A REVIEW OF ROMAN LEAD-ALLOY MATERIAL RECOVERED FROM THE WALBROOK VALLEY IN THE CITY OF LONDON

C.E.E.JONES

INTRODUCTION

There has been a long-held assumption as to the nature of a number of Roman lead-alloy objects recovered from the early stratified deposits of the stream bed of the River Walbrook, in the City of London. This arose from entries in the accession register of the former Guildhall Museum and subsequent publications referring to the material as 'pewter'. In this paper 'pewter' is defined as a tin-rich alloy which metal analysis has shown for Romano-British tablewares of the 3rd and 4th centuries to be a mix of some 60% –80% tin and 40% –20% lead, with copper, antimony, nickel, iron and silver present in minute and variable quantities (Hughes 1977, 42; Tylecote 1962, 69; Peal 1967, 20).

When first taken into the Guildhall Museum collections the lead-alloy objects from the Walbrook received minimal attention. Some of the finer, more complete items have been mentioned since in publications (Chapman 1977, 61; Hatcher and Barker 1974, 19; Merrifield 1969, 163; Peal 1967, 19) but the group as a whole has not received detailed examination. With the assistance of both the Museum of London Conservation Laboratory and the British Museum Research Laboratory, a programme of analysis was carried out on a number of Walbrook items in order to ascertain their precise metal composition. It was hoped that these results would determine the exact nature of the metal alloy and also help resolve a dating anomaly regarding the development date of the Romano-British pewter industry.

The material under review comes from a number of different Roman deposits along the valley of the Walbrook and it has been demonstrated by a study of the coin sequence that these deposits on the Bucklersbury House site terminated *c.* AD 155 (Merrifield 1962, 48). In addition it has been argued that this area of the Roman settlement was at that time an industrial rather than residential area, and it had been assumed that the 'pewter' recovered from the lowest levels of the watercourse was either manufactured or traded in London (Chapman 1977, 61). This is some 150 years earlier than the date normally suggested for the *floruit* of the pewter industry in Roman Britain (Peal 1967, 19; Hatcher and Barker 1974, 18). With the exception of the Walbrook material, all known Romano-British pewter can be assigned to between *c.* AD 250 and the beginning of the 5th century (Peal 1967, 21, 24; Hatcher and Barker 1974, 10).

THE MATERIAL

Fifty-three objects in total were examined, of which forty-seven came from the Walbrook Valley deposits. These range from fully formed domestic ware items to pieces of scrap metal. They are listed in Figs. 1 and 2.

Acc. No.	*Object*	*Provenance*	*Date received into collection*
A94	spoon bowl	Angel Court	1911
A5098	misc. object	Angel Court	1913
A5099	misc. object	Angel Court	1913
14276	disc	Bank of England	1936
14277	disc	Bank of England	1936
14278	disc	Bank of England	1936
14280	lead solder	Bank of England	1936
14575	lamp-holder	Bank of England	1937
16459	metal strip	Bank of England	1943
16775	rod ?handle	Bank of England	1935
16776	rod ?handle	Bank of England	1935
18185	metal strip	Walbrook excavations	1954
18220	plate	Walbrook excavations	1954
18221	plate	Walbrook excavations	1954
18248	lead ?sinker	Walbrook excavations	1954
18342	scrap	Walbrook excavations	1954
18734	ornament/dolphin	RMLEC temple site	1954
19038	scrap	Bucklersbury House site	1955
19268	finger ring	Bucklersbury House site	1955
19279	canister	Bucklersbury House site	1955
19316	?weight	Bucklersbury House site	1955
19357	finger ring	Bucklersbury House site	1955
19432	spoon	Bucklersbury House site	1955
19459	fitting	Bucklersbury House site	1955
19490	spoon	Bucklersbury House site	1955
19504	misc. disc	Bucklersbury House site	1955
19634	misc. disc	Bucklersbury House site	1955
19756	misc. disc	Bucklersbury House site	1955
19759	misc. disc	Bucklersbury House site	1955
19793	patera handle	Bucklersbury House site	1955
19800	ligula	Bucklersbury House site	1955
19949	scrap	Bucklersbury House site	1955
19972	misc. disc	Bucklersbury House site	1955
20373	spoon	Bucklersbury House site	1957
20376	misc. disc	Bucklersbury House site	1957
20378	misc. disc	Bucklersbury House site	1957
20838	bowl	Bucklersbury House site	1957
20839	canister	G.M. excavation Walbrook	1957
20841	lead weight	Bucklersbury House site	1957
20853	misc. object	Bucklersbury House site	1957
20884	scrap	Bucklersbury House site	1957
20896	scrap	Bucklersbury House site	1957
20969	scrap	Bucklersbury House site	1957
21004	scrap	Bucklersbury House site	1957
21044	casket fitting	Bucklersbury House site	1957
21070	inscribed tag	Bucklersbury House site	1958
23318	scrap	Bucklersbury House site	1963

Fig. 1 Tin and Lead-alloy Material from the Walbrook Valley in the Museum of London Collections

Acc. No.	*Object*	*Provenance*	*Date received into collection*
A14690	bowl/lamp filler	unstratified from Old London Bridge site	1914
A19574	plate	foreshore find from Isleworth —instratified	1918
1421B	lamp holder	ex Smith collection	
8133	bowl		
24766	canister	unstratified from Upper Thames Street	1966
79.82	lamp base	Royal Exchange site	

