Pudding Pan: A Roman Shipwreck and its Cargo in Context

Michael Walsh

The British Museum

I have protracted my work till most of those whom I wished to please have sunk into the grave, and success and miscarriage are empty sounds: I therefore dismiss it with frigid tranquillity, having little to fear or hope from censure or from praise. (Johnson 1755)

For Anna and Johnny

Published with the generous support of

The John and Ruth Howard Charitable Trust

Roman Research Trust

ROMAN RESEARCH TRUST

Research supported by

UNIVERSITY OF Southampton

Publishers
The British Museum
Great Russell Street
London WC1B 3DG

Series editor
Sarah Faulks

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ISBN 978 086159 202 9
ISSN 1747 3640

Front cover: Mosaic from the Piazzale delle Corporazioni in Ostia, Italy, depicting transshipment of an *amphora* from a seagoing vessel to a river barge (photo: author)

Printed and bound in the UK by 4edge Ltd, Hockley

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Acknowledgements

This book is based upon my doctoral thesis, which was generously sponsored by the University of Southampton. Other funding for various aspects of this research was very kindly provided by the following organizations: Historic England (in all its various guises), the Townley Group of the British Museum, the Friends of the British Museum and the Roman Research Trust. I am very grateful to the British Museum not only for generously funding various elements of the fieldwork, but also for publishing this book, generously supported by the John and Ruth Howard Charitable Trust and the Roman Research Trust.

I must express my sincere thanks to the following people for their help and advice at various stages of this research, including Jonathan Adams, David Williams and the late David Peacock (University of Southampton), Roberta Tomber (British Museum) and Martin Millett (University of Cambridge). I must also thank Justin Dix (University of Southampton) for originally getting me involved in this site; little did I know then that I would still be looking for it almost 20 years later! I would also like to thank Brenda Dickinson (University of Leeds) for her help in identifying the samian potters' stamps.

Words cannot express my gratitude to J.D. Hill (British Museum) without whose guidance and advice my thesis would never have been completed, and this book would never have been published. I am also very grateful to Steven Willis (University of Kent at Canterbury) and Anne Marriott for their very helpful comments on earlier drafts of this book. The British Museum Research Publications series editor Sarah Faulks was unerring in her patience and support throughout the various iterations of the publication process.

I must also thank the fishermen of Whitstable who shared their thoughts on the location of the site and kindly allowed me to record their artefacts, including Andy Riches, the late Steve Gannon, John Martin and John Peyton, and especially Phil and Julie Edwards for putting up with me both on and off the water. I must also thank the curators of all the museums that gave me access to their collections, especially Martin Crowther, Manda Gifford and Craig Bowen of the Canterbury Museums Service. Thanks are due to Sally Evans (Cotswold Archaeology) and Michael Grant (Coastal and Offshore Archaeological Research Services) for their help with seabed topographic images and text.

Finally I must thank my long-suffering wife Elizabeth and my children Rory, Phoebe, Alicia and Myles for their tremendous patience while I 'indulged' myself.

Chapter 1
The Riddle of the Sands

> Both cursory and detailed surveys of ancient wrecks consistently show that table and domestic ware pottery formed a minor component of ships' cargoes … pottery (apart from *amphorae*) never accounts for more than about 20 per cent of the recovered cargo, even when *amphorae* were in a minority … but what archaeological residues might we expect to discover of a ship whose main cargo had been grain? Recognition of just the subsidiary cargoes, among which pottery would bulk large, could lead to a completely erroneous interpretation of the original cargo … the identification of a 'pottery' ship raises the suspicion that the archaeology has been misunderstood (Fulford 1987: 60–1).

The Pudding Pan wreck site

A site lies off the north Kent coast near Herne Bay that has intrigued investigators for almost 300 years though all attempts to locate it have been foiled. Called 'Pudding Pan', the site is known only through the recovery of Roman artefacts, predominantly samian ware, in the oyster dredges and fishing nets of the commercial fishermen of Whitstable. The significance of these artefacts was only recognized by antiquarians and collectors visiting the town in the 18th century, although the appearance on the earliest known marine chart of the area dating from the Tudor era (see **Fig. 19**) of a sand bank called 'Pan Sand' suggests that pots may have been recovered long before their importance was appreciated. Since its recovery, the assemblage from the site has been spread far and wide to institutions and private collectors both nationally and internationally. The British Museum holds one of the largest collections of pottery from the site including examples of most, if not all, of the vessel forms known to have been recovered from the site, as illustrated in the plate section at the back of this volume (see also **Fig. 3**).

The current project, which is the focus of this book, has been running for several years and has involved an assessment of all previous investigations of the site, identification and analysis of the recovered assemblage, analysis and contextualization of the significance of the assemblage, in addition to ongoing attempts to locate the site using geophysical and diver surveys. A catalogue of all the known finds from the area is presented at the back of this book (Appendix 1); where specific artefacts are discussed in the text, the number in parentheses refers to the item in this catalogue. Continued public interest in the site is evidenced by specific displays and exhibitions such as the 2016 exhibition at the Turner Contemporary Museum in Margate.

The recovered samian, a distinctive red-slipped tableware found at most archaeological sites of Roman date, was not of local manufacture; it had been transported across the Channel from the production centre of Lezoux in central Gaul and was lost en route to an as yet unidentified British market. Thus, of the many theories proposed to explain the presence of these central Gaulish imports off the north Kentish coast, a shipwreck or jettisoned cargo seem the most likely.

It is a site of great importance and worthy of full investigation: it is only the second Roman wreck from a maritime context discovered in British waters (see Rule and Monaghan 1993), for all other Romano-British hulks have been found in riverine contexts. It dates from the later 2nd

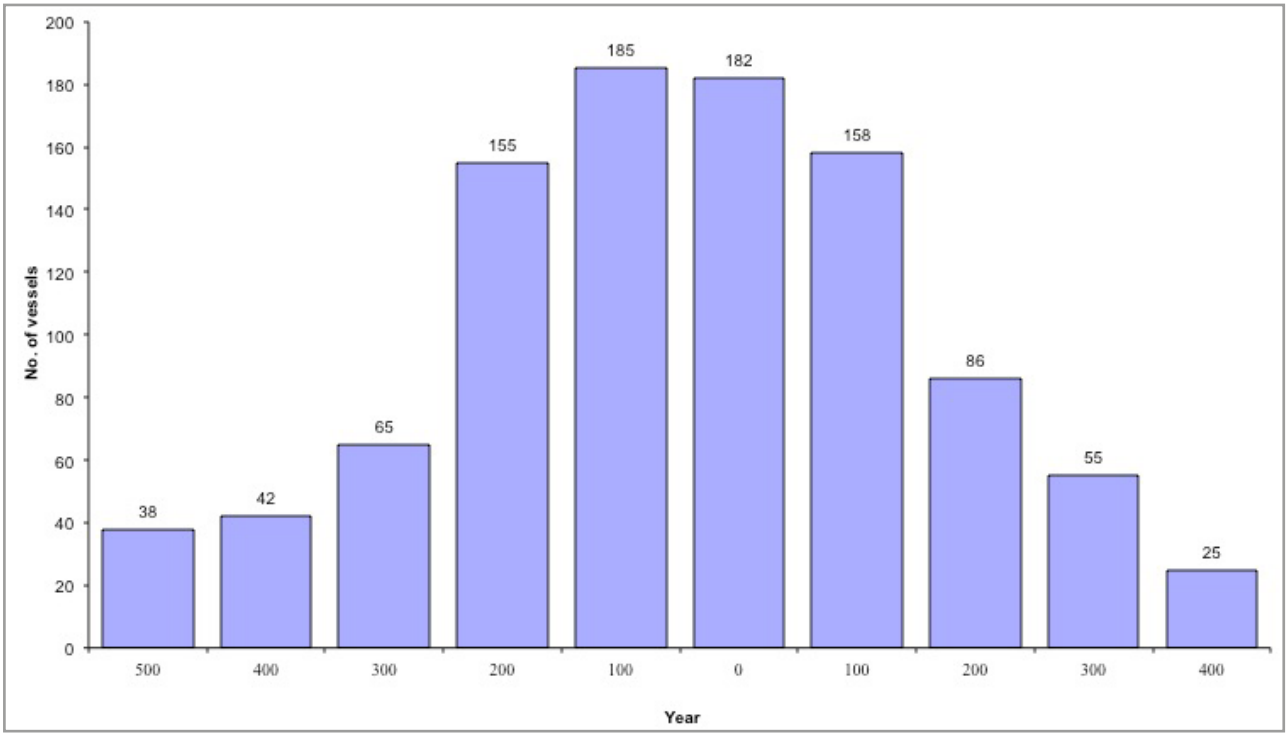


Figure 1 Graph showing temporal bias in the discovery of Roman period shipwrecks in the Mediterranean from the late Republican and early Imperial periods (after Parker 1992a)

century AD, a period from which relatively few other wrecks have been discovered anywhere in the Roman world, and it seems to represent a shipwreck on which the bulk consignment was plain samian (*terra sigillata*) wares rather than *amphora*-borne cargo or loose-carried product such as grain. Indeed, the recovered assemblage is so rare in the Roman world that it warrants close analysis.

The imperative to find this site is pressing as no comparable wreck has ever been discovered in northern European waters and similar wrecks in the Mediterranean are extremely rare. Although the site has yet to be located, a sufficiently large quantity of pottery has been dredged from the area to enable a study of the composition of this cargo of samian. It can also inform us about the supply of this ubiquitous pottery type to Britain in particular, and about Roman maritime trade in general. The last published attempt to do this is more than one hundred years old (Smith 1907, 1909). Since then our understanding of Roman Britain, maritime trade and samian pottery has changed considerably, more pottery has been recovered from Pudding Pan itself, and further attempts have been made to locate the source.

Background

The role of trade in the development and maintenance of ancient urban communities with access to the sea has long been recognized (Fulford 1987), although the nature and scope of that trade is less well defined. In the absence of direct evidence for a considerable proportion of traded goods, which are either archaeologically undetectable or fleetingly cited in literary sources, pottery has been used as a proxy (Middleton 1979; Fulford 1984; 1987: 60). The flaws in this approach, based upon discarded detritus from end-user terrestrial contexts far removed from the actual mechanics and mechanisms of trade, have been effectively identified elsewhere (Fulford 1978; 1987: 66).

Evidence from Roman shipwrecks in the Mediterranean appears to corroborate the idea that pottery usually accompanied other cargoes, but the frequency of this practice is unclear. Although a considerable body of maritime evidence directly related to trade does exist it is disproportionately represented geographically, temporally and typologically. This has resulted largely from the serendipitous discovery of sites by non-archaeologists, hence the emphasis on the most visible wrecks in areas of greatest underwater activity. Nevertheless, the advantages of shipwreck investigation have long been acknowledged (see Parker 1973; Muckelroy 1978; 1980; Parker 1980; Gianfrotta and Pomey 1981; Adams 2003: 3ff).

This undirected approach, however, has resulted in a heavy bias towards the discovery of *amphorae*-laden wrecks in the Mediterranean from the late Republican and early Imperial periods (**Fig. 1**; after Parker 1992a), with far fewer wrecks from other periods and a distinct scarcity of evidence for other cargoes (**Fig. 2**), especially for the transportation of pottery in its own right. That pottery was transported by sea as a bulk consignment is confirmed, contrary to popular belief (see Dannell and Mees 2013: 178, n. 25), by the discovery of a very limited number of these most elusive sites, which serves to emphasize the extent of this bias.

Moreover, few of the wrecks that are known have avoided the attention of looters before serious investigation has taken place. The resultant loss of artefactual and contextual evidence, often to the extent that the nature of the main consignment has been obscured, has had a significant and detrimental impact on the range and quality of subsequent publications. Thus attempts to contextualize consignments in terms of larger trading networks, by relating the shipments to production, mercantile, transition and consumer sites, are rare.

Figure 2 A classic Republican *amphora* wreck from the Mediterranean; the Madrague de Giens wreck contained thousands of Dressel 1b *amphorae*

More serious is the paucity of maritime evidence of any kind from northern Europe (cf. Fulford 1987: 59), with considerable periods for which there is no evidence whatsoever. Given that from the last quarter of the 1st century BC to the mid 3rd century AD Britain was in receipt of possibly millions of consumer goods and containers of wine, olive oil and so forth from the Roman world (Fulford 2007: 54), this lack of evidence is both surprising and concerning.

