and functions of the various items. All the objects, together with detailed archival reports, are stored in the Museum of London, where they may be examined on request.

Dating

A G Vince

Almost all the knives, shears, scissors, folding knives and scabbards illustrated in this catalogue are from recent archaeological excavations and are mainly from stratified contexts (Table 2). Unstratified material, whether from the Museum of London's older collections or from sites excavated by the museum's Department of Urban Archaeology, is only illustrated where it helps to amplify a point arising from the study of stratified artefacts.

Much of the material included here comes from excavations along the Thames waterfront and was collected from the massive dumps of domestic rubbish used to make up the ground behind timber revetments. Revetment dumps are usually composed of black, highly organic refuse interleaved with recognisable tips of material such as building debris and oyster shells. Foreshore deposits on the other hand consist mainly of silts and gravels, also often highly organic. Unlike the dumps, which seem to contain rubbish brought from a wide area of the City, the foreshores can be expected to contain material discarded from the waterfront itself which may therefore reflect medieval riverside activities.

The size of the excavated assemblages and the methods of recovery vary from site to site and this limits the information which can be extracted from the data. This applies both to the relative quantities of artefacts between sites and the ratio of leather to metal finds within sites. Thus, any statement about preferred dumping points for artefacts along the waterfront based on our data is probably unjustified, as would be any attempt to compare the ratio of knives to scabbards through time if the pattern found were not repeated on different sites. There is no reason to suggest that either the knife or scabbard collections are biased, and, providing the assemblages are of sufficient size, they can be used as a representative sample of their date, gathered, one suspects, from a wide area of the City.

The dating of these deposits is based on a wide range of techniques. Where possible, dendrochronological analysis of the timber revetments themselves has been undertaken, but the most precise dating comes from coins, tokens and jettons. These finds are so numerous that they can be used to give a deposit a *terminus ante quem*, the date before which the group must have been deposited. The late 13th-century deposit from Swan Lane, for example, produced 43 coins and 94 lead tokens, and none of the coins would have been legal tender after *c.*1280. Some of the smaller deposits, and most of the finds from inland sites included here, are dated less precisely by the pottery assemblages found with them. Even when dated by pottery alone there are few items included in this publication which cannot be dated to within half a century. The methods used to date the sequence and a description of the major changes in the

Table 2. The objects according to deposition date.

Date	Knives		Folding Knives		Shears		Scissors		Scabbards	
	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%
L12th C	10	3			1	2			1	1
E–M13th C	14	5			4	7			14	12
L13th C	18	6	1	50	2	4			18	16
E–M14th C	27	9			6	11	1	33	47	41
L14th C	183	60	1	50	34	62	1	33	12	10
E–M15th C	28	9			4	7			1	1
Unstrat.	23	8			3	5	1	33	22	19
Total	303		2		54		3		115	

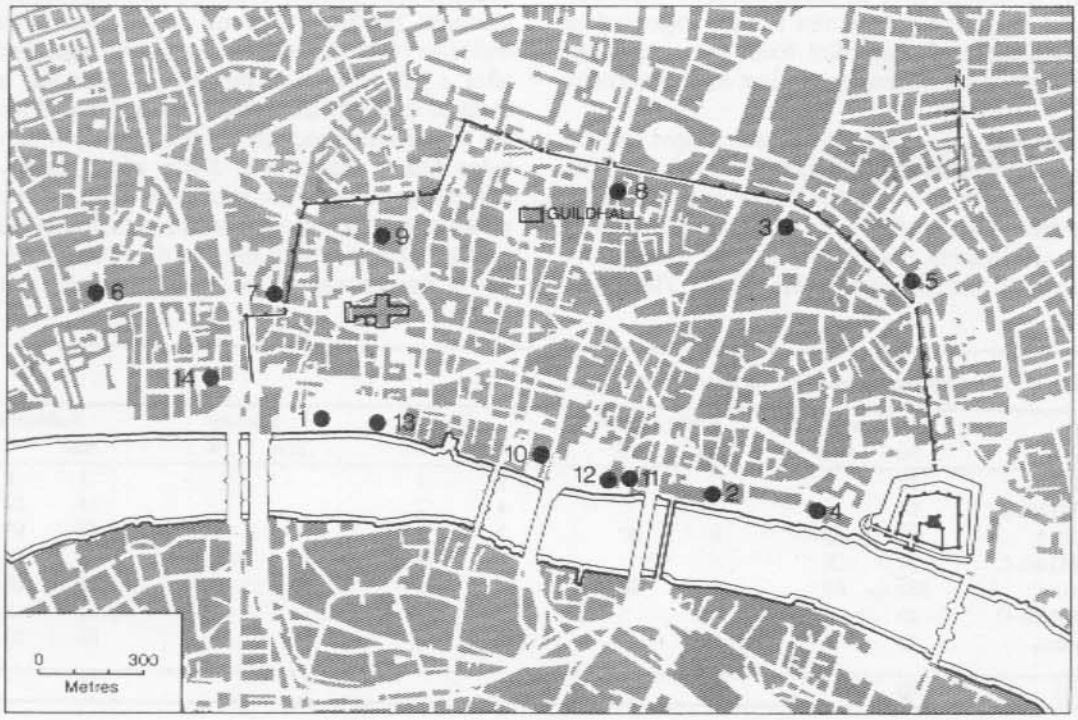
pottery found is published elsewhere (Vince, 1985). Unless otherwise stated, the identification of the numismatic finds is by P Stott, of the Medieval Department, Museum of London, while dendrochronological analysis is by J Hillam and C Groves, of the Sheffield University Dendrochronological Laboratory.