Fig. 2 Non-Walbrook material included for comparison

THE ANALYSIS

A limited number of lead alloy objects was selected for two types of non-destructive analysis of their metal composition. The British Museum Research Laboratory undertook the X-ray fluorescence analysis of sixteen artefacts, ten of which came from firmly established Walbrook contexts. The remainder, included for comparison, came from unprovenanced or unstratified provenances in London. X-ray fluorescence is a surface analysis technique that reveals component elements present in the artefact. Measurement of the concentrations of detected elements was carried out and the figures obtained were compared to those for lead, tin and leaded bronze alloys of known composition. The analyses of the sixteen items revealed lead, tin, iron and copper present. Antimony, known to be an element present in ancient pewter (Hughes 1977, 42) was not detected in these tests for if present, it was present in quantities too small to be registered on the equipment used (Hughes, pers.com.). The results of the X-ray fluorescence analysis were programmed into a computer and each element recorded as a percentage of the total 100% (Fig.3).

Spot tests, the second form of analysis, involve assessing the reactions of metals to specific chemicals and this was undertaken by Conservation Officers in the Museum of London's Conservation Laboratory. This is a widely accepted method for discovering the presence of certain metal(s) in an object when the precise (and more expensive) X-ray fluorescence facilities are unavailable. The opportunity was taken to test its validity as a tool for accurately determining the nature of lead alloys and tests were carried out on the sixteen selected artefacts. Unlike X-ray fluorescence however, spot tests do not produce quantifiable results which poses a problem for precise alloy identification. In some instances the results showed disproportionate readings for the previously established tin to lead ratio. This bias derives from the fugitive nature of lead which produces a chemical reaction far more readily than tin. Thus in the chemically-based spot tests a disproportionately strong reaction may be produced from a very small amount of lead. (The results are noted in the catalogue using terms such as very strong, strong and negative). On the basis of spot testing alone therefore it is not possible to say if an item is high grade tin with a small proportion of lead, or pewter following the definition adopted by Hughes (1977) and Tylecote (1962).

Object	*Acc.No.*	*% tin*	*% lead*
Canister	19279	99.0	0.12
	20839	98.9	0.48
	24766	96.8	2.46
Bowl	20838	98.6	1.31
	8133	79.6	20.0
	A14690	0.6	99.1
Lamp base	79.82	0.4	98.4
	1421B	2.4	97.3
	14575	0.07	99.7
Plate	18220	96.2	3.54
	18221	97.9	0.41
	A19574	76.1	23.6
Spoon	19490	75.0	23.5
	20373	72.2	25.4
	A94	75.4	19.7
Ligula	19800	97.2	2.55

Fig. 3 Results of X-ray Fluorescence Analysis on Selected Objects (trace elements not included)

The readings obtained by X-ray fluorescence analysis of the London material fall into three groups: tin with a small quantity of lead (0.1%–3.5%); lead with a small percentage of tin (0.07%–0.7%); and pewter, an alloy with large proportions of both metals in the range 72%–79% tin and 20%–30% lead. It is interesting to note that the spoons are all of pewter, the lamp bases are lead and the canisters are tin with minute amounts of lead but that the bowls and plates do not form such discrete groups with one bowl made in each of lead, tin and pewter, and two plates of tin and a third in pewter.

Spoon (Acc. No. 19490) is 75% tin: 20% lead, i.e. pewter. This item comes from the Bucklersbury House site and is said to be from the streambed and therefore from a 1st to early 2nd-century context though it should be noted that stylistically it belongs to a somewhat later period (Strong 1966, 177). From the X-ray fluorescence it is shown that spoons Acc. Nos. A94, 19490 and 20373 (Fig. 7) are all pewter and a fourth spoon bowl (Acc.No. 19432) of the later cochlea form (Strong 1966, 177) could also be pewter, the lead and tin elements both showing up strongly in spot tests.

Plates (Acc. Nos. 18220 and 18221) (Fig. 6) recovered during excavations in association with 1st to 2nd-century pottery, are clearly tin with only small quantities of lead present. This accurate identification of the metal resolves the problem voiced by Peal (1967, 21, 24, 25) and reiterated by Hatcher and Barker (1974, 19) of pewter forms appearing in London's archaeological record some one hundred years or so before the generally accepted date of the beginning of pewter manufacture in Britain. However, although plate Acc. No. A19574 (Fig. 6) is pewter (the lead-tin ratio falls within the range noted by Tylecote (1962, 69),) the piece is an unstratified find from the River Thames near Isleworth, included for comparison. Stylistically it fits into Peal's 3rd and 4th-century rim types (1967, 26, 27) and as a pewter item is not therefore out of place in the dating sequence for Romano-British pewter tableware established from other stratified finds in Britain (Tylecote 1962, 68).

CONCLUSION

The results obtained from submitting a number of Roman items from the Walbrook Valley deposits to X-ray fluorescence analysis have shown them to be, not of pewter, but of either tin or lead, and it should now be considered that other stratified lead-alloy objects of late 1st and 2nd-century date that were originally thought to be 'pewter' are in fact essentially tin.