The significance of the site and the aims of this study

This study will show that as a result of these factors a significant body of evidence, namely 'pottery' cargoes, has been completely overlooked, thus skewing our understanding of the nature of ancient trade (see Dannell and Mees 2013: 178, n 25; **Fig. 3**). This approach is both different and important, not only because it considers an elusive northern European wreck and its apparent primary cargo of plain samian wares (*contra* Dannell and Mees 2013: 178, n. 25) in the context of a wider trading network but also because it adopts a proactive approach to locating and investigating a site that has so far avoided the attention of looters and, for that matter, archaeologists.

By examining the Pudding Pan site, from which direct evidence for trade has been recovered, it is hoped that this study will redress the balance in some small measure. It has been possible to take advantage of the tremendous progress made in the study of samian production, distribution and use since the last academic publication on the site more than a century ago (Smith 1907; 1909). In particular, the recently published study of samian potters' stamps (Hartley and Dickinson 2008–12; henceforth *NOTS* 2008–12) provides the latest dating evidence for the site. This book sets the data from Pudding Pan against similar evidence from around the Roman world to highlight the significance of this site.

Pudding Pan has the potential to alter radically our perception of the trade and distribution of samian wares. The number of samian vessels known to have come from the site has doubled during this study and a wide range of other, previously unrecorded, Roman and medieval artefacts identified. This has been achieved through liaison with private individuals and public institutions, such as local and national museums, whose collections include artefacts from Pudding Pan. Analysis of the recovered assemblage has provided information regarding the nature of the deposit and suggested a model for the recovery of the samian vessels.

Its significance, however, is diminished by our inability to locate the source. Here an attempt has been made to establish its nature and approximate location through assessment of previous investigations. Contact with the commercial fishermen of Whitstable not only revealed that, despite claims to the contrary, samian ware was still being recovered but also provided up-to-date locational information. Geophysical and diver surveys have been undertaken in the area (see Walsh 1998) and are ongoing.

In the past there has been a tendency to dismiss maritime evidence like this because the finds are frequently unprovenanced and without context. In this study new approaches have been adopted in an effort to highlight the potential of these artefacts. Although they lack context in the conventional sense, they are not merely a completely random deposit 'of so much bric-à-brac' (Cool and Baxter 2002: 365), for there is in fact identifiable patterning and the various deposits appear synchronic.

Figure 3 A selection of plain samian wares from Pudding Pan in the British Museum collection

It seems likely that the consignment was manufactured shortly before its loss. Analysis of the artefacts provides information both in relation to the range of contemporary samian forms fashionable at a particular moment as well as on contemporary potters (see plate section for details), their styles, techniques and manufacturing processes, and details of cargo composition and stowage. The absence of decorated wares when compared with terrestrial assemblages is highly unusual and endeavours have been made to establish whether it was an anomalous cargo destined for a specific purpose or a trading norm that has eluded archaeologists until now.

Until this current study, the true extent and nature of the recovered assemblage had not been fully established and a reassessment of the site was long overdue, particularly in light of the significant numbers of complete and near-complete samian vessels that are now known to have been recovered and which have been recorded in considerable detail. Although the site assemblage now numbers over 550 vessels it is rarely mentioned in samian studies despite being a statistically significant sample and regardless of the fact that as it comes from a primary trade context it could make a considerable contribution to our understanding of the transportation and marketing of these ubiquitous wares. Previous investigations have largely focused on the nature and location of the deposit and the intended destination of the consignment with little attention being paid to the significance of the assemblage in terms of the trade in samian wares.

This study, in addition to re-examining the nature and location of the site and the destination of the original consignment, considers the implications of the recovered assemblage for current concepts of the transportation and marketing of pottery, particularly samian wares. The significance of maritime evidence will be illustrated through detailed analysis of the assemblage from Pudding Pan, which will be compared with similar assemblages from both the source/production area and with similar assemblages from the shipment's likely destination, such as shop and warehouse assemblages and dockside dumps. This will place it in context as part of the supply chain of samian ware and other goods across the Channel in the later 2nd century AD. The assemblage will also be compared with assemblages from the few similar wreck sites that have been investigated in the Mediterranean. Cala Culip, off the north-east coast of Spain, is the only other comprehensively published Mediterranean wreck site to contain significant quantities of samian, and provides a relevant opportunity for comparison.

In the past much evidence has been been placed on the use of pottery as a proxy for the trade in other more valuable, though archaeologically invisible, goods. If, however, as seems to be the case, the paucity of bulk consignments of pottery reflects a modern detection bias rather than a common ancient practice then the use of pottery as a proxy is untenable. Furthermore, if it can be shown that pottery was indeed traded in its own right, we shall be forced to re-evaluate both the relationship between pottery and these other goods and our whole understanding of the nature of trade and the ways in which maritime research into the Roman Empire is conducted.

If Pudding Pan does represent a bulk consignment of plain samian wares it calls into question not only the notion of a 'piggy-back' trade, dependent upon other more valuable items, but also our concepts of the scale and volume of the cross-Channel trade in samian ware and other items that advocates of piggy-back trade suggest were of too low value to warrant transportation in their own right (Middleton 1979; Fulford 1984). Indeed, the assumption that samian and other ceramic products were of low value should be challenged (see Monteil 2005: 22; Mills 2013). As Willis (2005: 1.3) states:

> Samian required considerable resources both to produce and to transport to its consumer sites. If one follows a 'labour theory of value' approach this is likely to have been a comparatively pricey commodity despite the economies of scale in its production. Samian vessels were indeed evidently costly to purchase: a Dragendorff 37 of Cinnamus has a graffito pricing it at 20 asses, the approximate equivalent of one day's pay for a soldier, and a Ludowici Ta plate has a graffito indicating 12 asses (Darling 1998: 169). Despite potential cost, samian permeated society in Roman Britain as elsewhere, suggesting that it was popular and necessary as an accoutrement of social interactions and display.

Analysis of the variety of cargoes carried by Roman ships, based on Mediterranean shipwrecks, highlights not only the paucity of evidence for ships carrying sufficient quantities of pottery to be interpreted as cargo (as opposed to

pottery used as shipboard equipment) but also the limitations of this evidence for demonstrating a parasitic trade (Chapter 2).

The routes by which samian arrived in Britain are relevant to any discussion regarding the mechanics and mechanisms of trade as it was not always the most obvious or the shortest route that was used. They suggest that factors other than cost, distance or safety determined the route selection and have been central to the notion of a 'piggy-back' trade. Obviously route selection depended in part on the location of the production centres, but south Gaulish samian for example appears to have been transported via the south coast rather than the closer western coast of Gaul (Webster 1996: 2). Similarly, central Gaulish wares appear to have been transported via the Loire and then shipped around Brittany, rather than being taken by road to the Yonne and down the Seine which would have been safer than the longer sea route. All the evidence points to long-distance trade being conducted via the inland waterways of Gaul (Strabo IV 1.2, 1.14) rather than via the Atlantic coast route, with the Rhône–Saône axis appearing dominant from the concentration of inscriptions related to the shipment of goods on this route (Middleton 1979: 82, fig. 1).

The route taken to convey the Pudding Pan assemblage from Lezoux to Britain is central to the discussion regarding the nature of the original cargo. If the samian was conveyed as a sole cargo one would expect a more direct route from the production centres to the end users; if the samian was being shipped as subsidiary cargo one would expect a detour via the production area of the main commodity. Current theories suggest that the more circuitous the route the more mixed the cargo (Rhodes 1989); such mixing should be detectable in the recovered assemblage (Chapter 7).

The port of Roman London played a pivotal role in the importation and distribution of samian wares. London was a major entrepôt and large-scale redistribution centre for samian ware to the non-military hinterland sites in southern Britain through the 1st to 3rd centuries AD, as is demonstrated by the particularly high proportions of samian found in London compared with other sites and with other pottery types (Marsh 1981; Bird 1986; Symonds 2000; Dannell and Mees 2013).

If located this would be the first Roman maritime site to be discovered in northern Europe by using proactive research methods and would highlight the potential of this approach. The last Romano-British wreck investigation was undertaken in the 1980s (Rule and Monaghan 1993), so the application of modern techniques and current paradigms in the investigation of a newly discovered maritime site is long overdue. The discovery of a wreck at Pudding Pan would be an endorsement of this new methodology and would provide renewed impetus and interest in Romano-British maritime archaeology.

Brief note on phraseology

A variety of terms have been used for the very distinctive red Roman pottery that is under consideration here, including samian, Arretine, *terra sigillata* (TS), TS chiara, African red-slipped (ARS) wares etc. The relevance of these terms will be clarified below (see Chapter 3) but in the interests of clarity and consistency the term 'samian' will be used henceforth as a catch-all term except when referring to a particular pottery type for which the specific term is more appropriate.

Brief note on potters' stamp identifications

As stated on page 3, this research utilizes the latest study of potters' stamps (*NOTS* 2008–12) to date the recovered artefacts and the site. The stamp identifications conform with those used in *NOTS* (2008–12); where more than one potter is known to have used the same name the potters are distinguished using a lower case Roman numeral after the potter's name. Where a potter is known to have used more than one die to stamp his name each die is distinguished by a digit and a lower case letter, thus potter Atilianus i using stamp die 5a.

Chapter 2
Evidence from Shipwrecks for the Transportation of Pottery

> Finds have the greatest ability to illuminate the past when they are regarded as an integral part of the archaeological record. Their full meaning can only be grasped when their relationships with each other and with the stratigraphic sequence are understood. Divorced of these relationships they dwindle in importance to the state of so much bric-à-brac (Cool and Baxter 2002: 365).

This chapter will highlight the importance of Pudding Pan by reassessing the evidence for the maritime transportation of pottery both in northern Europe and in the Mediterranean. This will be achieved by examining the geographical, temporal and typological array of wrecks discovered from the Roman era. The scope of this evidence is limited, as most 'wrecks' discovered in northern Europe are in fact hulks that have been found in riverine contexts, having been abandoned and stripped of their contents in antiquity. Indeed, across the Empire as a whole very few wrecks containing significant quantities of pottery in general, and samian in particular, have been discovered, and even fewer were well preserved or investigated or have been published in detail (see Parker 1984: 100). Even if significant evidence of this type did exist in the Mediterranean, however, it is questionable whether such data, from the core of the Empire, would be relevant or applicable in northern Europe, on the periphery.

This rarity might stem from the fact that it was unusual for significant quantities of pottery to be transported by sea, which supports the notion of a parasitic, piggy-back trade (discussed below), but the wide dispersal of certain pottery types that is so evident in the archaeological record seems to challenge this notion. It is possible that the paucity of direct evidence for the maritime transportation of pottery instead reflects a problem in the detection of this primary evidence for trade. This is supported by the fact that most pottery wrecks have been discovered on multiple wreck sites. If there are common factors that make pottery cargoes more difficult to detect these will be given due consideration and neutralized in the search for further sites. This study will explore similarities between the Pudding Pan assemblage and those from Mediterranean maritime sites, especially any of similar date.