The medieval waterfront sequence begins in the late 10th and ends in the mid 15th century. However, before *c.* 1150 most of the finds from the city come from occupation sites in the City, with all the problems of dating and interpretation which such sites present. This material is therefore being prepared for publication together with the excavations on which it was found. Similarly, the one Tudor waterfront assemblage of any size, from Baynard's Castle (the fill of the robber trench of the west wall of 'Baynard's Castle dock'), is not a city-wide rubbish deposit, as are the medieval groups, and the finds are best considered alongside those from pits, wells, cellar fills and other deposits from individual tenements excavated in the City. These groups span the early 16th to 19th centuries and will provide a wealth of information on the date and associations of Tudor and later post-medieval artefacts. For these reasons, only finds dateable from the mid 12th to the mid 15th centuries are included here.

BC72: 'Baynards Castle Dock' (Fig. 1 No. 1).

Excavations in the area of Baynards Castle took place in 1972 (Webster and Cherry, 1973, 162–3). They produced two large medieval dump deposits, both related to a stone-walled dock, recently identified by T Dyson and C Taylor as the common or public East Watergate (pers. comm).

1 The location of excavations mentioned in the text.
- 1 BC72: 'Baynard's Castle Dock'
- 2 BIG82 and BWB83: Billingsgate Lorry Park
- 3 BIS82: 76–80 Bishopsgate St
- 4 CUS73: Custom House
- 5 DUK77: 2–7 Dukes Place
- 6 FLE82: 140–3 Fetter Lane
- 7 LH74 and LUD82: Ludgate Hill
- 8 OPT81: 2–3 Cross Keys Court
- 9 POM79: General Post Office site, Newgate St
- 10 PCD59: The Public Cleansing Depot (Dowgate)
- 11 SH74: Seal House
- 12 SWA81: Swan Lane
- 13 TL74: Trig Lane
- 14 TUD78: 5 Tudor St



(i) The construction of the dock
The northern wall of the dock was formed by utilising an earlier timber waterfront, and the eastern wall was a pre-existing stone wall. The west wall, however, was formed by reclaiming an area of foreshore within a stone wall. The dump behind this wall can probably be dated by jettons to the 1330s or later. The difficulty in providing a precise *terminus post quem* is that the jettons are of a type, copying the sterling coinage of Edward I–II, which could conceivably be as early as *c.* 1280. Other finds from the dump include a pewter *ampulla* of late 13th-century date and two lead tokens of Rigold's type D2–4 (Rigold 1980, 103–5). The large pottery assemblage from this dump has yet to be examined in detail but initial examination supports a mid 14th-century date. The group contained nine knives, a pair of shears and twenty-two scabbards.

(ii) The use and filling of the dock
A layer of silt within the dock contained a moderate-sized assemblage of pottery, and a post-sterling jetton. These suggest that it was in use in the mid to late 14th century. A vast assemblage was recovered from the back-fill of the dock, behind a further stone wall, which blocked the dock. Coins, pilgrim souvenirs and jettons suggest a deposition date in the last quarter of the 14th century. The group produced sixty-two knives, a pair of scissors, twelve pairs of shears but only four scabbards.

BIG 82 and BWB83: Billingsgate Lorry Park (Fig.1 No.2)

The Billingsgate Lorry Park excavation in 1982 examined a large area of late Saxon and medieval waterfront (Youngs, Clark and Barry, 1983, 191–2). The late Saxon deposits, however, were only exposed in a small area. Finds recovery on a scale unprecedented on a controlled excavation in London was undertaken using metal detectors and sieving. Despite this, datable artefacts were few until the late 12th century. The late Saxon to medieval sequence can nevertheless be dated accurately by a combination of coin-dating, estimates based on the structural sequences and pilgrim souvenirs.

(i) The later waterfronts
From the middle of the 12th century onwards, the sequence of reclamation at Billingsgate was similar to that discovered elsewhere. The junction of two properties with different reclamation sequences was recorded on the site. The interrelationships of these revetments, and the occupation deposits on top, allow a very long stratigraphic sequence to be constructed with groups deposited in some cases only 10 to 20 years apart.

The first major reclamation appears to be dated *c.* 1160 by pottery and by its position in the sequence. This produced two knives. From *c.* 1180 onwards these groups can be given an absolute date by the associated artefacts. The first such group is coin-dated to 1180 or later, and includes a pilgrim souvenir datable later than 1170. The next large dump can be coin-dated to the early years of the 13th century. These groups produced three knives, a pair of shears and four scabbards. The latest revetment found in the excavation is dated by a group of coins which were probably deposited soon after 1250 and contained two scabbards.

Following the excavation, in 1983 came a watching brief, and finds recovery also took place where the spoil was dumped. Although little of this material can be related to a single deposit, the analysis of the coins, pottery and other datable artefacts shows that the majority of these finds come from mid to late 14th-century revetment dumps to the south of the excavated structures. The scale of the discovery, and the emphasis on metal finds, can be judged by the fact that one hundred knives were recovered, twenty-one pairs of shears, a folding knife, but just one scabbard. A single knife was found with pottery of early 15th-century date, from the extreme south of the site.

BIS82: 76–80 Bishopsgate St (Fig.1 No.3)

Excavations in 1982 revealed a rubbish pit containing a small assemblage of late 13th to early 14th century pottery (Youngs, Clark and Barry, 1983, 192). The absence of large quantities of London-type baluster jugs suggest a date early within this bracket, perhaps the last quarter of the 13th century for the knife found in the pit.