There is no evidence from the material examined to support the argument that there existed a pewter industry active in *Londinium* during the first one hundred years or so of Roman occupation. However, there is now firm evidence on which to base the suggestion that a tin industry was active until *c.* AD 155 in the Walbrook area producing or trading in domestic and tableware items, for example plates (see Acc.Nos. 18220 and 18221) and canisters (Acc.Nos. 19279 and 20839) (Figs. 5,6). The spoons subjected to X-ray fluorescence (Acc.Nos. 19490, 20373 and A94) have already been noted as being the only pewter items amongst the Walbrook material examined. However these spoons (and also a fourth Acc.No. 19432) do not in themselves constitute sufficient evidence upon which to postulate an early Romano-British pewter industry in *Londinium* especially as they are of 2nd to 3rd-century forms (Strong 1966, 177) and their find spots and stratification are open to question, being workmen's finds rather than securely dated excavated items.

The group of objects submitted for X-ray fluorescence analysis from other London sources provided valuable comparative data (see Fig. 2). The two pewter items, plate Acc.No. A19574 and bowl Acc.No. A14690, (Figs. 5, 6) are of a composition within the range of other Romano-British pewter ware (Fig. 4) with suggested mid 3rd and 4th-century dates,

Provenance	*Object*	*% tin*	*% lead*
Appleshaw (Hants.)	'fish' dish	99.18	0.14
	circular dish	90.55	8.31
	small dish	72.36	26.09
	circular dish	64.75	34.66
	cup	76.41	23.08
	flanged cup	70.58	27.62
Icklingham (Suffolk)	tableware	79.0	21.0
	octagonal dish	45.75	53.34
Mildenhall (W. Suffolk)	bowl	74.3	25.8
	bowl	57.0	43.0
Corbridge (Northumberland)	ring	66.79	33.53
	strip	94.50	4.50
High Rochester (Northumberland)	cup	97.7	2.73
Camerton (Somerset)	plate	40.5	—
Brislington (Somerset)	cup	54.8	45.38
Abington Piggots (Herts.)	dish	62.3	37.7
	dish	70.0	30.0
Southwark (London)	dish ('MARTINVS')	72.9	26.75
Walbrook (London)	circular box	99.0	0.12
	circular box	98.9	0.48
	bowl	98.6	1.31
	lamp base	0.07	99.7
	plate	96.2	3.54
	plate	97.9	0.41
	spoon	75.0	23.5
	spoon	72.2	25.4
	spoon	75.4	19.7
		97.2	2.55
London area	circular box	96.8	2.46
	bowl	79.6	20.0
	bowl	0.6	99.1
	lamp base	0.4	98.4
	lamp base	2.4	97.3
	plate	76.1	23.6
Battersea	ingot	94.0	4.59
	ingot	68.4	31.5
	ingot	67.6	30.9
	ingot	67.4	31.1
	ingot	54.0	43.9
	ingot	50.4	43.3
Corbridge (Northumberland)	ingot (1 lb)	94.78	5.37

Fig. 4 Comparison of the Composition of lead alloy material from Roman Britain

the *floruit* of pewter manufacture in Britain. The ingots from Battersea, dated by epigraphic evidence to the 4th century and the Corbridge ingot, have been similarly analyzed (Hughes 1977). Their various compositions show that ready-made alloys of fairly uniform standards were available to the Romano-British metalworker and their tin and lead content may be compared to the material analysed from the Museum of London collection. The tin canister (Acc.No. 24766) was found in association with pottery of the 2nd to 4th centuries and its tin content (96.9%) is only marginally higher than that for the ingot recovered from the River Thames (BM registration number 91, 2-27, 3) and containing 94% tin.

From the analysis of the material recovered from the Walbrook it is now possible to discount the theory that pewter was present in *Londinium* before the mid

3rd century. The results do, however, indicate lead and tin industries active throughout the Roman period and they also support the evidence obtained from other sites in Roman Britain that high tin alloys were favoured for the production of certain tableware items such as dishes, canisters and plates.

CATALOGUE (*illustrated)

Canisters

*1. Acc.No. 19279: 1st-2nd century AD. Tin.
Canister with small ridge 17mm below rim as if to take lid. Base has circular groove and turning mark.
Decoration: 2 horizontal grooves on external surface near base. Surface polished.
Height 53mm. Diameter 60mm.
Metal composition: (BM Lab 1982) lead 0.12% : tin 99%
Provenance: Bucklersbury House, Walbrook valley.
Chapman, (1977, 58).

*2. Acc.No. 20839: 1st-2nd century AD. Tin
Canister with rebate for lid (missing). Base has circular groove and turning mark.
Decoration: 9 horizontal grooves on external surface; small mark consisting of 2 lines and 2 dots.
Height 68mm. Diameter 62mm
Metal composition: (BM Lab 1982) lead 0.4% : tin 98.9%
Provenance: Walbrook, 1955 excavations.
Chapman, (1977, 58).

*3. Acc.No. 24766: 2nd-4th century AD. Tin
Canister shouldered to take lid (missing). Base shows turning mark.
Decoration: 3 groups of double horizontal grooves on rebate; 3 grooves close together on external surface near base, and groove halfway down body.
Height 81mm. Diameter 62mm.
Metal composition: (BM Lab 1982) lead 2.4% : tin 96.8%
Provenance: unexcavated find in association with 2nd-4th century pottery, Upper Thames Street, London.
Chapman, (1977, 58).