Roman maritime finds from northern Europe

Setting aside etymological distinctions, five ships, 32 boats, 18 logboats/dugouts and seven barges dating from the Roman era have been found in northern Europe (**Fig. 4** and **Table 1**). In addition, deposits from Richborough (Lyne 1999), Nornour on the Isles of Scilly (Fulford 1989) and Herd Sand at South Shields (Bidwell 2001; **Fig. 5**) have been interpreted as remains of either ships or cargoes (see Walsh *et al.* 2013: 106). Several other putative Roman vessels were reported between the mid 19th and the early 20th centuries, though these interpretations should be treated with caution:

- a wooden hull found off the coast of Hayling Island (Wessex Archaeology 2013: WA259);
- a 'galley' from Southampton found in 1848 (Wessex Archaeology 2013: WA262);
- the discovery of 'an old barge' embedded in mud deposits at Southwark was reported in Guy's Hospital *Gazette* in 1889 (Historic England 2016: 5);

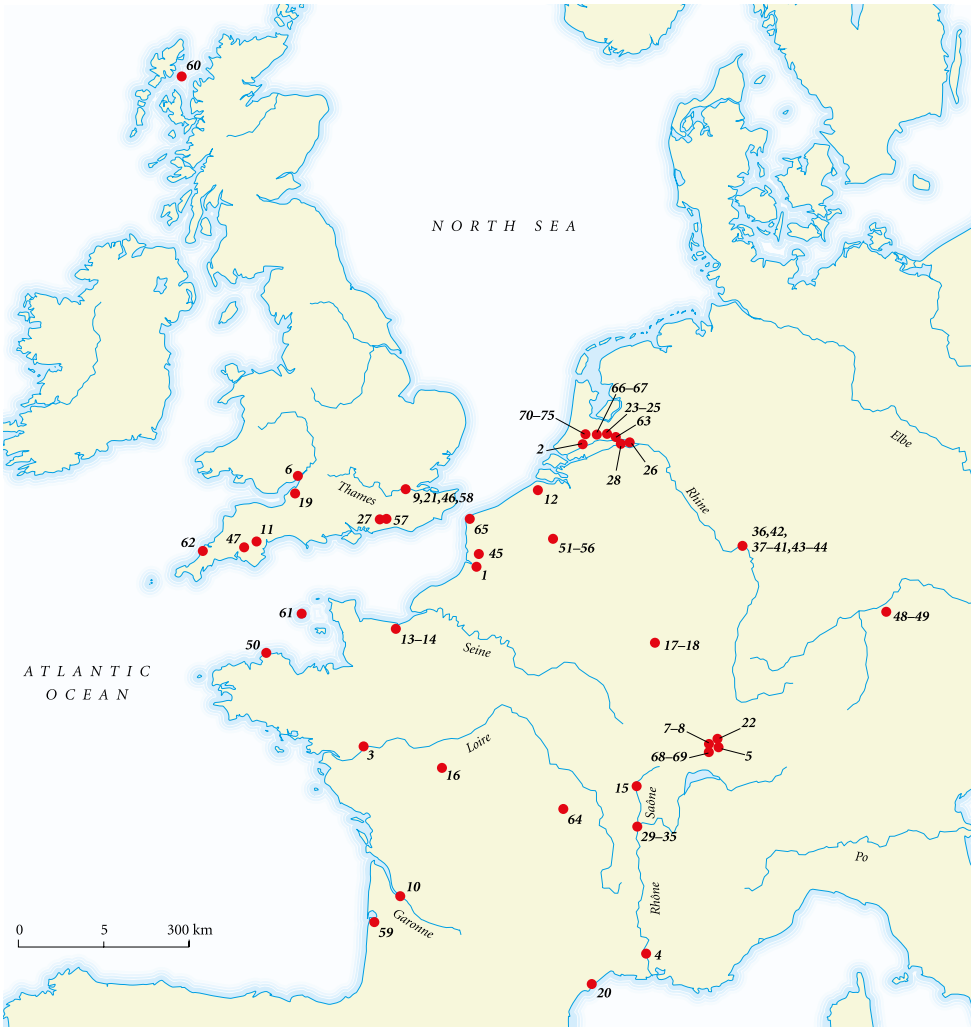


Figure 4 Locations of watercraft from the Roman era found in northern Europe (the numbers correlate with the entries in Table 1)

- worked timbers supposedly from a Roman 'galley' found by workmen mining shingle on the Stonar Bank in Kent for the construction of Dover Harbour in 1895 (Moody 2008: 43);
- portions of a 'burnt and mud-buried Roman ship' were discovered in Christchurch harbour in 1910 (Historic England 2016: 5);
- the remains of a vessel found in 1913 below Storey's Gate, Westminster (Historic England 2016: 5).

None of these vessels are known to have survived. The report of the Southampton 'galley' epitomizes the questionable identification of these sites as Roman; this wreck was recovered from American Wharf at the time of discovery reportedly with similar construction features to the Grace Dieu and is therefore not Roman (Friel 1993).

The temporal distribution of these largely serendipitous discoveries is erratic. There are periods of extensive maritime activity around Britain for which there is a considerable hiatus in the evidence for these most complex and most obvious large maritime artefacts (Arnold 1978: 32). This lacuna spans several hundred years, from the prehistoric Humber boats to the mid 2nd-century AD Blackfriars I ship (Walsh 1998: 25; Adams 2001: 307; **Fig. 6**). Consequently, we know more about the minutiae of the so-called 'Romano-Celtic' or 'Gallo-Roman' boat-building

Figure 5 Early 2nd century Roman shield boss of Junius Dubitatus recovered from the Herd Sand in the mouth of the River Tyne at South Shields in 1867. British Museum, 1893,1213.1

No.	Site	Location	Date (AD)	Contents
1	Abbeville boat	France	Roman?	none?
2	Alblasserdam dugout	Netherlands	*c.* 100–250?	pottery
3	Ancenis dugout	France	2nd–3rd century	none
4	Arles-Rhône 3 barge	France	1st century	stone, shipboard equipment – dishes and tools
5	Avenches boats	Switzerland	2nd century	none
6	Barlands Farm boat	Wales	3rd century	none
7	Bevaix boat	Switzerland	*c.* 182–90	none
8	Bevaix dugout	Switzerland	late 1st century BC	none
9	Blackfriars I ship	London	late 2nd–early 3rd century	Kentish ragstone, millstone, sherds
10	Bordeaux boat	France	161 AD	south Gaulish and Spanish TS, coarse wares, *amphora* necks
11	Bovey Heathfield logboat	England	Roman	none
12	Bruges boat	Belgium	2nd–mid 3rd century	none
13	Caen A boat	France	Roman?	none
14	Caen B boat	France	Roman?	animal horns
15	Chalon-sur-Saône	France	early 3rd century	none
16	Chantenay boat	France	Roman?	pottery
17–18	Chaudeney-sur-Moselle A & B	France	Roman?	none
19	Congresbury Moor craft	England	260–440	none
20	Conque des Salins	France	15–236	none
21	County Hall ship	London	293–300	none
22	Cudrefin dugout	Switzerland	*c.* 50 BC–AD 150	none
23	De Meern 1 barge	Netherlands	148	roof tile, tools, military objects
24	De Meern 4 barge	Netherlands	100	none
25	De Meern 6 punt	Netherlands	3rd century	none
26	Druten barge	Netherlands	*c.* 200	traces of slate; red-gloss and colour-coated pottery
27	Hardham dugout	England	*c.* 245–345	none
28	Kapel Avezaath barge	Netherlands	*c.* 100–60	none
29	Lyon Parc Saint-Georges 2 barge	France	210–15	none
30	Lyon Parc Saint-Georges 3 barge	France	160–85	none
31	Lyon Parc Saint-Georges 4 barge	France	158–85	none
32	Lyon Parc Saint-Georges 5 barge	France	150	none
33	Lyon Parc Saint-Georges 7 barge	France	254–60	none
34	Lyon Parc Saint-Georges 8 boat	France	55	none
35	Lyon Tolozan logboat	France	30	none
36	Mainz A boat	Germany	early Roman?	none
37–41	Mainz type A boats	Germany	4th century	none
42	Mainz type B boat	Germany	4th century	none
43–4	Mainz type C boats	Germany	early 1st century	none
45	Maresquel boat	France	2nd century	none
46	New Guy's House boat	London	*c.* 200	none
47	Newnham Park logboat	England	Roman	none
48–9	Oberstimm A & B boats	Germany	early 2nd century	none
50	Ploumanac'h ship	France	3rd–4th century	200 lead ingots
51–2	Pommeroeul A & B boats	Belgium	*c.* 50–150	none
53	Pommeroeul B logboat	Belgium	*c.* 50–150	none
54	Pommeroeul D barge	Belgium	*c.* 50–150	none
55	Pommeroeul E barge	Belgium	*c.* 150–225	none
56	Pommeroeul F dugout	Belgium	Roman?	filled with pottery
57	River Arun logboat	England	245–345	none
58	Royal Albert Dock logboat	London	Roman	none

No.	Site	Location	Date (AD)	Contents
59	Sanguinet dugout	France	mid 2nd century	none
60	Shiant Islands ship	Scotland	Roman?	none?
61	St Peter Port ship	Guernsey	*c.* 280–90	pitch, coins, ceramics, tiles, wheat
62	Tolcarne logboat	England	Roman	none
63	Vechten boat	Netherlands	1st century	none
64	Vichy boat	France	*c.* 100–50	decorated central Gaulish samian
65	Wissant boat	France		
66	Woerden boat	Netherlands	*c.* 170–5	none; grain remains
67	Woerden 7 barge	Netherlands	162–3	none
68	Yverdon A boat	Switzerland	late 1st century	none
69	Yverdon B boat	Switzerland	4th century	none
70–2	Zwammerdam 1, 3 & 5 logboats	Netherlands	mid 1st–mid 3rd century	none
73–5	Zwammerdam 2, 4 & 6 barges	Netherlands	mid 1st–mid 3rd century	none

Table 1 Watercraft from the Roman era found in northern Europe (see also Fig. 4)

traditions (see Marsden 1965; Ellmers 1969; Marsden 1977; Arnold 1978; de Weerd 1978; 1988) than we do about the transition in maritime transport from the Bronze Age (**Fig. 7**) through the Iron Age to the Roman era (Walsh 1998: 25; Adams 2001: 307; see also M. Johnson 1999: 21).

Of the 75 Roman vessels discovered in northern Europe (**Table 1**), only 15 (24 per cent) have been published in any significant detail (for the location of English finds see Wessex Archaeology 2013: fig. 6). For 37 vessels (49 per cent) only constructional details have been published, although this is often because the vessel had been stripped in antiquity, while the remaining 21 (28 per cent) have been only sketchily published. Two of the latter are amongst eight vessels discovered containing cargo: the Caen A boat included a consignment of animal horns (Ellmers 1972: 282–3), while the Chantenay boat contained pottery (Grégoire 1895) which may not even have been Roman. The Arles-Rhône 3 barge contained a consignment of stone as well as shipboard

Figure 6 The Blackfriars I ship, pictured here with its excavator, Peter Marsden, was discovered on the south bank of the River Thames between the two Blackfriars' bridges in the early 1960s

Figure 7 Bronze Age assemblage recovered from Langdon Bay, Dover, thought to be the remains of a cargo (now in the British Museum)

equipment including pottery and tools (Marlier 2011). Another site, the Pommeroeul F dugout, was almost completely filled with pottery when it was found but was destroyed by canal works in 1976 to the extent that the date of the vessel and the assemblage is unknown (Boe 1978; Parker 1992a: 326).

Fragments of the Vichy boat, laden with 2nd-century AD decorated central Gaulish samian, were recovered by dredge from the River Allier in 1964. No archaeological record of this potentially important site was made at the time as the workmen who discovered the site kept it secret, hence the nominal publication of the finds (Corrocher 1977; 1980; Rhodes 1989: 50). However, it is believed that the bulk of the boat remains *in situ* (Parker 1992a: 447).

Figure 8 Inscriptions found on the lead ingots on the Ploumanac'h wreck link them to Celtic tribes in Britannia, and date from 2nd to 4th centuries AD

The three remaining cargoes include Kentish ragstone on the Blackfriars I ship in London (Marsden 1965; 1972; 1990; 1994: 33–91), lead ingots on the Ploumanac'h ship off the north coast of Brittany (Pollino 1984: 13–21; DRASSM 1985: 75–6; Kainic 1986; L'Hour 1987; **Fig. 8**) and pitch on the St Peter Port ship in Guernsey (Keen 1986; Rule and Monaghan 1993; **Fig. 9**). All three of these most coherent and best-published northern European maritime sites were seagoing vessels. They carried raw materials for building, as did the Arles-Rhône 3 barge cited above, two of which were discovered in maritime contexts, and provided significant but limited evidence that has been discussed elsewhere (Walsh 1998: 25ff). The predominance of building materials is not surprising as, after grain, these cargoes are believed to have been one of the most important (Meijer and van Nijf 1992: 116; cf. Rickman 1985: 110).

One designated wreck, the Erme Ingot wreck (Wessex Archaeology 2013: WA127), and 18 further logboats from England have been ascribed such broad date ranges – late prehistory to the post-Roman period (2600 BC–AD 1000) – that they have been excluded from this study. None of the 23 logboats (including the five confirmed Roman examples) survived in an archaeological context (ibid.: 34).