CUS73: Custom House (Fig.1 No.4)

The Custom House excavations took place at the extreme eastern end of the City waterfront, just to the west of the Tower (Tatton-Brown, 1974, Tatton-Brown, 1975). A foreshore deposit overlying the remains of Roman timber quays contained a small quantity of early 13th-century pottery in its lower levels (group D2) and early to mid 14th-century pottery in its upper levels (Group D1). The majority of the usefully stratified medieval finds came from a revetment dump overlying this foreshore and from deposits stratified later than this dump.

(i) Group C2

The filling behind the group C2 timber revetment can be dated by pottery to the early 14th century or later. A tentative dendrochronological date for the revetment gives a *terminus post quem* of 1328 and there is documentary evidence for waterfront activity in the late 1330s, associated with defensive works at the start of the Hundred Years War. Material from the silting in front of the group C2 revetment (Group C1) can also be dated to the early to mid 14th century by the pottery. These deposits produced seven knives, a pair of shears and thirteen scabbards.

(ii) Group B

Material from the robbing of a structure in front of the timber revetment can be dated by pottery between *c.*1380 and *c.*1420 and included a knife and three scabbards.

DUK77: 2–7 Dukes Place (Fig.1 No.5)

Excavations at Dukes Place in 1977 disclosed a stone-lined cess-pit (Webster and Cherry 1978, 176). In the medieval period this pit would have been within the precinct of the priory of Holy Trinity Aldgate. The deposit was dated by pottery to the mid to late 14th century and produced glassware and textiles of high quality. A knife and a scabbard were also found.

FLE82: 140–3 Fetter Lane (Fig.1 No.6)

Excavations in 1982 revealed a rubbish pit containing a small medieval pottery assemblage (Youngs, Clark and Barry, 1983, 193). The pottery types present include two types found in the late 14th century which are rare or absent in early 15th-century deposits, and one which came into use *c.*1400. If all three vessels were in contemporary use then a date in the first quarter of the 15th century would seem likely for this group, and therefore for the knife found with it.

LH74 and LUD82: Ludgate Hill (Fig.1 No.7)

Excavations of the city ditch at Ludgate Hill in 1982 showed that where it abutted the street at Ludgate Hill it contained a single-period dumped deposit (Youngs, Clark and Barry, 1983, 194). This was confirmed by the discovery of sherds from the same pottery vessel throughout the excavation. Dating evidence consists of a coin minted 1302–10 while documentary evidence shows that the area was occupied by houses by 1340 (T Dyson, pers. comm). The deposit produced seven scabbards. A previous excavation in the area in 1974 sampled what was probably the same deposit and produced two further scabbards (LH74).

Further north the 1982 excavation showed that the ditch here seems to have been partly filled in the mid 13th century. The 1974 excavation produced a scabbard from what may be the same deposit.

OPT81: 2–3 Cross Keys Court (Fig.1 No.8)

Excavations in 1981 at Cross Keys Court showed that there had been a substantial rise in ground level during the medieval period due to the dumping of refuse on the site (Youngs and Clark, 1982, 192). The pottery from these layers includes much 14th-century material, as well as a number of late 12th-century sherds. Later activity on the site, including metalworking, may be dated to the 15th century. The knife included in this publication was found in a layer containing pottery of all dates from the late 12th to the 15th centuries.

POM 79: General Post Office site, Newgate Street (Fig.1 No.9)

Excavations in 1979 on the site of the new British Telecom building revealed a stone-lined cess-pit of 14th-century date (Webster and Cherry, 1980, 253). The finds assemblage from the pit was small

but composed largely of smashed pots. This assemblage probably dates to the early to mid 14th century, the probable date of the knife from the pit (No.294).

PCD59: The Public Cleansing Depot (Dowgate) (Fig.1 No.10)

Assemblages dated by pottery to the middle of the 14th century and closely comparable in composition with those from other waterfront revetment dumps were recovered under salvage conditions in 1959 at Dowgate. The finds included three scabbards.

SH74: Seal House (Fig.1 No.11)

The excavation at Seal House produced a medieval sequence starting in the late 11th to early 12th century with a foreshore deposit overlying the timbers of a Roman quay (Schofield, 1975, 53–7; Morgan and Schofield, 1978, 223–38). Small groups of 12th century date were recovered from the succeeding revetment dumps together with large groups of the early and mid 13th century.

(i) Waterfront I
The earliest dump was associated with a collapsed and robbed revetment, waterfront I, from which a dendrochronological date of 1133 or later was obtained. One knife (No.3), was found in the dump but there is the possibility of later 12th and early 13th century contamination, since sherds of this date were noted in the pottery assemblage.

(ii) Waterfront II
The second dump was found behind a timber revetment which was partially intact. A date of 1163–92 for the felling of the latest timber was obtained from the revetment. The pottery assemblage appears to be of one date, containing no obvious residual or intrusive sherds and the deposit produced one knife (No.1).

(iii) Waterfront III
The third dump was found behind an *in situ* revetment. A date of 1193 or later was obtained for the felling of the latest timber in the revetment. The dump was cut through to insert a timber-lined drain from which a date of 1203 or later was obtained by dendrochronology. The deposit produced two knives, two pairs of shears and four scabbards. Five knives and four scabbards were found in building levels contemporary with the use of waterfront III (Nos.16, 17, 19, 22, 23, 374, 375, 377, 380).

(iv) Waterfront IV
The latest excavated dumps at Seal House postdate the waterfront III revetment and were found on either side of a large mortared stone wall foundation, resting on the foreshore. Three groups were distinguished on stratigraphic evidence but are all probably of one date. Pottery is the only dating evidence and suggests a date of *c.*1250 for the one scabbard, published as unstratified (No.481).

SWA81: Swan Lane (Fig.1 No.12)

The 1981 excavation and watching brief at Swan Lane uncovered an almost complete sequence of activity on this site from the late Saxon period to the middle of the 15th century (Youngs and Clark, 1982, 193; Youngs, Clark and Barry, 1983, 194–5).