Bowls

*4. Acc.No. 20838: 1st-2nd century AD. Tin.
Small bowl shaped like a truncated cone. Base shows central turning mark. Vessel polished on both surfaces.
Depth 34mm. Diameter 84mm.
Metal composition: (BM Lab. 1982) lead 1.31% : tin 98% (MoL Lab. 1982) lead fairly strong : tin very strong
Provenance: workman's find, Bucklersbury House, Walbrook.
Guildhall Museum booklet, (1954–55, 18)

*5. Acc.No. 8133: Roman. Pewter
Hemispherical bowl on footring with thickened everted rim. Turning mark at centre of inside surface.
Depth 30mm. Diameter 107mm.
Metal composition: (BM Lab. 1982) lead 20% : tin 79.6%
Provenance: unknown.

*6. Acc.No. A14690: Roman. Lead
Small bowl with lip pulled out and down (possibly to aid pouring – a lamp-filler?).
Decoration: beading around rim. On base faint Chi-Rho has been scratched.
Depth 20mm. Diameter (base) 20mm.
Metal composition: (BM Lab. 1982) lead 99.1%: tin 0.6% (MoL Lab. 1982) lead very strong: tin negative
Provenance: unstratified from ballast material dumped at Old London Bridge site.

Plates

*7. Acc.No. A19574: Roman. Pewter.
Flat dish with small footring and wide rim (40mm) which is decorated. Central design on dish consists of 3 engraved concentric circles and punched geometric design.
Diameter 330mm.
Metal composition: (BM Lab. 1982) lead 23.6% : tin 76.1%
Provenance: from River Thames at Isleworth.
Peal, (1967, 24, 25, 27, 31). London Mus. Cat.3 (1930, 120)

*8. Acc.No. 18220: 1st-2nd century AD. Tin.
Undecorated plate with footring and rim (*c.* 10mm wide) thickened at edge. Now mis-shapen.
Diameter of footring 114mm. Diameter of plate *c* 197mm.
Metal composition: (BM Lab. 1982) lead 2.5% : tin 96.2%
Chapman, (1977, 61). Peal, (1967, 24, 25, 27, 31).

*9. Acc.No. 18221: 1st-2nd century AD. Tin.
Plain plate on footring with horizontal rim (*c.* 12mm wide). Circle and dot turning mark on centre of inner surface.
Diam. of footring 115mm. Diam. of plate 196mm.
Metal composition: (BM Lab. 1982) lead 0.41% : tin 97.9%
Provenance: Walbrook excavations 1954.
Chapman, (1977, 61). Peal, (1967, 24, 25, 27, 31).

Lamp bases

*10. Acc.No. 79.82: Roman. Lead.
Circular dish with flat base and incurving sides.
Diam. 111mm. Depth 38mm. Internal Depth 25mm.
Metal composition: (BM Lab 1982) lead 98.4% : tin 0.04%.
Provenance: Royal Exchange.

*11. Acc.No. 1421B: Roman. Lead.
Small tray on three legs (one now broken).
Length 95mm; width 53mm; depth 20mm.
Metal composition: (BM Lab 1982) lead 97.3% : tin 2.4%.

*12. Acc.No. 14575: Roman. Lead
Holder in form of spoon-like tray. Damage at end of bowl. Tapering handle of square section shows solder-line visible on underside.