The excavation of the Blackfriars I ship recovered sherds from at least 74 Roman pots spanning the 1st, 2nd and 3rd centuries AD (Marsden 1972), which is surprising given the ship's relatively short lifespan. This material spans too broad a period to be accounted for as residual deposits even to an uncommon degree (see Fulford 1987: 61), or with some degree of curation. Residuality of a mere 30 years after Dragendorff form 29 is commonly believed to have gone out of production is considered noteworthy elsewhere (Willis 1997a: 19). Moreover, given its fragility, pottery must always have had a shorter working life than that of its owner (Evans 1981: 517) or indeed that of a ship. Two ancient wrecks found in Mediterranean harbours, Monaco and Port Vendres, were both contaminated by material dropped by later

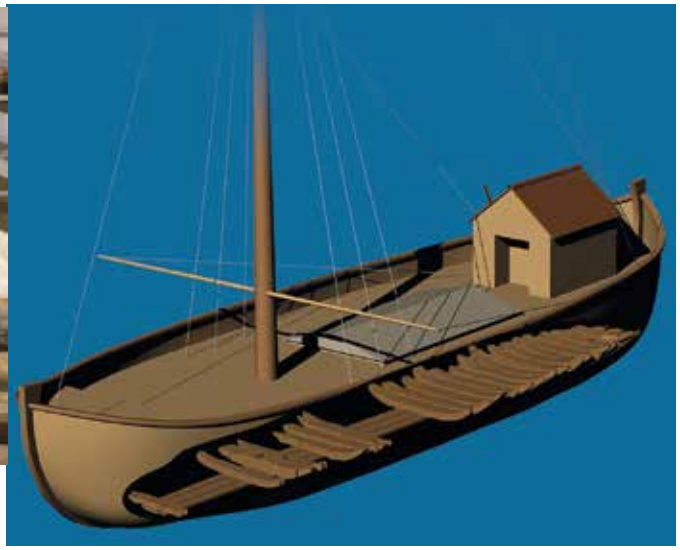


Figure 9 Timbers recovered from the St Peter Port wreck in the conservation laboratory (above) and a reconstruction of the ship based on the timbers and site investigations (right)

Figure 10 Remains of the County Hall ship discovered on the south bank of the River Thames in 1910 when the foundations for County Hall were being dug

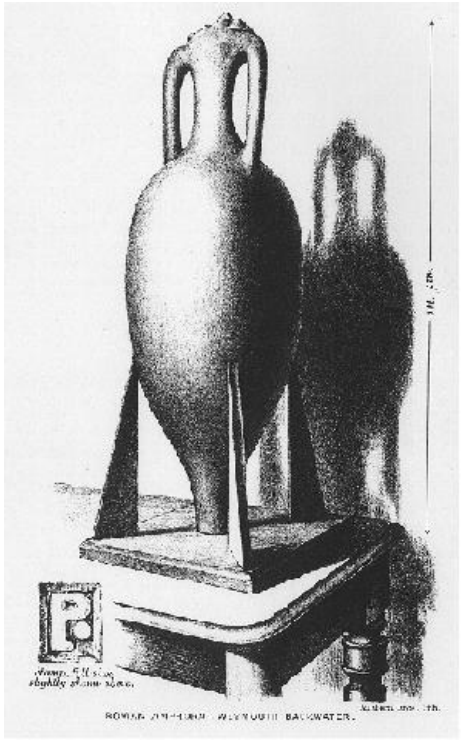


Figure 11 *Amphora* recovered from Weymouth Bay in the 19th century (Damon 1890) recently identified as a Pascual 1 (Parham and Fitzpatrick 2013)

harbour users (Parker 1980: 42). Given the location of the Blackfriars ship on one of the busiest waterways of Roman Britain the broad date range must represent contamination. The assemblage allegedly recovered from Pudding Pan reflects a similar range of dates but has led to quite different conclusions, which will be discussed in detail below.

The great majority of watercraft found in northern Europe were constructed in the so-called Romano-Celtic or Gallo-Roman tradition, in contrast to the Mediterranean or Scandinavian traditions, although the reality is more complex than these geographical demarcations suggest. Northern European vessels built in the Mediterranean or shell-first tradition, using mortice and tenon joints to connect the planks, include the County Hall ship found in 1910 during the construction of County Hall on the south bank of the Thames (Marsden 1974; 1994: 109–28; **Fig. 10**), the Oberstimm boats found in 1986 in the course of the old river Brautlach in Germany (Höckmann 1988: 395; Schönberger *et al.* 1988), the Vechten boat (Muller 1895; Marsden 1976: 51; Höckmann 1991: 98), found at a Roman fort in the Netherlands in 1893, and the De Meern 4 barge, also found in the Netherlands (van Holk 2011: 38). Incidentally, the County Hall ship was the first identified Roman sea-going ship discovered anywhere in the world (Historic England 2016: 5). All these vessels were abandoned in antiquity and excavation and publication has been variable. Rather than representing direct trading links with the Mediterranean they all seem to have been built in northern Europe. Roman artefacts, particularly *amphorae*, discovered along the Iberian and Gallic Atlantic coasts (Galliou 1982; Tchernia 1983: 96) appear to have been associated primarily with local cabotage, as indicated by the St Peter Port ship, rather than with long-distance, inter-regional trade.

An assortment of maritime finds from around the British Isles provides further tantalizing hints of other possible sites (**Fig. 11**), although to suggest that each find represents a shipwreck or cohesive archaeological site rather than a casual loss either thrown or lost overboard is stretching the point somewhat (*contra* Harmand 1966; Parker 1992a: 211, 218–19, 295; McCann and Freed 1994). To cite one example: 41 Roman coins found off the Needles and dating from the late 3rd century AD have been interpreted as evidence of a 'warship' (Wessex Archaeology 2013: WA ID 68). However, the excavators of a 19th-century wreck off the Needles have demonstrated convincingly that the coins, in the era of the Grand Tour, were most probably the private souvenirs of an officer of the Pomone (1811), which had been stationed in the Mediterranean (Bingeman and Tomalin 2016).

Nevertheless, concentrations of material discovered in similar locations over time do warrant closer inspection. For example, there is anecdotal evidence that iron anchors and planking recovered in the 19th century from the West Caistor marshes near Caistor-by-Norwich came from a Roman boat (Fryer 1973: 269). Another site off the West Sussex coast, comprising rows of Roman tiles, is believed to represent a shipwreck or a villa (Wessex Archaeology 2013: WA ID 160).

For centuries, a great variety of Roman artefacts has been, and continues to be, recovered from maritime contexts in northern European coastal waters. Among them are *amphorae* (Harmand 1966; McDonald 1978: 24; see fig. 8; Galliou 1982; Sealey and Tyers 1989; Parham and Fitzpatrick 2013), pottery (e.g. Pownall 1779), coins (Dean 1984: 79), ingots (Craddock and Hook 1987; L'Hour 1987), anchors (Cook 1971; Boon 1977a; 1977b; Dean 1984: 79; Marsden 1990: 71; Markey 1991; 1997), military equipment (Bidwell 2001), roof tiles (Spurrell 1885: 281–4; Wessex Archaeology 2013: 34) and brickwork (Pownall 1779: 282) (**Figs 12–14**). However, although individual finds have been researched and occasionally published there has been no synthesis similar to the corpus of artefacts found off the French coast (Galliou 1982; see Walsh 1999). A general

Table 2 Wrecks (after Parker 1992a) containing significant cargoes of pottery

Site	Date	Pottery	*Amphorae*
Congloué A	*c.* 210–180 BC	7,000 Campanian A	400 Graeco-Italic, 30 Rhod
Pakleni	2nd century AD	30,000 coarse wares	
Planier III	*c.* 60–40 BC	Campanian black-gloss	Dressel1B, Panella 2, Lamboglia 2
Punta Scaletta	*c.* 140–130 BC	Campanian black-gloss	
Riou I	*c.* 200–190 BC	Etruscan or Latin black-gloss	
Spargi	120–100 BC	1000s black-gloss	400–450 Dressel 1A, Dressel 1B, Rhodian
Viganj	2nd century AD	50,000 pieces	

Figures 12–13 Obverse and reverse of a Roman coin recovered in 1983 from the entrance to Lulworth Cove, Dorset, by a scallop diver. It was identified as a billon tetradrachm which had been minted in Alexandria in the late 2nd or early 3rd century and not commonly found in the west (Dorset SMR no. 9 000 1432 - MWX2620)

Figure 14 *Amphora* neck recovered from the sea at Newhaven, now in Newhaven Museum (not numbered)

assessment of wrecks pre-dating 1840 includes a short section on the Roman era (Wessex Archaeology 2013).

The complete absence in northern Europe of ships built in the Mediterranean and the preponderance of native craft probably reflects the largely terrestrial and riverine contexts in which the majority of these vessels have been discovered. The De Meern 1, De Meern 4 and Woerden 7 barges, for example, were built from trees grown in the local area (van Holk 2011: 35–9). Although the presence of Mediterranean ships cannot be discounted, the predominance of local ships and boats seems a good indication of the types of vessel that frequented the major ports of northern Europe. This appears to confirm that long-distance trade was conducted via the inland waterways of Gaul (Strabo, *Geography* IV.1.2, 1.14), which were navigable along all the main axes of communication (Middleton 1979: 82), rather than by open-sea voyaging around the Atlantic coast. Avoidance of long-distance sea voyaging is further supported by claims that the emperor Gaius transported the triremes used in his mock assault on Britain overland most of the way (Suetonius, *Gaius* 47; Dio LIX.25.2). It is also claimed that the emperor Claudius marched with elephants through Gaul to Boulogne *en route* to Britain after the invasion, having twice nearly been wrecked whilst sailing from Ostia to Marseilles (Suetonius, *Claudius* 17). These passages seem to confirm a preference for the overland route and reinforce the notion that sea voyaging, even in the relative safety of the Mediterranean, was a dangerous undertaking to be avoided, although the denigratory nature of Suetonius' narrative must be considered. The overwhelming concentration of inscriptions related to the shipment of goods on the Rhône–Saône axis highlights the dominance of this route (Middleton 1979: 82, fig. 1).

Shipwrecks containing pottery

The vast majority of the 1,200 or so ancient shipwrecks catalogued by Parker (1992a) contained *amphorae*. Very few Mediterranean cargoes comprised solely tablewares (**Table 2**), which were usually complementary to consignments of *amphora*-borne products (Parker 1992a: 7, 16). Of the 98 best-preserved and best-investigated sites, 50 (51 per cent) carried only one category of cargo, of which 45 (90 per cent) consisted of *amphora*-borne products, although only 30 per cent carried a single class of cargo object (i.e. *amphorae* of just one type). Pottery or tiles were each present exclusively on only three of the 98 sites, while one cargo consisted of stone (Parker 1992a: 20–1). The three sites exclusively containing pottery are the Punta Scaletta wreck off the Italian coast (Parker 1992a: 359, no. 960; Lamboglia 1964), and the Pakleni (Parker 1992a: 298, no. 773) and Viganj (Parker 1992a: 447, no. 1216) wrecks off the Croatian coast. The Punta Scaletta wreck contained Campanian A black-gloss tablewares stacked in piles and dating from 140 to 130 BC. The Pakleni wreck consisted of a

Site	Date	*Amphorae*	Arretine	Other
Cabrera 4	*c.* AD 1–15	700 Dressel 7	1 plate	ingots
Dramont D	*c.* AD 40–50	Dressel 2–4, Rhodian	some	*mortaria*
Grand Ribaud D	*c.* 10–1 BC	230 Dressel 2–4, Pascual 1, Coan, Dressel 9	NC	11 *dolia*
Grand Rouveau	mid 1st century AD	Dressel 2–4 Tarraconensis	2 plates	
Ladispoli A	*c.* AD 1–15	40 Dressel 2–4, Haltern 70	NC	19 *dolia*
Nicotera	late 1st century BC		1 plate	stone
Plane A	*c.* 50 BC	Dressel 1B, Lamboglia 2	some	lamps
Planier I	*c.* AD 1–15	Dressel 2–4 Tarraconensis	NC	
Planier III	*c.* 60–40 BC	Dressel 1B, Lamboglia 2, Panella 2	2 pots	black pot
Pointe Lequin C	*c.* AD 50–70	Dressel 2–4 Tarraconensis, Dressel 7–11, Gauloise	some	
Punta Patedda	15 BC–AD 20	*amphorae*	some	beakers
Sud Lavezzi B	AD 10–30	Haltern 70, Dressel 7–11, Dressel 20	NC	ingots
Torre Valdaliga	*c.* AD 1–20	Dressel 2–4, Dressel 7–11	some	

Table 3 Early wrecks containing Arretine wares (NC = non-cargo)

Site	Date	*Amphorae*	Samian	Other
Cavallo A	AD 40–60	*amphorae*	1 bowl	glass
Chiessi	AD 60–85	*amphorae*	bowls	ingots
Diana Marina	AD 50	1000 Dressel 2–4 Tarraconensis	NC	16 *dolia*
Dramont F	*c.* AD 400	120 filled with pine resin	NC	4 anchors
Fuenterrabia	*c.* AD 100–50		1 cup	iron ore
Guardis B	AD 1–25	Ebusitan, Dressel 2–4, Pascual 1	NC	oysters
Lavezzi II	AD 40–70	Dressel 7–11, Camulodunum 186A, Dressel 9	NC	
La Luque A	mid 2nd century AD		1 bowl	tiles
La Luque B	300–25 AD	Tunisian	1 bowl	lamps
Panarea (Alberti)	AD 50–100	77 Dressel 2–4, 69 horn-handled	1 bowl	
Port-Vendres II	AD 42–8	80 Dressel 20, 15 Haltern 70, Dressel 28	NC	ingots, glass
Port-Vendres III	mid 2nd century AD	Gauloise 4	NC	iron blades
Porto Cristo A	*c.* AD 50–70		NC	lamps

Table 4 Wrecks containing Gaulish samian (NC = non-cargo)

probably newly manufactured consignment of approximately 30,000 2nd-century AD coarse wares possibly from Asia Minor but it has only been published in Croatian. The Viganj wreck, which had been heavily looted, consisted of an estimated 50,000 pieces of coarse ware pottery of probable Aegean origin dating from the 2nd century AD.