(i) The late 12th-century waterfronts
Immediately above a late 11th to early 12th-century foreshore deposit were revetment dumps containing late 12th-century pottery. These were observed both in the excavation and subsequent watching brief and had a wide extent. In virtually every instance the timber revetment itself had been destroyed to re-use the timbers, so that the distinction between one dump and the next was unclear. There is little sign from the associated finds of any distinction in date between these dumps. The latest dumps were found behind *in situ* revetment walls. Three coins from these dumps indicate a deposition date later than 1180. Dendrochronological analysis by J. Hillam and C. Groves has shown that timbers of mid 12th century or later date underlie the earliest dumps. The deposits, which produced six knives, a pair of shears and a scabbard, can be broadly dated to the second half of the 12th century.

(ii) The mid 13th-century waterfronts
In front of the late 12th-century revetments, and separated from them by a series dated to the early

13th century by pottery, were dumps datable to the mid 13th century, found behind *in situ* timber revetments. The finds include one short-cross penny and one long-cross penny, consistent with the evidence of the pottery for a mid 13th century deposition date. The dumps produced 4 knives, a pair of shears and a scabbard.

(iv) The late 13th-century waterfronts
The most productive dumps found at Swan Lane lay in front of the mid 13th-century revetments. A large series of coins and tokens was recovered, showing that the waterfront across the middle part of the site was reclaimed at a single period, if not as a single operation. Coin-dating alone suggests a date between *c.* 1270 and *c.* 1279 for the deposition of the dumps. The pilgrim souvenirs suggest a date after 1270, and possibly later than 1280. The dumps produced eighteen knives, two pairs of shears, a folding knife and thirteen scabbards.

(v) The early 15th-century waterfronts
In the extreme south-east corner of the site large groups of finds were recovered from either side of a timber revetment. Those behind the revetment date to the very end of the 14th century or to the beginning of the 15th century, recently confirmed by a dendrochronological date of 1394 or later for the base plate of the revetment. The dump produced three knives. The deposits in front of the revetment (which could be divided into those from the foreshore and those from the revetment dump above) produced thirteen knives and can be dated by coins to 1422 or later. The latest coin came from the foreshore but analysis of the lead tokens show that the dump contains a higher proportion of later types. It is likely that the foreshore contains material accumulated between *c.* 1400 and *c.* 1430, while the overlying dump contains mainly material dating closer to *c.* 1430. The absence of coins of Henry VI is thought to preclude a later date for either deposit.

TL74: Trig Lane (Fig. 1 No. 13)

The Trig Lane waterfront sequence, excavated between 1974 and 1976, extends from *c.* 1250 to *c.* 1440 and provides large dated finds assemblages of late 13th-century, late 14th-century and mid 15th-century date (Milne and Milne, 1980).

(i) Groups 2 and 3
The earliest large groups of finds came from dumping behind the G2 revetment. Only the base-plate of this waterfront remained, the G3 superstructure having been rebuilt about 20 years later. The pottery from the dump associated with G3 is remarkably similar to that from G2, including some sherds from the same vessels. This suggests that the G3 finds are in fact derived from the G2 dump, which was dug out and then backfilled when the back-braces of the G3 waterfront were inserted. The deposit contained three scabbards, which probably date to *c.* 1270, but may possibly date to *c.* 1290.

(ii) Group 7
A substantial foreshore in front of the G3 revetment was sealed by the dump behind the G7 structure. There is no independent date for G7; the date of *c.* 1340 given in the excavation report is based on a combination of pottery dating and an estimation of the time needed after *c.* 1290 and before *c.* 1360 for the foreshore to accumulate. The dump contained nine knives, four pairs of shears, a pair of scissors and a scabbard.

(iii) Group 10 and 12
A further advance of the waterfront was represented by the G10 revetment, which sealed a foreshore deposit. The G10 dump is dated by dendrochronology to *c.* 1360 and contains three knives and three scabbards (Nos. 82, 110, 128, 453–4, 459). It was repaired over part of its length in *c.* 1430 (G12). Examination of the pottery from G12 shows that this dump is composed mainly of redeposited spoil from G10, although dendrochronology shows that it was a repair of the G10 waterfront dated *c.* 1430. The knife from G12 could therefore date either to *c.* 1360 or *c.* 1430.

(iv) Group 11
A large group of finds comes from the dump behind the G11 revetment, dated *c.* 1380 by dendrochronology, jettons and pilgrim souvenirs. Amongst the finds are five knives, (Nos. 68, 253–5, 277).

(v) Group 15
The foreshore in front of the G11 revetment was examined over a wide area and is dated *c.* 1380–*c.* 1430 by jettons and pilgrim souvenirs. Eight

knives (Nos.88, 104, 107, 149, 175, 250–2) were also found in this deposit. The dump above this foreshore was associated with a stone river wall, G15, resting on a timber base-plate, dated *c.*1440 by dendrochronology. It produced eight knives, four pairs of shears and a scabbard.

TUD78: Tudor Street (Fig.1 No.14)

Excavations on the site of Bridewell Palace showed that the area had been under water until the early 15th century. The unstratified scabbard (No.478) was probably deposited in river silt during the 14th century.

Manufacturing techniques

JANE COWGILL

There is no archaeological evidence from London for the production of any of these artefacts and knowledge of the manufacturing methods employed has therefore been gained primarily from an examination of the finished objects. This has been supplemented by a brief appraisal of medieval documentary records (pp. 32–34). For clarification, the terms used in the text are shown on Figures 2–4.