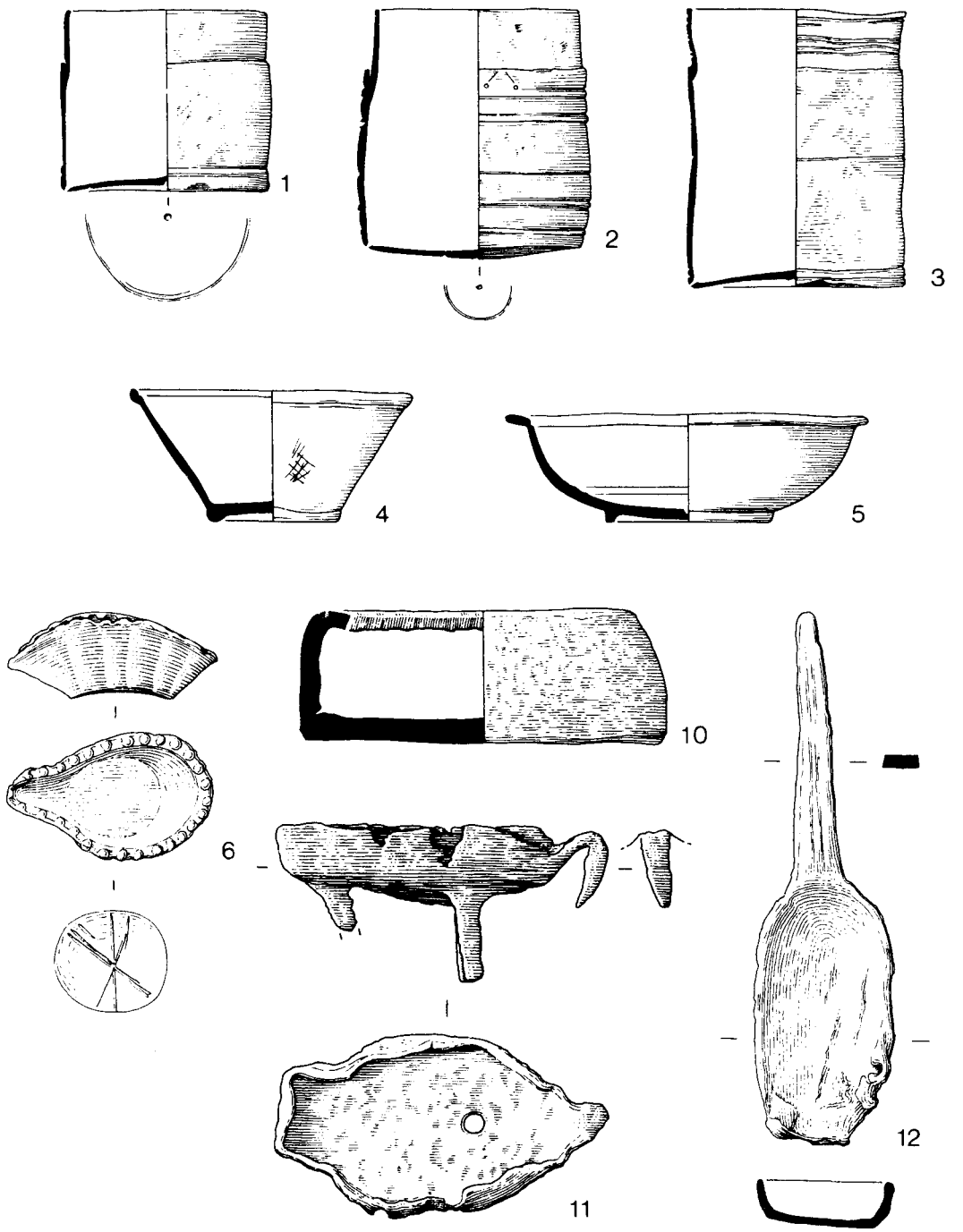

Fig. 5 Roman lead-alloy objects: Canisters, nos. 1 – 3; bowls, nos. 4 – 6; lamp bases, nos. 10 – 12 (1/2)

Overall length 160mm. Bowl width 40mm.
Metal composition: (BM Lab 1982) lead 99.7% : tin 0.07%. Provenance: Bank of England/Walbrook.

Spoons

*13. Acc.No. A94: Roman. Lead alloy.
Cochlea bowl fragment with remains of floral motif and raised knob in centre of bowl. Section of handle survives.
Overall length 68mm; width of bowl 26mm.
Metal composition: (BM Lab 1982) lead 19.7% : tin 75.4% (MoL Lab 1982) Lead very strong; tin very strong.
Slightly less lead present than normal for pewter composition, though tin present within accepted range. May possibly have been made deliberately as a low grade tin combined with lead and other elements.
Provenance: Angel Court, Walbrook.

*14. Acc.No. 20373: 2nd–3rd century AD. Pewter.
Fiddle-shaped bowl of spoon with ridge just below rim; handle missing.
Length 38mm; greatest width 25mm
Metal composition: (BM Lab 1982) lead 25.4% tin 72.2%.
Provenance: Bucklersbury House, Walbrook.
Chapman, (1977, 61). Guildhall Museum (1954–55, 18).

*15. Acc.No. 19490: 2nd–3rd century AD. Pewter.
Incomplete spoon; the bowl (damaged by heat) is of pewter; handle is of iron.
Fiddle-shaped bowl (see 20373).
Length overall 103mm; bowl length 33mm; width 26mm.
Metal composition: (BM Lab 1982) lead 23.5% : tin 75%. Provenance: Bucklersbury House, Walbrook.
Chapman, (1977, 61). Guildhall Museum (1954-55, 18).

Miscellaneous Objects

*16. Acc.No. 19800: ligula: 1st-2nd century AD. Tin.
Ligula (in 2 pieces) had point at one end and flat scoop at other. Near scoop there is grooved banding as decoration on rod.
Length 115mm (overall).
Metal composition: (BM Lab 1982) lead 2.5%: tin 97%. Provenance: Bucklersbury House, Walbrook.

*17. Acc.No. 18734: dolphin ornament: Roman. Tin.
Small dolphin; tail slightly damaged; groove beneath belly for possible attachment.
Length 77mm; body width 20mm.
Metal composition: (MoL Lab 1982) lead slight: tin strong.
Provenance: Mithraeum, Walbrook.

*18. Acc.No. 19793: patera handle: Roman. Lead alloy.
Cast handle with evidence of repair at terminal end (2 rivets visible and some solder flow). Decoration most clearly visible on sections nearest vessel bowl.
Length 118mm. Width of handle 36mm. Width of arms 79mm.
Metal composition: (MoL Lab. 1982) lead moderate: tin very strong.
Probably tin rather than pewter – see discussion on the limitations of spot testing but also note Harker (1982) who describes a patera handle from Springhead, Kent. In that case the metal alloy is 47.2% lead and 39.8% tin. Outside the percentages used in this paper to define pewter, the alloy used to make the Springhead handle may well be a similar metal mixture as the lead-tin alloy used in the London handle.
Provenance: Bucklersbury House, Walbrook.
Chapman, (1977, 61).