More sites containing significant proportions of pottery, rather than purely *amphora*-borne products, have been investigated since Parker's catalogue was published (e.g. Tusa *et al.* 2009) but they still represent only a tiny fraction of the number of wrecks investigated.

A number of other notable pottery wrecks were poorly preserved, poorly investigated or briefly published. For example, the Spargi wreck near Sardinia, dated *c.* 120–100 BC, was only partly excavated before it was looted. The main cargo consisted of Dressel type 1A and Dressel type 1B *amphorae* as well as various other *amphorae*, and thousands of pieces of stacked Campanian B-type black-gloss tablewares. Somewhere between 400 and 450 *amphorae* were recovered from the site, representing only about 12 per cent of the cargo and occupying just one sixth of the hold. Thus either a large proportion of the consignment had been looted prior to investigation or a perishable cargo occupied the remainder of the hold (Pallarés 1986).

At Grand Congloué, an islet south of Marseilles, two shipwrecks that occurred a century apart were originally excavated and published as a single site (Benoit 1961). The earlier site contained over 400 Graeco-Italic *amphorae*, and 30 Rhodian *amphorae* dated *c.* 200 BC as well as 7,000 pieces of Campanian A pottery dated *c.* 190 BC. The later site dated from *c.* 110–80 BC and contained *c.* 1,500 Dressel 1A *amphorae* (Long 1987a; 1987b). The Planier III site included considerable quantities of black-gloss ware similar to Campanian B as well as a cargo of Dressel 1B, Panella 2 and Lamboglia 2 *amphorae* and minerals (Tchernia 1971). The association of *amphorae* with large quantities of Campanian black-gloss wares seems to be a common feature of these early wrecks.

The Riou I wreck off the southern coast of France was an unusual and potentially important site, which appeared to contain pottery as the main cargo, unless the primary cargo was of low volume and high value. It seemingly comprised only black-gloss tablewares dating from the early 2nd century BC but has been only briefly published (Benoit 1956: 29; Lequément and Liou 1975).

Site	Date	*Amphorae*	ARS	Other
Femmina Morta	early 4th century AD	Africana 2B–D, Keay 3A & 81, Almagro 51C, Dressel 23	ARS	
Laurons B	*c.* AD 175–200	Gaulish	NC	corn
Mateille A	*c.* AD 400–25	Almagro 51A, Tunisian	ARS	metal
Monaco A	*c.* AD 200–50	Mauretanian, African 2A	NC	coarse ware
Punta Ala	*c.* AD 250	Dressel 20, African 2B–D & pear-shaped	ARS	*dolia*
Sobra	*c.* AD 320–40	1000 Tunisian	NC	
Yassi Ada B	late 4th–early 5th century AD	1100 Tunisian	NC	

Table 5 Late wrecks containing African red-slipped (ARS) ware and Eastern *sigillata* (NC = non-cargo)

Site	Date	Main contents
Cape Gelidonya B	50–25 BC	300 Eastern *sigillata* vessels
Plavac A	late 1st century BC–early 1st century AD	Dressel 2–4 *amphorae*; decorated samian
Dramont G	*c.* 60–70 AD	roof tiles; 40 south Gaulish samian; 200 coarse ware vessels
Culip IV	61–79 AD	76 Dressel 20 *amphorae*; 2,750 south Gaulish samian
Pudding Pan	*c.* 175–95 AD	450 central Gaulish plain samian
Port Miou	*c.* 400–25 AD	*amphorae*; 50 ARS wares; 17 lamps
Dramont E	*c.* 420–25 AD	*amphorae*; ARS

Table 6 Wreck sites on which significant quantities of samian have been found

It is clear from this sample that although the vast majority of known shipwrecks contained *amphorae* there are a number of sites where the substantial quantities of both tablewares and coarse wares suggest that they were being conveyed as a primary or significant secondary cargo. Unfortunately, looting and poor publication of sites has resulted in the under-utilization of this vital primary evidence for trade. However, the assumption that samian and other tablewares were transported only as secondary cargoes is challenged by these shipwrecks where the main cargo, apart from *amphora*-borne products, was common ware (i.e. neither samian nor glazed ware). The more humble the commodity, the more striking this phenomenon (Pucci 1983: 111) as it appears to undermine the notion that some items were of too low value to be transported in their own right.

Shipwrecks containing samian

Parker's (1992a) catalogue of *c.* 1,200 wreck sites includes only 40 that recorded samian in its many forms amongst their assemblages (see **Tables 3–6**). Of these, 33 contained limited quantities of samian that clearly comprised ship's equipment or crew's possessions rather than cargo. Thirteen of these were early Roman in date, ranging from the 1st century BC to the mid 1st century AD, and included a few pieces of Arretine ware (**Table 3**). The primary cargo was conveyed by *amphorae* on all but one of these sites while the primary cargo on the remaining site comprised a consignment of stone. The small quantities of Arretine found on each of these sites imply that it was shipboard equipment rather than secondary cargo.

Thirteen sites containing Gaulish samian ranged from the early 1st century AD to the late 4th century (**Table 4**). Again, the primary cargo was conveyed by *amphorae* on the majority of these sites, although the main cargo on one site comprised iron ore, another consisted of roof tiles and a third was formed of lamps. The samian on seven of these sites was definitely not cargo and the remaining six sites each contained only one or two samian vessels, which again must represent shipboard equipment.

Seven sites contained limited quantities of African red-slipped (ARS) wares, ranging in date from the later 2nd century AD to the early 5th century. Once again the primary cargo on all these sites was conveyed by *amphorae*. The ARS ware on four of the sites was specifically identified as non-cargo while the remaining sites contained too few vessels to represent cargo.

Besides Pudding Pan, only six wrecks have been discovered that contained sufficient quantities of samian to be interpreted as cargo rather than shipboard equipment. None are dated to the same period and thus the assemblages are very different. The Cape Gelidonya B wreck, located off the southern coast of Anatolia (Turkey) and dated to *c.* 50–25 BC, was heavily looted, so only a selection of the 300 or so Eastern *sigillata* A vessels removed by divers has been published. It is reported that no other cargo was visible so it is possible that these fine wares represented the main cargo, although either the boat was very small or there was considerable unreported looting (Bass 1972; Mitsopoulos-Leon 1).

In contrast, the Plavac A site, found off Cape Plavac in Croatia and dating from the late 1st century BC to the early 1st century AD, was well preserved, but it has not been extensively published and then primarily in Croatian. This seemingly large ship, *c.* 25–30m long, contained a cargo of Dressel 2–4 *amphorae*, a consignment of moulded samian, possibly from Puteoli, and a range of shipboard equipment (Gunjača 1976/7). It is unclear how large the *amphora*-borne or samian consignments were, or whether plain wares were included. However, it appears that the samian was a secondary cargo from which plain wares had been excluded,

the significance of which will be discussed below. Details of a second wreck discovered at Cape Plavac, containing 1st-century AD pottery, is only very briefly reported (Parker 1992a: 318).

The Dramont G wreck, found off the Cap du Dramont in southern France and dated *c.* 60–70 AD, was also perfectly preserved when first discovered but the cargo, along with the remains of the ship's structure, was subsequently destroyed by looters as a result of indolence by officials. This small ship carried a locally produced cargo of roof tiles, including *tegulae* and *imbrices*, as well as a substantial quantity of pottery too large to constitute shipboard equipment. There were at least 40 stamped south Gaulish samian cups, 100–200 coarse ware vessels and a range of shipboard equipment (Joncheray 1976: 259). The presence of a locally produced cargo of tiles and pottery on a small vessel must point to a coaster engaged in local trade or a transhipment consignment.

In addition, two late Roman wrecks off the southern French coast, Dramont E and Port Miou, both dating from the early 5th century AD, included consignments of ARS wares amidst primarily *amphora*-borne cargoes. Unfortunately, both sites were destroyed by looters but they were important for the dating of ARS wares (Hayes 1980: 482). The well-preserved Dramont E site included a large consignment of *terra sigillata* (TS) chiara D and other late Roman *sigillata* fore and aft of three upright layers of late Roman Tunisian *amphorae* (Joncheray 1975). The Port Miou site included over 50 pieces of TS chiara D and 17 lamps but only one of the *amphorae* survived and was published (Parker 1992a: 329, no. 873). Unlike the above sites Culip IV, dating from the later 1st century AD and containing 2,750 south Gaulish samian vessels, avoided the attention of looters, was fully excavated and well published (in Catalan), and will be investigated in detail below (Nieto Prieto *et al.* 1989).

The paucity of evidence for pottery transportation

Unless we believe that these seven significant samian sites from a sample of over 1,200 represent the sum total of preserved wrecks of the hundreds if not thousands that must have been involved in the transportation of samian ware, many of which inevitably came to grief, then there must be an explanation for this disproportionate detection rate. The ratio of *amphora*-laden to non-*amphora*-laden wrecks is so high that it is inconceivable that it in any way reflects the relative proportions of ancient traffic in samian and *amphora*-borne cargoes, but must indicate instead some modern bias of chance discovery.

One must therefore ask why the most easily recognizable and most ubiquitous Roman pottery on terrestrial excavations, one of the key indicators of the widespread cultural reception of Rome, especially as these vessels were undoubtedly transported throughout the Empire in huge quantities, is so poorly represented in the maritime archaeological record? It is abundantly clear that more wrecks containing *amphorae* have been discovered than any other type. Not only is this because these were the bulk carriers of the ancient world and therefore made up the greatest number of cargoes, but also because of a modern bias towards the discovery of these sites over others owing to the greater prominence and visibility of *amphorae*. This emphasizes the chance nature of most discoveries: a research-led approach would focus attention away from the heavy bias of *amphorae* sites towards those sites that are less well represented, such as those containing samian.

There appears to be a pattern in the discovery of maritime samian sites as five of the six known wrecks containing significant quantities of samian were discovered in areas where other ancient wrecks have been found. Only Port-Miou was discovered in isolation, but this site also contained *amphorae*. This must confirm the notion that samian and other fine ware sites are far less visible under water than other wrecks and therefore more difficult to detect using current technologies.

At Cala Culip, six wrecks were discovered, five of which ranged in date from the mid 1st century BC to the late 1st century AD, while the sixth was medieval. The first of these wrecks, Culip I and Culip V (discovered in the 1950s), were very heavily looted, as were the later discoveries of Culip II and Culip III, which were destroyed.

Only Culip IV, the samian wreck, and Culip VI, the medieval wreck, escaped the notice of looters, probably because both were largely concealed by sea-grass and were only discovered by archaeologists re-examining the other wrecks in the mid 1980s (Nieto Prieto *et al.* 1989). Parker (1980: 47) suggests that the growth of eel-grass on the Grand Avis and Garoupe B wrecks off the southern coast of France may have been stimulated by siltation of the sites and subsequently afforded some protection to both sites from natural and human depredation. Perhaps samian cargoes are more conducive to siltation and subsequent colonization by plant life, thus rendering them more difficult to find? Culip IV will be assessed in detail in comparison with the finds from Pudding Pan below (see Chapter 8).