The Knives, Shears, Scissors and Folding Knives

All the metal objects were studied using radiography, and the resulting X-radiographs reveal many details of manufacture, for example traces of solder or scale rivets. Over two thirds of the makers' marks are not visible except by this means.

The non-ferrous metals (decoration, inlaid makers' marks and fittings) were qualitatively analysed by Paul Wilthew at the Ancient Monuments Laboratory, using energy dispersive x-ray fluorescence, which is non-destructive (Wilthew 1984a; for a simple description of the technique, see Tate 1984). To avoid contamination from corrosion, the areas to be analysed were cleaned, but low levels of copper, lead and, sometimes, zinc were often detected, even on ferrous areas. They are almost certainly the result of contamination during burial. Using this method an area of about one square centimetre on the surface of the object could be examined. This is too large an area for the composition of adjacent non-ferrous metals on the artefacts to be determined and for this reason solders and end plates composed of more than one copper alloy could only be given non-specific identifications (for example No.261)

It was possible to examine a small sample of the iron tools, ten knives and five shears, to show both the exact method of construction and the quality of the materials used (Appendix 1). Blades were only considered suitable if the full length survived in good condition, so that several sections could be removed. Those selected were all as similar as possible in form, but from different periods, to emphasise any changes in technique through time. Nevertheless, both whittle- and scale-tang knives were chosen from the late 14th and 15th-century groups. The results show not only the precise methods of construction employed but also variations in the quality of the finished tools.