*19. Acc.No. 21044: ornamental fitting: 1st–2nd century AD context. Tin.
Rectangular fitting probably for a casket. One surface has decoration – frieze of arches in relief. Small projections protrude from lower edge.
Length 48mm x 26mm.
Metal composition: (MoL Lab 1982) lead slight: tin strong.
Provenance: Bucklersbury House, Walbrook.
Guildhall Museum (1954–55, 8).

*20. Acc.No. 19459: fitting: Roman. Lead alloy.
Strands of metal in lattice form; probably decoration for a box.
Length 68mm; width 20mm
Metal composition: (MoL Lab 1982) lead strong: tin strong.
Probably tin with low lead content rather than a strict pewter composition. See discussion on spot test analysis.
Provenance: Bucklersbury House, Walbrook.

*21. Acc.No. 19357: finger-ring: 1st-2nd century AD. Lead alloy. Incomplete finger-ring - band broken. Decorative design in shape of St Andrew's cross with a ridge outline and central knob.
Dia. *c.* 16mm; cross 12mm x 10mm
Metal composition: (MoL Lab 1982) lead very strong: tin very strong. Probably tin with low lead content rather than a strict pewter composition. See discussion on spot test analysis.
Provenance: Bucklersbury House, Walbrook.

*22. Acc.No. 19268: finger-ring: 1st–2nd century AD. Tin. Finger-ring formed by a length of wire of which one end if bent round to form a decorative loop.
Dia. *c.* 26mm
Metal composition:(MoL Lab 1982) lead slight: tin very strong.
Provenance: Bucklersbury House, Walbrook.

23. Acc.No. 19432: spoon: 2nd–3rd century AD. Lead alloy. Bowl of cochlea with ridge below lip on inside. Small hole in bowl. Part of handle survives.
Length *c.* 40mm
Metal composition: (MoL Lab 1982) lead strong: tin strong.
Provenance: Bucklersbury House, Walbrook.

24. Acc.No. 21004: lead strip: 1st–2nd century AD.
Strip of lead with 2 hooks protruding from one surface. Function unknown.
Length 117mm; width 13mm.
Metal composition: (MoL Lab 1982) lead very strong: tin very slight.
Provenance: Bucklersbury House, Walbrook.

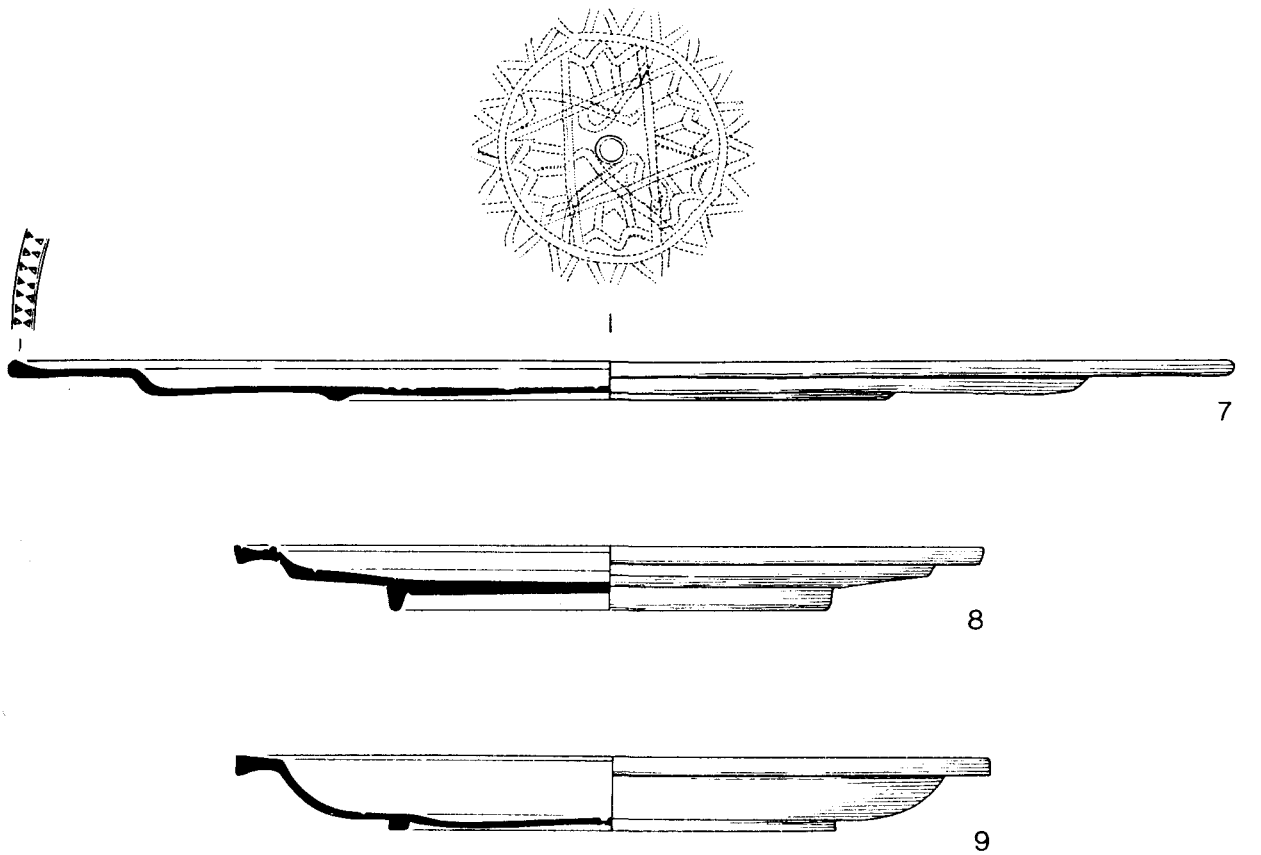

Fig. 6 Roman lead-alloy objects: Plates 7–9 (1/2)