In a similar scenario to Cala Culip, four wrecks have been discovered near Cape Gelidonya off the Turkish coast: the famous Bronze Age site (A); the samian site (B); the hearth from a galley of a ship of indeterminate age (C); and a medieval wreck (D). Like Cala Culip, two of the three wreck cargoes (including the samian) had been so severely looted that it is unclear whether the samian was a sole cargo, a component of a larger cargo or some other deposit.

Cap Dramont has similarly been the site of multiple events, with at least nine shipwrecks spanning the entire Roman era. All but one, an 18th-century wreck, are dated from the late 2nd century BC to the early 5th century AD. Six of these sites contained *amphorae*. In the case of the Dramont A wreck these were in large quantities of about 1,000 *amphorae*. At Cape Plavac, off the Croatian coast, two Roman wrecks have been discovered. Unusually, it was the well-preserved Plavac A wreck, containing a consignment of moulded samian, that was the first to be encountered, but this site also included a consignment of Dressel 2–4 *amphorae* and it is likely these that were discovered first – before the samian – so the hypothesis that samian wrecks have not been found in isolation is likely to hold true for Plavac A.

The Pudding Pan material, like that from Cape Gelidonya, has been widely dispersed during its 300-year history – as far as North America – not as a result of looting but owing to the nature of the discoveries. The source from which the Pudding Pan material was recovered has never

been located so the site is known only through the retrieval of central Gaulish samian wares and other artefacts by commercial fishermen primarily working the oyster beds on the Kentish Flats off the north Kent coast. Analysis of these artefacts has indicated a broad spread of dates from the mid 1st to the mid 3rd century AD, with the bulk of material dating from the later 2nd century. The dearth of samian wreck sites and the scarcity of sea-going ships in northern Europe elevate Pudding Pan to a prominent position in the pantheon of Roman shipwreck sites. Even if the source site cannot be found the artefacts recovered to date still rank it as the second most important samian wreck site throughout the Empire and it is also only the third Roman shipwreck from a maritime context ever investigated in northern Europe.

This invisibility of samian sites may make the detection of new sites difficult but it is beneficial in protecting these elusive and crucial sites from what Parker (1992a) calls 'the predatory nature of most divers'. These sites are extremely important as they represent the missing link in the samian supply chain, providing the only primary information we have regarding the undoubtedly massive trade in samian and other tablewares. It is possible that tablewares were transported only as part of a mixed consignment that was usually made up of *amphora*-borne products, although this perception could equally have developed as a result of the discovery bias that is so heavily skewed towards the recovery of wrecks containing *amphorae*. Has anyone specifically looked for wrecks containing cargoes other than those conveyed by *amphorae*? Obviously, by their very nature *amphorae* and *amphorae* mounds are much easier to spot under water, especially by the amateurs who have located the great majority of ancient wreck sites in the Mediterranean.

Parasitic, piggy-back trade

The paucity of wrecks containing substantial consignments of tablewares and other utilitarian pottery has contributed to the assumption that these wares were of too low value to be transported in their own right (Fulford 1987: 61; *contra* Mills 2013) – hence the notion of a parasitic, piggy-back trade, dependent upon merchants using these goods to fill spaces between primary cargoes on their ships (Middleton 1979: 90; Fulford 1984: 137). It has even been suggested that long-distance trade in certain commodities *depended* upon the ability of the trader to exploit official supply routes (Middleton 1979: 90; *contra* Fulford 1984: 136). For example, the distribution of black-burnished ware (BB2) along Hadrian's Wall from the early 2nd century AD has been cited as evidence for the transportation of grain from the south to the garrisons in the north (Middleton 1979: 93–4).

The importation of these invisible goods seemingly not only provided the catalyst for the importation of samian but also subsidized these imports sufficiently to suppress local competition. Proponents cite the anomaly of central Gaulish samian exports to Britain far exceeding those from the considerably closer eastern Gaulish production centres (Middleton 1979; Fulford 1984), although it must be stressed that these industries were not contemporary and so were not in competition. Moreover, the central Gaulish output was truly vast. The argument that the south Gaulish samian supply to London was twice that from central Gaulish producers, with Lezoux ware representing only about 15–20 per cent of the total supply (Marsh 1981), must be treated with caution for similar reasons. In addition, whilst essentially true for London it is not consistent throughout the province, where central Gaulish wares are more common (S Willis, pers. comm.).

Advocates of parasitic trade claim that this movement of apparently 'low-value' goods (*contra* Mills 2013) over long distances can only have been economically viable if the goods were conveyed on an official supply route supplementary to a more significant, higher-value, primary cargo – in this case the transportation of grain from the grain-producing areas of Gaul to the armies on the Rhenish and British frontiers. However, as noted above, samian vessels were valued and deemed valuable and therefore, weight for weight, they were in fact more valuable, if less essential, than grain.

Fulford (1984: 135–6) suggests that the increased volume of post-invasion importation is difficult to explain as a result of mercantile activity and must relate to Imperial demands linked to changes in the British garrison. A number of traders from Britain can be firmly associated with military supply lines on the Rhineland through the find-spots of their inscriptions at Domburg, Köln and Mainz (Middleton 1979: 95). However, the causal link between army supply and the importation of samian has now been effectively undermined as civilian areas continued to receive samian supplies long after the army had departed (Willis 2005).

As the quotation at the head of the first chapter illustrates, the perception of a parasitic trade is so ingrained that Fulford (1987: 61) suggests that an interpretation of a 'pottery' ship stems from a misunderstanding of the archaeology where the primary cargo has not survived. However, this overlooks the possibility of biased sampling; *amphorae* may well have borne the most common consignments in antiquity but their domination of the maritime archaeological record is disproportionate and must reflect their greater visibility under water compared to other artefact types. So much depends on the notion that pottery is a suitable proxy for other archaeologically invisible goods (Fulford 1987: 68) that the concept has not been seriously challenged.

In the absence of evidence for the volume of trade, the correlation between pottery and other traded goods that are archaeologically invisible has remained a vital indicator (Fulford 1987: 66). To acknowledge that pottery may have been traded in its own right undermines this correlation. This is not to deny that parasitic trade occurred but to suggest that a glib dismissal of pottery shipments is unjustified based on partial evidence motivated by expedience. It is one thing to infer a trading route between two locations based upon pottery evidence, quite another to suggest that a more valuable primary cargo that is undetectable archaeologically provided the catalyst for that trade and that pottery can then be used as proxy for the absent primary cargo. Fulford (1987: 70) accepts that there is no direct correlation at any one site owing to the practice of cabotage and the redistribution of merchandise.

This assessment of the evidence for pottery transportation has illustrated that there is in fact equally

limited evidence from Mediterranean wreck sites to support the concept of a parasitic, piggy-back trade. The discovery of a consignment of *c.* 50,000 coarse wares on the Viganj site is difficult to interpret in any way other than as a primary cargo. This and other wrecks where pottery has made up the main consignment therefore demonstrate that a primary trade in table and cooking wares existed. Moreover, very few wrecks contained more than a few pieces of samian, and these have been interpreted as ship's equipment or crew's possessions rather than indicative of a piggy-back trade. As demonstrated, only a very small proportion of the more than 1,200 wrecks catalogued by Parker (1992a) can be attributed conclusively to a piggy-back trade, which cannot account for the wide dispersal of many pottery types in the Roman era.

This brief assessment has outlined the variable nature of existing maritime evidence for the transportation of pottery in the Roman era. It is clear where the greatest lacunae in the evidence occur, with disproportionate representation of evidence between the Mediterranean and northern Europe. For example, there are at least two centuries of Roman maritime activity around the British Isles that are not represented at all. Even within the Mediterranean region there is considerable disparity in the geographical distribution of maritime evidence, apparently reflecting differing levels of modern underwater activity, recreational diving and fishing rather than intensive use of particular routes in antiquity. In contrast, typological and temporal variations seem to reflect varying intensity in the use of particular vessels at particular times.

All too often this primary evidence has fallen prey to looters (see Radić Rossi 2012: 287) before serious academic research could be undertaken, with dire consequences for our understanding of the mechanics and mechanisms of trade. Not only artefacts have been lost but also the more important contextual evidence for the transportation of these elusive cargoes, to the extent that it is often unclear what proportion of the overall consignment was represented by the pottery. This pervasive predation must account for the poor publications record of many of these key sites. Only minimal details are recorded for well over half the sites catalogued by Parker (1992a) and many of the supposedly fully investigated sites require reassessment and reinterpretation in the context of Imperial trading networks. Against the background of the main samian assemblage recovered from Pudding Pan off the north Kent coast this study will reassess our current understanding of the nature of the maritime trade in pottery.

Thus it can be appreciated that the site of Pudding Pan has the potential both to add greatly to the body of maritime evidence from northern Europe and to increase our knowledge of shipwrecks containing tablewares, especially samian-type cargoes, across the Empire. Although the site has not yet been located the assemblage is still the second largest cargo of samian discovered throughout the Empire and appears to challenge the received orthodoxy regarding the transportation of fine tablewares. Was the ship solely carrying tablewares, and plain wares to boot, in contrast to overwhelming evidence from the Mediterranean? Or was the samian a secondary cargo, leaving a significant primary cargo still to be discovered?

Chapter 3
Background to the Pudding Pan Site

> Within the space of a few years back, people who are curious in antiquities have taken occasion to observe a very peculiar kind of red earthenware found amidst the cottage furniture of the fishermen on the Kentish coast, within the mouth of the River Thames. On examination they have discovered it to be ancient Roman manufacture. Upon enquiry after the source from whence such great quantities of this earthen ware could have for so many years been derived, a traditional story has been brought forward, and is now the current solution to this curious fact; namely, that some Roman vessel, freighted with these wares, must have been many ages ago cast away; and that upon the wreck of its hulk breaking up, this curious lading poured forth into the open sea on the coasts, hath been dragged up from time to time by the fishermen's nets: and the place of the wreck has been supposed to be somewhere about Whitstable-bay (Pownall 1779: 282).

> [S]ome of these vessels … evidently appear to have been made rather for culinary, than for religious purposes; they might have baked puddings and pies, stewed meats, or served for tarts or custards. And the enlightened fishermen have very sensibly and very uniformly applied them to these purposes, till the ardour of the antiquary rescued them from their hands (Keate 1782: 126).

It is almost 300 years since the first recorded discovery of Roman pots at Pudding Pan but contrary to Keate's prediction (1782: 127) the source has not been exhausted and a reassessment of the site is now appropriate. This chapter will set the background for the study of the site: why this site was chosen and why it is important. A variety of inaccuracies and misconceptions have developed over the last three centuries regarding Pudding Pan that need to be corrected and dispelled. The distinction between Pudding Pan and Pan Sand will be clarified and the ancient sea level and coastline in the area – essential to the understanding of the nature and location of the site(s) – considered. The role played by Pudding Pan in the designation of the name 'samian', the historiography of the site and the various theories regarding the nature of the deposit will also be examined.

Throughout its history this site has been known variously as Pudding Pan Sand, Pudding Pan Rock, Pan Sands (Pownall 1779; Rhodes 1989; Parker 1992a) or Pan-Pudding Rock (Jacob 1782: 121). However, the use of site-specific appellations that identify areas of the seabed which lie several kilometres apart from each other are inappropriate as they are too specific for this as yet unidentified site. Henceforth, therefore, the term 'Pudding Pan' will be used when referring to the 'site'. The probability that there is more than one site is discussed below.

The site was originally chosen as the focus for this research for several reasons. First, this is undoubtedly the best-known Roman maritime archaeological site in British waters, with a long history of finds by local fishermen of samian ware and other Roman artefacts over at least three centuries. Second, although material from Pudding Pan has been recorded since at least the early 18th century, its source has eluded detection despite numerous attempts to locate it. Third, besides one unpublished undergraduate dissertation (Watson 1987) the site has been virtually ignored since the early 20th century (Smith 1907; 1909), at which time 282 samian vessels were recorded, 216 of them stamped. Consequently although many major samian studies refer

briefly to the site (B.R. Hartley 1972; Willis 1997a; 1997b) it has never been discussed in any detail in the context of cross-Channel samian supply. There is a pressing relevance here, as the stamped samian assemblage from Pudding Pan has been a central reference point for dating excavated late 2nd-century AD samian groups and thereby, crucially, sites in Britain and abroad throughout the past 100 years (e.g. Tyers 1996; Dickinson and Hartley 2000; *NOTS* 2008–12).