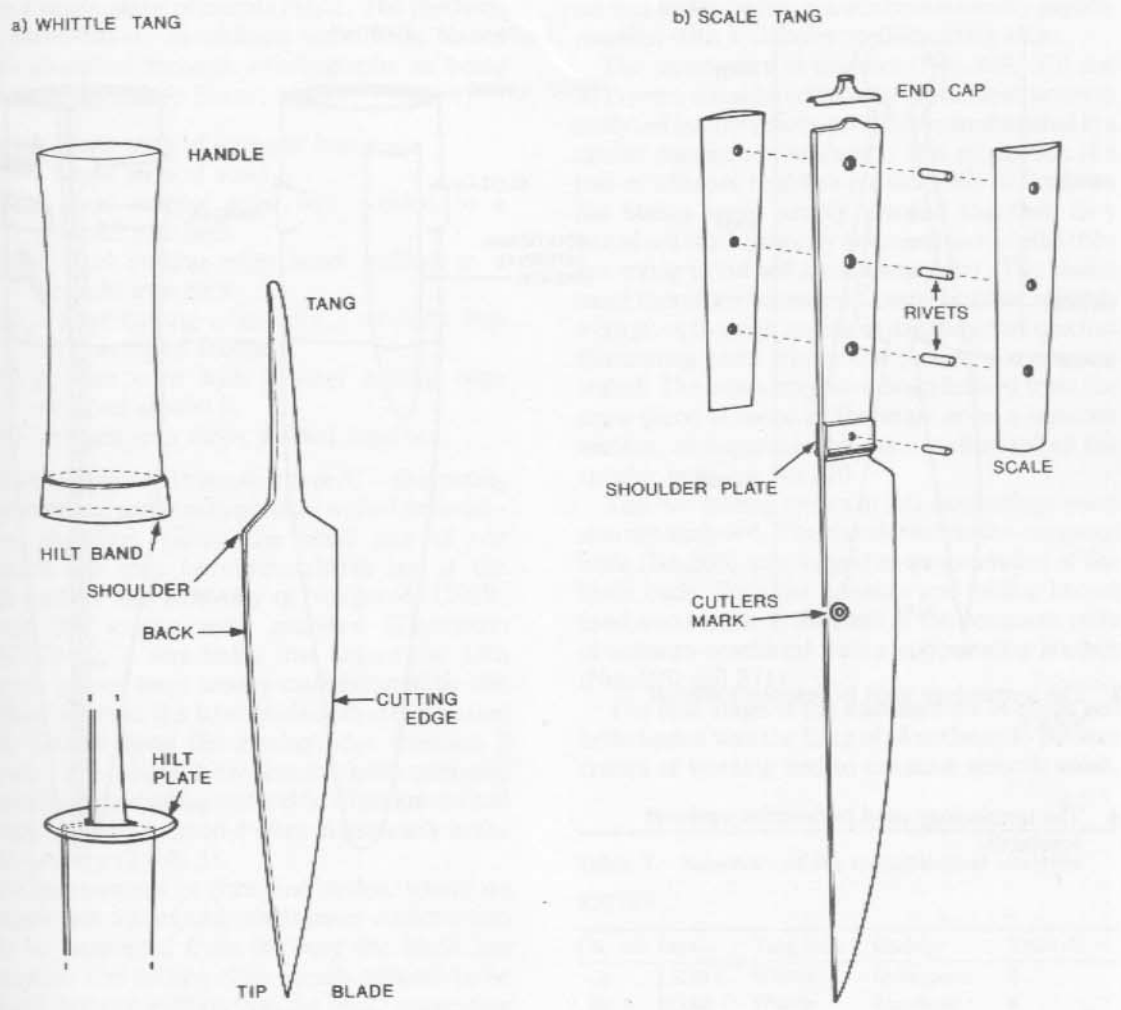
BLADES

I Forging

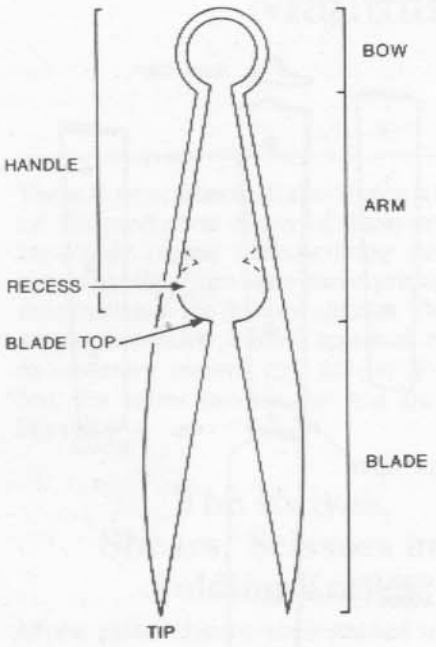
The blades were forged mainly from wrought iron, but as this was not hard enough to give a good cutting edge, an additional harder iron section was often built into them. Wrought iron cannot be hardened by heat treatment, whereas irons with a higher carbon content (carbon steels) can be tempered and hardened (Hodges 1964, 80). For simplicity wrought iron is here referred to as 'iron', and irons with a higher carbon content as 'steel'; for the exact terms see Appendix 1.

The carburisation of iron is a slow process and it was not economical for the individual smith to produce his own steel, which was expensive and sparingly used (Tylecote 1981, 45–6). It was usually imported from Sweden, Russia or Spain, since native ores were generally unsuitable for conversion during the medieval period (ibid, 44).

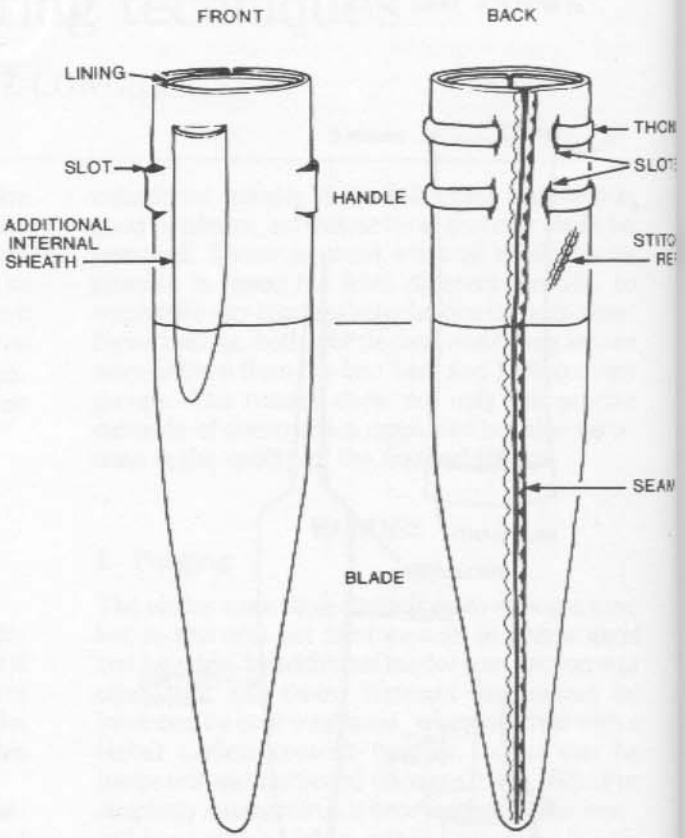
The blade and tang of a knife, and the arms and blades of shears, were forged from a single piece of iron to which the steel cutting edge was welded before shaping. The metals were cooled rapidly, or 'quenched', to increase the hardness of the steel. This made the steel brittle, and therefore it was sometimes gently heated, or 'tempered', to increase resilience. (For further details see Hodges 1964, 84–5.) Metallography has revealed many different ways of combining iron and steel within a knife blade, summarised by Tylecote (1981, 47). Five combinations were recorded within the analysed sample, as well as tools made



2 The main components of a medieval knife:
(a) with whittle tang,
(b) with scale tang.

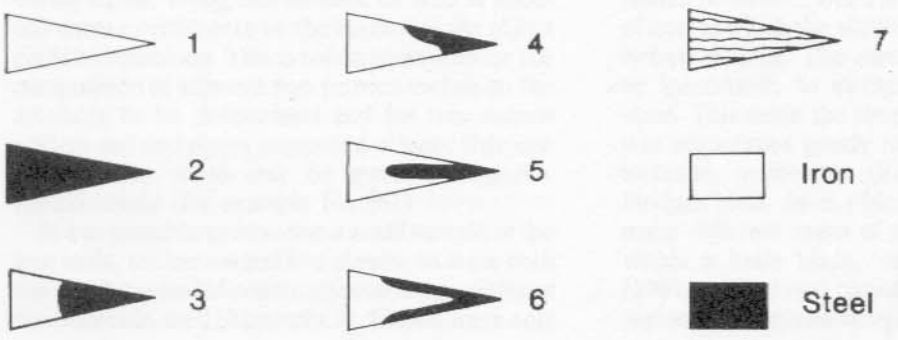


3 The terminology used to describe medieval shears.



4 The terminology used to describe medieval scabbards.

5 Methods of combining iron and steel in edged tools.



from a single piece of metal (Fig.5). The methods are listed below. In addition some knife blades were identified through x-radiographs as being pattern welded (see below, p. 16):

(1) a single strip of wrought iron
(2) a single strip of steel
(3) a steel cutting edge butt welded to a wrought iron back
(4) a steel cutting edge scarf welded to a wrought iron back
(5) a steel cutting edge with a wrought iron back wrapped around it
(6) an iron core with a steel cutting edge wrapped around it
(7) wrought iron strips welded together

No examples of Tylecote's type C – alternating layers of steel and iron to produce a piled material – were identified. Given the small size of our samples this may be unremarkable but at the 10th-century and later city of Novgorod, USSR, where 304 knives were analysed (Thompson 1967, 73–4), it was found that before the 13th century knives were usually manufactured by this method whereas the later blades often had a steel strip welded along the cutting edge (method 3 above). The single 12th-century knife analysed was constructed using method 5, while knives and shears made by method 4 were in use early in the 13th century (Table 3).