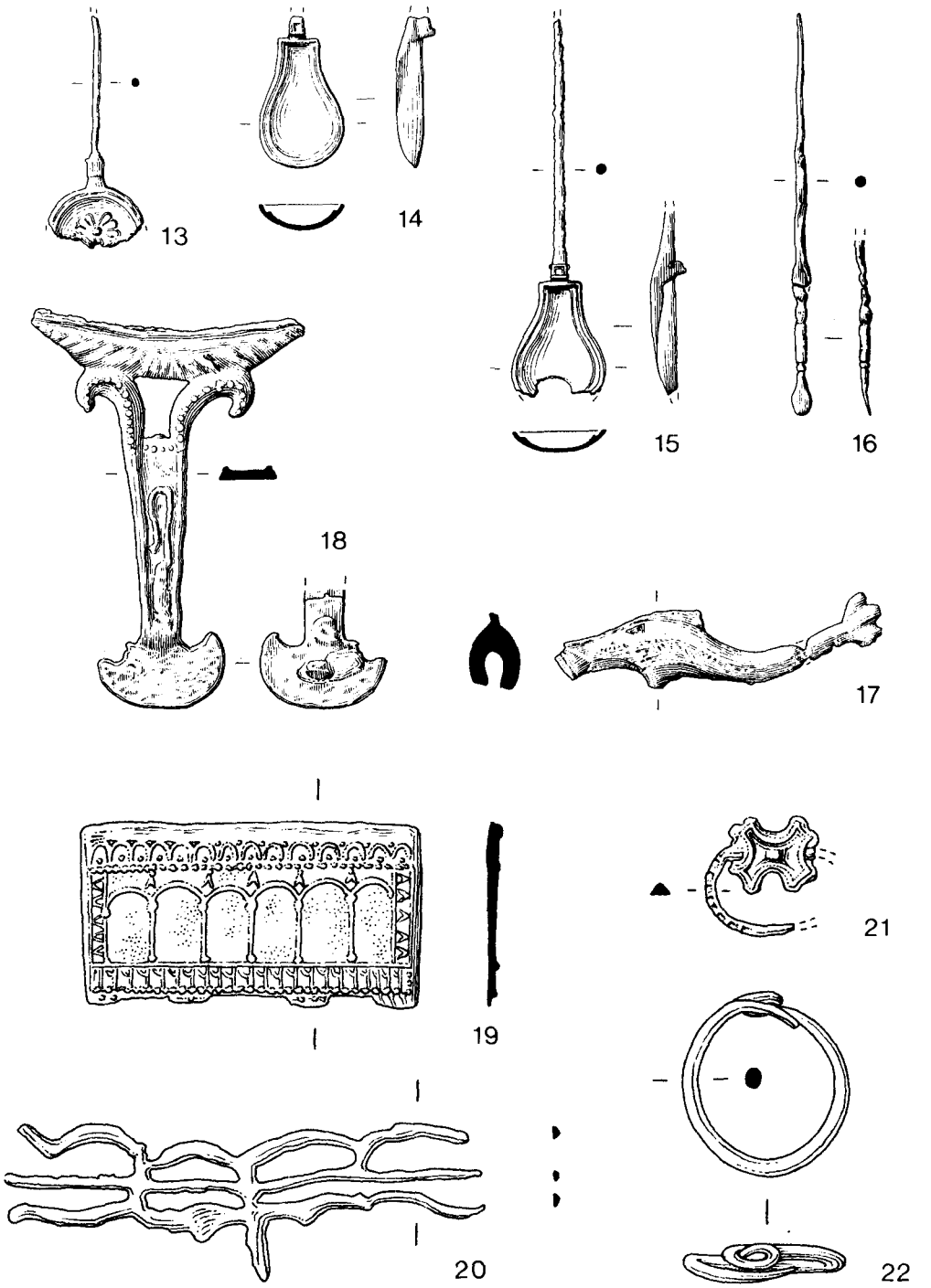

Fig. 7 Roman lead-alloy objects: Spoons, nos. 13–15; ligula, no. 16; dolphin ornament, no. 17; patera handle, no. 18 (1/2); ornamental fitting, no. 19 (1/1); fitting, no.20 (1/1); finger-rings, nos. 21–22 (1/1)

25. Acc.No. 20841: weight: 1st–2nd century AD. Lead. 'Bun-shaped' piece of lead; presumably a weight as numerals VIIII incised on base.
Weight 2.954gm (6lb 8¾oz). Diam. *c.* 5mm; depth *c.* 30mm
Provenance: Bucklersbury House, Walbrook.

26. Acc.No. 16775: rod: 1st–2nd century AD. Lead alloy.
Incomplete rod of octagonal section with ornamental terminal. Probably handle of a ladle or similar.
Length 214mm; width 6mm.
Metal composition: (MoL Lab 1982) lead strong: tin very strong.
Unlikely to be pewter – see discussion on spot tests.
Provenance: Bank of England, Walbrook.