Given this background a number of questions arise. What has happened to the site since the early 1900s? Have fishermen continued to recover vessels and, if so, how large is the assemblage now? Equally importantly, with the aid of modern global positioning systems (GPS), are today's fishermen better equipped than their predecessors to identify the likely location(s) of the source(s) of the material? The record of evidence has indeed changed since the early 1900s and new research possibilities and perspectives have emerged. The known samian assemblage from Pudding Pan currently numbers some 526 complete or near-complete vessels plus a further 32 fragments, and it continues to grow as more public institutions curating artefacts from the site are identified and as more private collectors come forward. A variety of theories have been proposed to explain the existence of this central Gaulish Roman pottery off the English coast, all of which will be explored below.

If we assume that the assemblage represents a cargo of close contemporaneity then it provides a unique and key opportunity to study a range of forms that were probably manufactured shortly before their loss. This can provide insights into how fashionable particular forms were, enables comparison of important typological details and provides information on the contemporaneity of potters working and transporting their products together at a particular time. The nature of the Pudding Pan assemblage, consisting largely of intact pots, enables analysis to be undertaken that would be difficult on a more fragmented assemblage such as that from Cala Culip or those commonly found on terrestrial sites. For example, it enables the study of variations in particular forms by particular potters in order to provide insights into the *modus operandi* of the samian workshops. Variations in form size could inform us about the number and variety of moulds, templates and guidelines used by particular potters and the methods by which the pots and 'standards' were produced. The rarity of a seemingly primary consignment of tablewares is enhanced by the absence of decorated samian wares from the assemblage, an absence that would be highly unusual were this group from a settlement site. This has prompted a variety of explanations that will be examined below. In addition, the assemblage provides a unique insight into the size and composition of a northern European cargo with the concomitant benefits that this brings to our understanding of trade in the provinces of the Empire.

Evans (1981: 527) suggested that the information that could be derived from the Pudding Pan cargo was limited as a consequence of it being recovered piecemeal in the 18th century. This trite and seemingly widely held assumption has never been challenged and may explain why this assemblage has received so little attention from samian specialists. It is true that the artefacts have been recovered piecemeal, but since the 18th century the site has continued to yield considerable quantities of samian ware so that the assemblage has reached a statistically significant mass with an unusually high proportion of complete or near-complete vessels. This, therefore, appeared to be an ideal site in need of reassessment and contextualization in the light of recent work, particularly in the field of samian research.

This study will re-examine Pudding Pan in a multiplicity of relevant contexts in order to elevate the site to the status it deserves as one of the major sites in the panoply of key Roman-period assemblages in northern Europe. The assemblage is enhanced by its maritime context as it provides primary evidence of samian *en route* to the end user and thus from the perspective of supply rather than the more usual evidence from terrestrial sites – rubbish discarded by the end user once it has been broken beyond repair. The cachet of Pudding Pan is further enhanced not only by the rarity of these site types throughout the Empire and complete absence of such sites in northern European waters (as illustrated in the previous chapter) but also by the quantities of complete or near-complete vessels that have been recovered. Throughout the Empire only Cala Culip has yielded larger numbers of samian vessels, but the bulk of its consignment was crushed by the heavier items of cargo, the Dressel 20 *amphorae* that composed the bulk of the shipment, as a result of the ship inverting during the wrecking process (Nieto Prieto *et al.* 1989).

The scarcity of similar sites having been established in the preceding chapter, the focus here will be the history of Pudding Pan, including an assessment of the various theories that have been expounded regarding the source of the material. This dispersed assemblage continues to be augmented, primarily through targeted research via contact with museums locally, nationally and internationally. It is also being extended through contact with the commercial fishermen of Whitstable, who still regularly dredge artefacts from the site.

First, however, it is necessary to define precisely to what the two terms Pudding Pan and Pan Sand refer. To date there has been much misinformation regarding their location and nature, often with a liberal interchanging of the two terms as if they refer to the same area. In addition, many theories have been expounded regarding the nature of the source material, questioning whether these areas were dry at the time of the original deposition of the Roman artefacts. Whether the site was terrestrial or maritime at the point of deposition is obviously crucial to its interpretation. So its approximate location off the north Kent coastline at the time of deposition must be ascertained through a brief examination of the relative topography of the coastline combined with other data from the region such as sea-level change, rates of land subsidence and coastal erosion. This will include analysis of the genesis of the unusual nomenclature that apparently derives from the recovery of pottery; the dates at which these terms came into common parlance may be informative.

Site location

Pudding Pan and Pan Sand are situated off the north Kent coast in the outer Thames estuary in an area generally known as the Kentish Flats at the eastern end of the Queens Channel (**Fig. 15**). Pudding Pan is approximately 6km due

Figure 15 Site location map

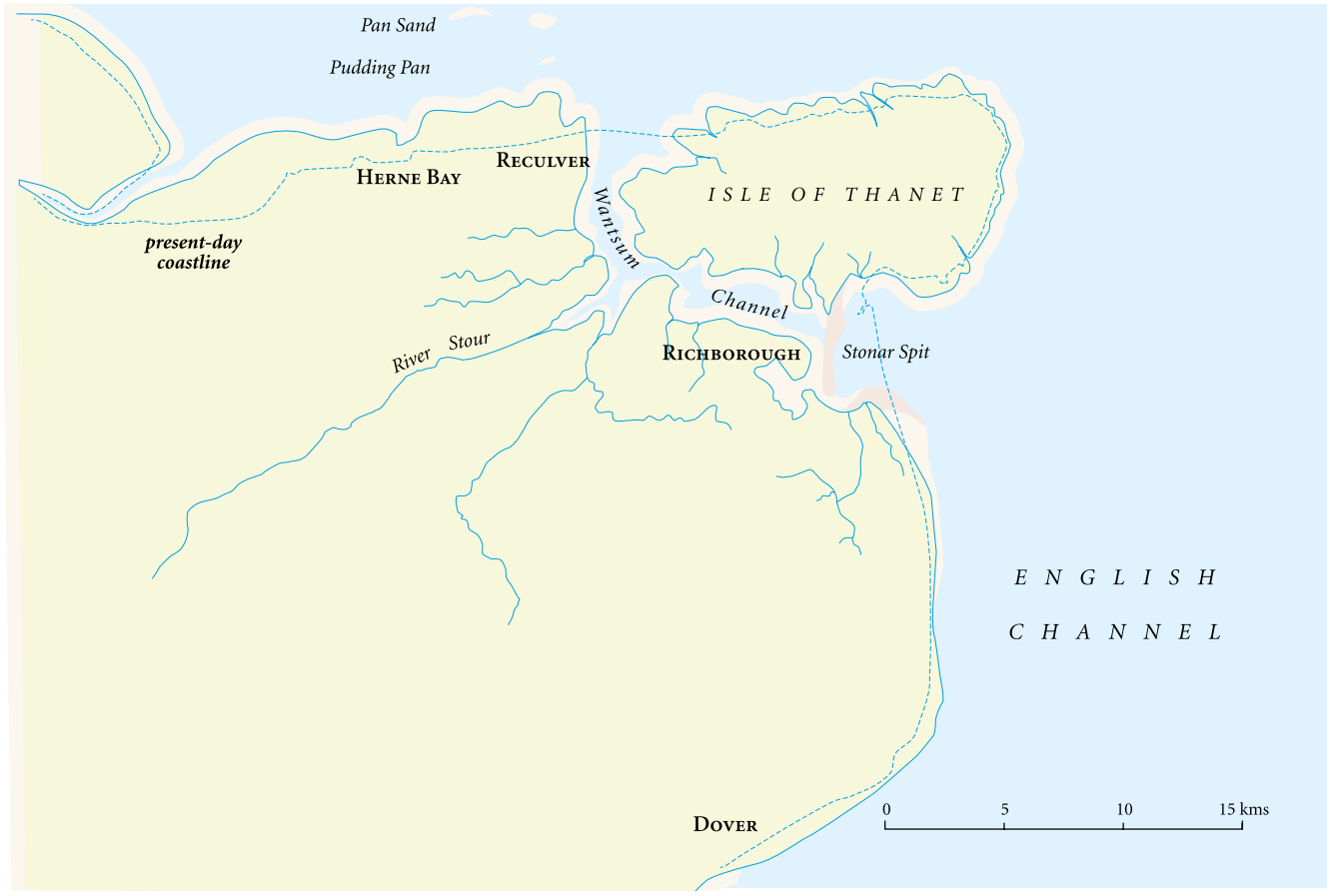


Figure 16 Conjectural reconstruction of the coastline of the Isle of Thanet in the Roman period (after Moody 2013)

north of the clock tower at Herne Bay, marked on the Admiralty chart for the outer Thames estuary (chart number 1607) as an area of cement boulders 2.7m below chart datum, surrounded by mud, sand, shale and stone. Pan Sand is a southward-curving, crescent-shaped sandbank with an east–west alignment, approximately 5.5km north-east of Pudding Pan, measuring some 2.3km in length by 0.15km at its widest point, marked by the Pan Sand beacon (Hall 1973 corr. 2013). Pudding Pan is currently approximately 7.5km north-west, and Pan Sand approximately 10.5km north-north-west, of the Roman shore fort of Reculver (*Portus Regulbium*). This fort 'guarded' the northern end of the Wantsum Channel, through which ancient ships passed to avoid sailing around the dangerous waters of the North Foreland (Isle of Thanet) (Walsh *et al.* 2013: 95; **Fig. 16**). The south-eastern end of the Wantsum Channel was similarly marked by the Roman fort of Richborough (*Portus Rutupiae*), which is now stranded some 3.2km inland from the sea. The site of the Roman harbour at Richborough, believed by many to have played a key role in the Claudian invasion of AD 43, has still not been identified with any certainty (see Moody 2008).

This channel, which separated the Isle of Thanet from the mainland, continued to be used as an important shipping route from the English Channel to the Thames as late as the early modern period. By the 15th century, however, although the Stour was still navigable as far as Canterbury the rest of the channel was a marsh and no longer navigable. The process of alluviation appears to have begun before the Roman period when the eastern end of the channel became partially blocked by a bar of shingle, the Stonar bank, which prevented the channel from being scoured by the tides. The build-up of mud deposits was exacerbated by the longshore drift across the eastern mouth of the channel of eroded cliff material from Deal northwards and by the erosion and redeposition of eroded cliff material from Reculver in its northern mouth. These natural obstacles, assisted by human intervention to prevent the flooding of pastureland in the Middle Ages, eventually caused the choking of the channel (Hawkes 1968: 225–9; S. Johnson 1976; Moody 2008: 35–52).

All that now remains is a broad arc of marshland varying in width from 1.2km to 4.8km, through which the Stour and other lesser rivers meander to the sea. The extent of the marshland today does not represent the coastline of Roman times, which is now buried to a considerable depth, as this boundary was reached relatively recently when the building of effective sea walls prevented further extensive deposition of alluvium by flooding. It has been estimated that there may be as much as 12m of alluvial mud covering the bottom of the Wantsum Channel. There has been a long history of marsh growth throughout the Middle Ages and it was probably far advanced even in Roman times, so there is no way of knowing the extent of the open water in the channel at the time. There is no record of the navigability of the channel in Roman times, but in the early 8th century Bede described the Wantsum as three furlongs broad and fordable in only two places, one of which was probably where the Roman road from Canterbury to Thanet crossed (Hawkes 1968: 225–9, fig. 24; Moody 2008: 35–52; Walsh *et al.* 2013:

Figure 17 The towers of St Mary's church that were originally built at the centre of the Roman fort of Reculver but which are now perched on the cliff edge. Note the remains of the Roman walls in the foreground

95). Still, the importance of the channel in Roman times can be gauged from the strategic siting of the shore forts to guard both its entrances (Pearson 2002).

In order to ascertain the relationship between Pudding Pan, Pan Sand and the coastline at the time of the deposition of the samian to provide a palaeo-geographical context, it is necessary to examine the evidence for fluctuations in sea level, land subsidence and rates of coastal erosion. The north Kent coast has been retreating for many centuries as a result of a combination of slow sea level rise and gradually dropping land levels, both being the long-term consequences of the last (Pleistocene) ice-age. Much of this coastline was shaped following the last glaciation, during the Holocene period (Halcrow 2010: 26). The extent of coastal erosion since the early 3rd century AD is graphically illustrated by the precarious state of the remains of the Roman shore fort at Reculver, approximately half of which has been lost to the sea (see Philp 1996: 9, fig. 5; **Fig. 17**).