On fragmentary or corroded blades, where no analysis was attempted, multi-piece construction may be suspected from the way the blade has corroded. The cutting edge usually appears to be in much better condition than the back, suggesting that methods 4, 5 or 6 were used (Pl.1). This is clearly visible on knives and shears of all dates and has been noted in the illustrations (for example knives Nos.27 and 106, and shears No.337). The existence of two or more metals can also sometimes be seen on x-radiographs, when some sections of the blade appear denser than the rest (Pl 2).

The metallurgical analysis of the shears shows a greater degree of standardisation in manufacture with method 4 predominating (Table 3). The arms and bow were probably made from the same piece of iron as the blade. A number of characteristics of shear blades remain unchanged throughout the medieval period, the most notable being that the left blade always overlaps the right. The cutting surface had to be flat, the reverse is usually slightly rounded with a chamfer at the cutting edge.

The three pairs of scissors (Nos.369, 370 and 371) were considered too rare to be destructively analysed but they were probably manufactured in a similar manner to the shears. The production of a pair of scissors requires considerable skill. If two flat blades were simply pivoted together they would not work properly because the material they are trying to cut will force them apart. The blades must therefore be made to curve or twist inwards from pivot to point, so that in use they only touch at the cutting point where the pressure is concentrated. The bows may have been formed from the same piece of metal as the arms or as a separate section, as suggested by the x-radiograph of the circular bows on No.370.

The two folding knives in this assemblage were also not analysed. The thumb rest on the complete knife (No.309) was forged as an extension of the blade back. Both the scissors and folding knives used iron pivots, in the case of the complete pairs of scissors combined with a copper alloy washer (Nos.370 and 371).

The final stage in the manufacture of shear and knife blades was the filing of all surfaces to remove traces of working and to create a smooth finish.

Table 3. Summary of the metallurgical analysis.

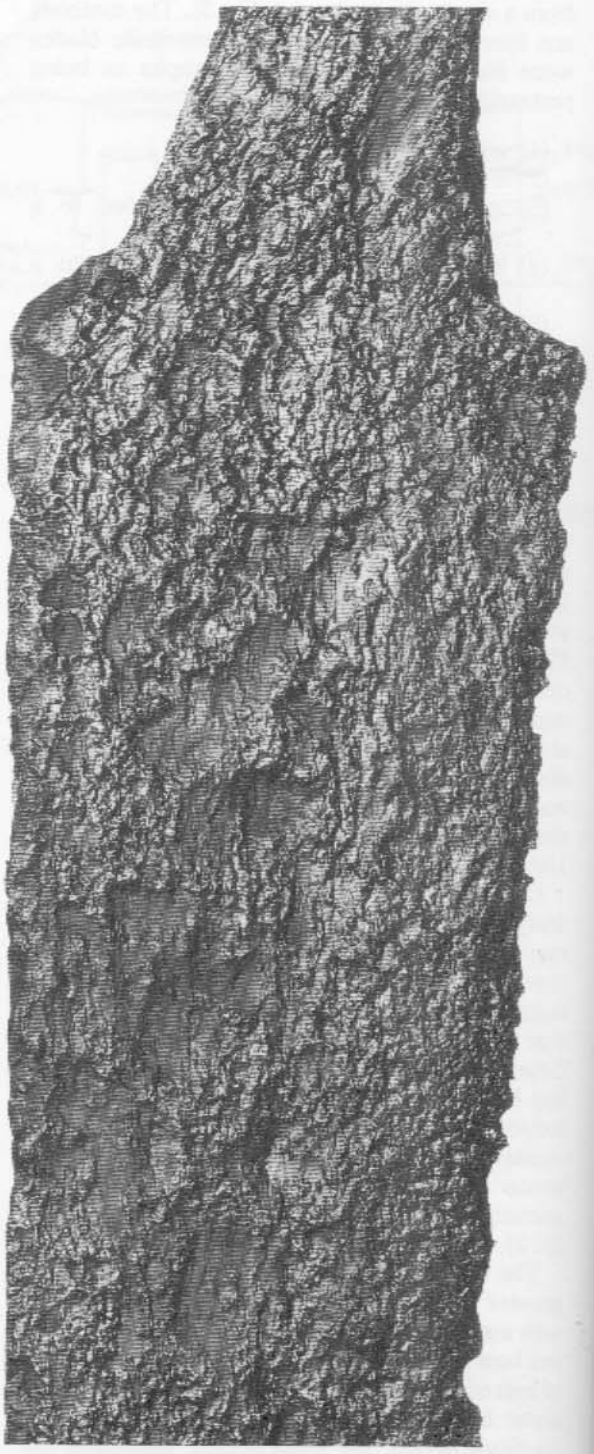
KNIVES

Cat. no.	Date	Tang type	Quality	Type
2	L12th C	Whittle	Quite good	5
12	M13th C	Whittle	Excellent	4
16	E13th C	Whittle	Very poor	1?
26	L13th C	Whittle	Good	3
44	M14th C	Whittle	Poor	6
63	M14th C	Scale	Excellent	6
84	L14th C	Whittle	Very poor	1
121	L14th C	Scale	Very poor	7
258	M15th C	Whittle	Poor	7
266	M15th C	Scale	Good	6