27. Acc.No. 16776: rod 1st–2nd century AD. Lead alloy.
Similar to 16775 (26) – tapering, twisted rod of six facets. No terminal.
Length *c.* 27mm; width *c.* 5mm.
Metal composition: (MoL Lab 1982) lead strong: tin very strong.
Again, unlikely to be pewter.
Provenance: Bank of England, Walbrook.

28. Acc.No. 18248: lead object: 2nd century AD. Lead.
Squat, hour-shaped piece of lead – possibly fishing weight.
Length 25mm; greatest diam. 25mm.
Provenance: Walbrook 1954 excavations.

29. Acc.No. 20853: lead object: Roman. Lead.
Cylindrical object of cast metal; one end closed. Possibly ferrule or small flask. Mould mark visible on base.
Length 59mm; diam. of base 20mm.
Provenance: Bucklersbury House, Walbrook.

30. Acc.Nos. A5098, A5099: miscellaneous objects:
&31. Roman. Lead alloy. Two objects of solid spoon shape – function unknown.
Length *c.* 70mm; width 40mm; depth 12mm.
Provenance: Angel Court, Walbrook.

32. Acc.No. 19316: miscellaneous sphere: Roman. Lead alloy.
Lead alloy sphere with 2 projecting iron loops, both of which are broken.
Function, possibly balance weight.
Diam. of sphere *c.* 21mm.
Provenance: Bucklersbury House, Walbrook.

33. Acc.No. 21070: tag: Roman (? 2nd century AD). Lead alloy.
Rectangular tag with graffito inscription.
Provenance: Bucklersbury House, Walbrook.
JRS 47(1957) 232.

34.- Acc.Nos. *14276, *14277, *14278, 19504, 19634,
43. 19756, 19759, 19972, 20376, 20378: miscellaneous discs: Roman. Lead alloy.
Assorted discs of worked metal – functions unknown.
Various sizes but mainly between 20 & 50mm diam.
Provenance: mainly from Bucklersbury House site except those marked *.

44.- Acc.Nos. 14280, 18342, 19038, 19949, 20969,
49. 23318: waste material: Roman. Lead alloy.
Assorted waste pieces of metal, worked but of no particular form: 14280 is a lump of lead alloy attached to a piece of sheet bronze; 23318 is a distorted piece with an iron nail in place.
Provenance: Walbrook.

50. Acc.Nos. 16459, 20884, 20896: waste
53. material: Roman. Lead alloy. Assorted strips of metal – coiled and straight – but functions unknown.
Provenance: Walbrook.

ACKNOWLEDGEMENTS

I wish to thank Dr Hugh Chapman and Jenny Hall of the Museum of London for the opportunity to undertake this project and for their encouragement throughout. I am indebted to Dr M. Hughes of the British Museum Research Laboratory who kindly undertook the X-ray fluorescence of selected Walbrook material. I wish to thank Helen Ganiaris, Conservation Officer, Museum of London, for carrying out the spot test analyses, Suzanne Keene, Senior Conservation Officer, for her assistance in arranging the analysis programme, Tony Wilmott for providing information on Walbrook valley excavations, and Nick Griffiths for undertaking the illustrations.

BIBLIOGRAPHY

BROWN (1976) D. Brown in *Roman Crafts* ed. D. Strong and D. Brown (London 1976) 25–41.
CHAPMAN (1977) H. Chapman, in T.R. Blurton 'Excavations at Angel Court, 1974'. *Trans. London Middlesex Archaeol. Soc.* 28 (1977) 58, 61.
GRIMES (1968) W.F. Grimes *The Excavation of Roman and Medieval London* (London, 1968).
GUILDHALL MUSEUM *Small Finds from Walbrook 1954–55*, (London) 18.
HATCHER & BARKER (1974) J. Hatcher & T.C. Barker *A History of British Pewter* (London, 1974) 1–19.
HARKER (1982) S.R. Harker 'Latest from Springhead' in *Kent Archaeological Review* (Summer 1982) 195.
HUGHES (1977) M.J. Hughes 'The Analysis of Roman Tin and Pewter Ingots' in *Aspects of Early Metallurgy* (ed. W.A. ODDY (London, 1977) 41–50.
LIVERSIDGE (1968) J. Liversidge *Britain in the Roman Empire* (London, 1969) 207.
LONDON MUSEUM (1930) *London in Roman Times* London Mus. Cat.3 (1930) 120
MERRIFIELD (1962) R. Merrifield 'Coins from the Walbrook, and their significance' *Antiq.J.* 42 (1962) 39–52.
(1965) R. Merrifield *Roman City of London* (London, 1965)
(1969) R. Merrifield *Roman London* (London, 1969).
PEAL (1967) C.A. Peal 'Romano-British Pewter Plates and Dishes' *Proc.Camb.Ant.Soc.* 60 (1967) 19–37
STRONG (1966) D. Strong *Greek and Roman Gold and Silver Plate* (London, 1966) 155–56, 177.
TYLECOTE (1962) R.F. Tylecote *Metallurgy in Archaeology* (London, 1962) 67–70.
TYLECOTE (1976) R.F. Tylecote *A History of Metallurgy* (London, 1976) 61–62, 82–106.