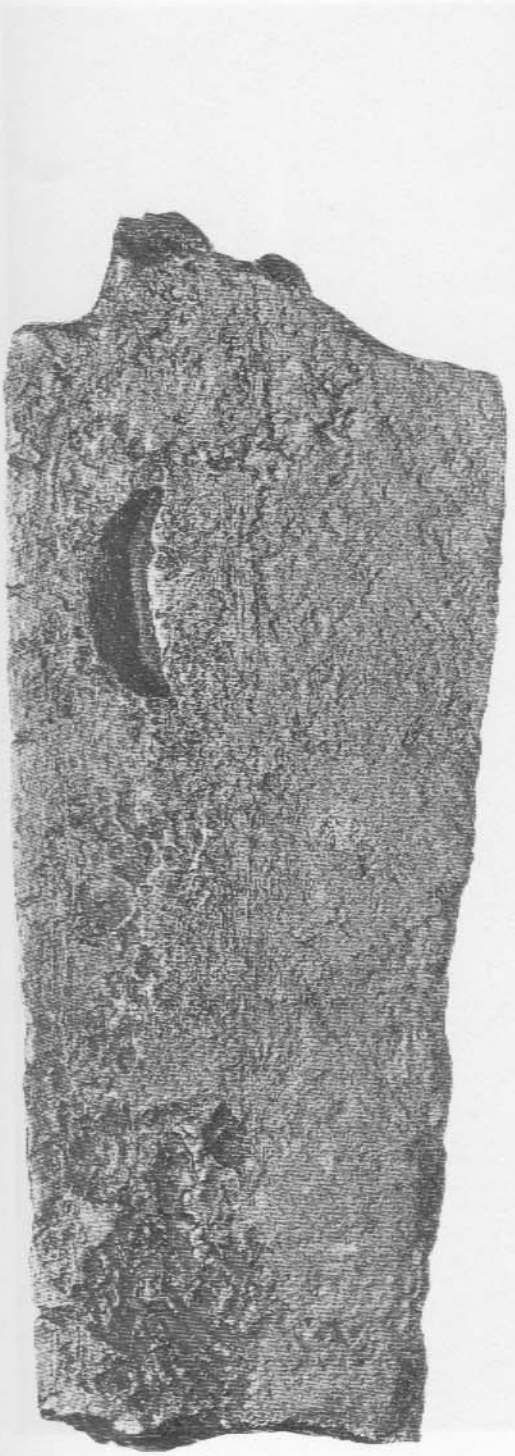
SHEARS

Cat. no.	Date	Quality	Type
313	E13th C	Good	4
320	M14th C	Quite good	1
325	L14th C	Poor	2
359	M15th C	Excellent	4
364	Unstrat.	Good	4

PLATE 1
Differential corrosion on knives and shears caused by variation in metal composition.
(a) Knife No.27
(b) Knife No.31
(c) Shear blade No.311



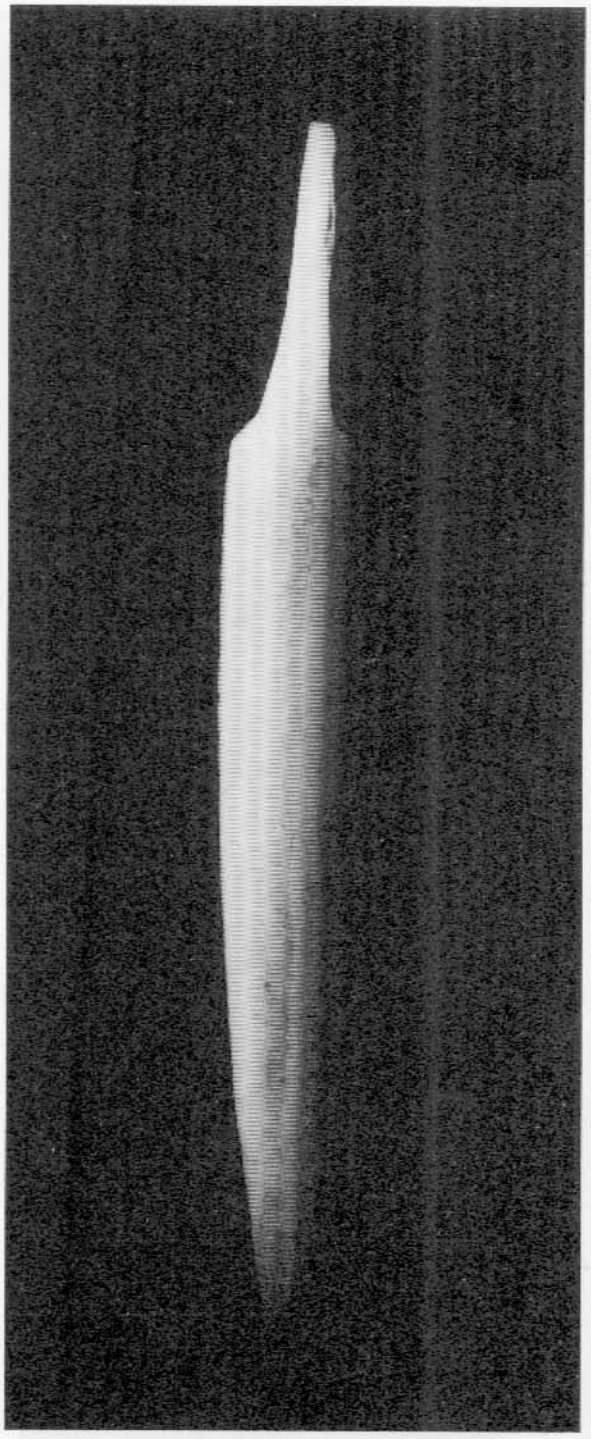
a



b

c

PLATE 2
Evidence for construction revealed by x-radiography.
(a) The different density of areas on blade No. 233
(b) Slag lines on Blade No.54.



a