The rate of coastal erosion at Reculver can be approximated from a number of references. John Leland recorded that in *c.* 1530 the fort was about a quarter of a mile or a little more from the sea (Philp 1996: 3), which is also depicted on Richard Caundish's marine chart of *c.* 1533 (see below and **Fig. 19**; Caundish is referred to elsewhere by the more modern 'Cavendish', but Caundish is used throughout here). A map of *c.* 1600 shows that this distance had reduced to less than 200m while another of 1685 shows the distance as less than 10m. The north wall of the fort collapsed on to the beach *c.* 1700, and by 1809 the sea was within a few metres of the church. The erosion has now been checked by the construction of massive sea defences, with the church, which was built in the centre of the fort, being now just a few metres from the cliff edge (Philp 1996: 3, fig. 2). The contrasting situations of Richborough and Reculver amply illustrate the complexities of determining the nature of the physical geography of this area in Roman times and its subsequent metamorphosis.

While the palaeo-geography of the area generally has been determined, the history of sea level change in this area is less well understood, particularly attempts to reconstruct the tidal range in the Roman era. Long-term records of general trends in relative sea level (RSL) change have traditionally been calculated in the field of earth sciences, focusing upon the dated litho-stratigraphic changes (which can be used directly to infer tidal height) recorded in the estuarine sedimentary record. In the wider area the main studies of note are those of Devoy (1979), within the middle Thames estuary, and Long (1991) within the East Kent marshes. Using the modern tidal range, Shennan and Horton (2002) calculated the rate of relative land subsidence/sea level rise in the Thames to be in the order of *c.* 0.74mm/year RSL rise in the last 4,000 years. However, if lower tidal ranges are considered, as seems more appropriate historically, the rate of RSL rise generally decreases.

Other studies have focused upon determining tidal height measurements from the archaeological structures present within the local estuaries. Waddelove and Waddelove (1990) attempted to calculate the position of the highest astronomical tide (HAT) from a number of Roman quays and revetments discovered in London, in the River Medway, and in Dover. They assumed that all such structures were designed to be positioned above the water level at the time they were constructed, so HAT could be inferred by deducting an extrapolated clearance (*c.* 0.5m) from the known height of the top of such structures. As a result they calculated a relative rise in sea level of *c.* 4.1m in the last 2,000 years. However such calculations are problematic as it is unlikely, for functional reasons, that

Figure 18 William Heather's chart of 1811 showing Pan Speck and Albion Knowl to the north-east of Pan Sand (highlighted by red rectangle). Comparisons between this chart and Captain Bullock's chart of 1844 (Fig. 21), which was based on his survey in 1839, illustrate the advances in marine cartography in this relatively short period following the establishment of the Admiralty Hydrographic Office

quay structures would have been constructed to a height that never flooded. Subsequently, some authors (e.g. Steedman *et al.* 1992) have attributed these quays to actual HAT, resulting in significantly lower calculations than those of Waddelove and Waddelove (1990). In contrast, Brigham (1990) has observed that the late Roman waterfront in London required continual rebuilding in order to maintain functionality, with a *c.* 1.5m drop in RSL occurring over its lifetime. Sidell (2003) reviewed the assessments of the sea level record derived from archaeological structures, and noted that although this should work in principle, its accuracy depended upon whom was responsible for constructing the waterfront (centralized government or local tenants), that it was impossible to establish the operative height of each quay (and the possibility that they were subject to flooding), and that the structures themselves may not have survived intact.

Sidell (2003) reassessed both sources of sea level history focusing on the inner Thames estuary. She calculated a model for the general trends in sea level calculated by sea level index points (SLIPs) which showed a rise of 1.9mm/year when based upon mean sea level (MSL) altitudes calculated using modern tidal range. By calculating these SLIPs using the calculated evidence of historic tidal range (less than 4m in the medieval period and *c.* 2.25m in the early Roman period, compared to the largest known modern tidal range of 8.17m at London Bridge), she calculated the rate of RSL rise must be reduced to possibly as little as 0.3mm/year for the past 3,000 years. While this value accounts for the general trend in sea level rise over this period, the archaeological record demonstrated the occurrence of shorter-term oscillations in RSL. Sidell (2003) found that the Roman waterside sites showed reasonable consistency in altitude, at a broad scale, with gradual decline in altitude of the working surfaces from the 1st century construction of the waterfront through to the final river wall in the 3rd century. Most significantly these numerous sites indicated a drop in relative river levels of up to 1.5m between the late 1st to the 4th centuries, though it was not possible to explain reasons for this observed drop.

Although the broad palaeo-geography of the coastline of the Thames estuary may have undergone relatively minimal changes since the Roman period (excepting land claim on the coastal fringe), the record of sea level change is potentially more complex than the general models of sea level demonstrate. The reduction in the construction of waterfront structures in London during this period does attest to a temporary reduction in river levels during this period and lower tidal range than found nowadays. However the general conclusion that can be drawn from these studies is that Pudding Pan would have been submerged and navigable in the late 2nd century with Pudding Pan approximately 3km and Pan Sand approximately 7km out to sea in Roman times, which is

Figure 19 Detail of Richard Caundish's chart of the outer Thames estuary of *c.* 1533, probably the earliest chart of this area. Pan Sand can clearly be seen (highlighted by red rectangle). It has been suggested that the decorative quality of this chart means that it was intended for the eyes of King Henry VIII. British Library, Cotton MS Augustus I.i.53

relevant to the discussion below regarding the nature of the deposit.

Can the variety of chart features in the vicinity that include the designation 'pan' be coincidental? Or do the appellations derive from the pots recovered from the site? As a precedent, the chart feature 'Albion Knowl' is marked on William Heather's chart of 1811 (**Fig. 18**) in a position that corresponds with the wreck site of the *Albion*, a ship of the English East India Company that sank in 1765 (Redknap 1990). Tyers (1996: 2) states that the sandbar known as 'Pudding Pan Sand' [*sic*] is the only place in Britain named after a Roman pottery type (see also Keate 1782: 125).

Pan Sand was known to Tudor hydrographers and appears on the earliest marine charts produced of this area; the origins of marine cartography in England date back only to the 16th century. Pan Sand is marked on Richard Caundish's chart of the Thames estuary from *c.* 1533 (Robinson 1962: 22; plate 5; **Fig. 19**), on William Burrough's chart of 1596 (Robinson 1962: plate 11), and as 'pan sand or gerdler' [*sic*] on Robert Norman's more accurate manuscript chart of 1580; Norman's was the first to illustrate the complex system of banks and channels in this area (Robinson 1962: 27–9, fig. 1). As the earliest published accounts of Pudding Pan only record the recovery of pots from some 200 years later, this implies that pots may have been recovered from the area much earlier than previously thought.

The range of bank and channel names in this area has remained relatively consistent over the last 400 years, and the identification of individual features is not problematic.

Although there is very little bathymetric data on these early charts they do provide some indication of deep water suitable for safe navigation and minimum depths over banks (Burningham and French 2008: 3). Although navigation markers like buoys and beacons were in use at the time of the earliest charts they were not marked (Robinson 1962: 23). Pan Sand, for example, is marked and buoyed on the Greenvile Collins' 'Coasting Pilot' of 1693 but is unnamed (Singer 1972: 9). This practice seems commonplace throughout the 17th century; although the sand bank is marked on charts it remains unnamed only to re-emerge in the 18th century on the charts of Philip Lea (1700) and Mount and Page (1769).

In contrast, the area known as 'Pudding Pan' is a much later addition to the marine charts of the area. It first appears on the survey of 1862–3 conducted by Staff Commander Calver which was published in 1865 (**Fig. 20**). Interestingly, it is missing from Captain Bullock's chart of 1844 (**Fig. 21**) and all subsequent corrections of this chart up to and including 1863. Nor does it seem to feature on any previous charts. Thus the first appearance of Pudding Pan can be dated confidently to 1862–3 and must relate to the growing awareness of the recovery of the Roman tablewares from this particular area.

Differences in datum used in historical charts present problems of consistency in the absolute vertical datum when attempting temporal comparisons (Burningham and French 2008: 6). However, there is no evidence of a significant change in the bed level of Pan Sand or the associated features of Pan Patch and Pan Speck to the north over the last 400 years (Burningham and French 2008: 20). Although the location of Pan Sand has remained fairly stable over the centuries since the area was first surveyed using more reliable techniques, its shape and orientation has changed considerably thus suggesting some mobility of the sandbanks in this area (see **Figs 22–4**). The extent of this mobility can be tracked and assessed by comparing the various marine charts that have been published for this important sea route since Caundish's chart of *c.* 1533 (**Fig. 19**). Obviously, the older the chart the less accurate the data and the more circumspect the conclusions that can be drawn from any comparisons. The charts commissioned after the establishment of the Admiralty Hydrographic Office in the early 19th century used more reliable survey techniques (Robinson 1962: 127); compare for example **Figures 18** and **21** which were published only 33 years apart. The most recent and most accurate Admiralty chart of the area (no. 1607) was published in 1973 (Hall 1973) with corrections published in 1981, 1988, 1992, 1997, 2001, 2004, 2006, 2009 and 2013.

A comparison of the zero contour line on this chart with subsequent corrections (**Fig. 22**) enables a detailed illustration of the morphology of the Pan Sand sandbank over a 40-year period. This comparison generally demonstrates a slight eastward shift through time with a trend of accumulation at the eastern end of Pan Sand and erosion at the western end of the sandbank, although the shape and orientation of the sandbank remains relatively stable.

The Admiralty chart (no. 1607) published in 1932 by Vice Admiral Douglas (corrected in 1939) shows Pan Sand slightly further south (**Fig. 23**) than on the 2013 chart, although it has the same general orientation and shape as the later charts. The position of Pan Sand on the 1898 corrected chart of Captain Wharton (1886) is slightly misleading as unlike the other charts, the 6 foot contour line is depicted rather than the area that dries. However, like the other charts, it does show that Pan Sand is in the same general area, which is indicative of a generally stable topography in the area over a longer timescale. This has some bearing on the discussion below regarding the cyclical nature of the pottery recovery (see Chapter 4).

Previous studies have found that systematic errors in the positioning of offshore features only proved problematic for historic charts up to and including the 1824 chart of Mackenzie, Spence and Thomas (Burningham and French 2009: iii). Notwithstanding this, earlier charts appear to show significant differences in morphology and orientation, compared to modern charts. The charts of Mackenzie (1775), Mackenzie, Spence and Thomas (1824) and Calver (1865) all illustrate Pan Sand rotated through up to 45 degrees from its current position. In the case of Mackenzie (1775) it is oriented along a north-west/south-east axis but in the 19th century charts it has rotated through 90 degrees to a north-east/south-west alignment, and seemingly extends from a longer bank connected with the 'Ridge', located further eastward (**Fig. 24**). The depiction of Pan Sand on the 1865 chart shows the sandbank much truncated. These changes in orientation should not be over-emphasized as they seem fairly superficial; the underlying sandbank appears stable in terms of location. This analysis concurs with other studies which found that the general framework of banks and channels in the greater Thames estuary has remained consistent over the *c.* 180 years between 1824 and 2003, and that the greater changes are associated with shifts in bank position rather than a broader downwearing or vertical growth. This study (Burningham and French 2009: 28) also found that the Pan Sand – Ridge – Tongue bank group had maintained their position, despite quite significant changes in planform and size. They concluded that 'the presence and distribution of features is remarkably similar to that depicted in 17th century charts, suggesting an inherent and significant long-term stability' (Burningham and French 2009: 30). Although earlier charts (pre-1775) identify Pan Sand, as stated above, their lack of accuracy and difference in scale renders comparisons meaningless (For recent indications of seabed morphology, see Chapter 5).

Why 'samian'?

Before examining the history of the site it is worth looking briefly at the term 'samian'. This is the term commonly used in English to describe a variety of red-gloss pottery imported to Britain mainly from Gaul and Germany between the mid 1st and mid 3rd centuries (Webster 1996: 1). Continental archaeologists use the term '*terra sigillata*'. 'Samian' was used in the Roman world as a generic term for earthenware, rather like the modern use of the term 'china'. The passage in Pliny (*Natural History* XXXV.46, 160–1) regarding pottery in general, and samian in particular, is ambiguous and has been a matter of considerable debate for centuries. It states that fine wares were widely traded by land and sea and the factories that produced them were famous. However, no

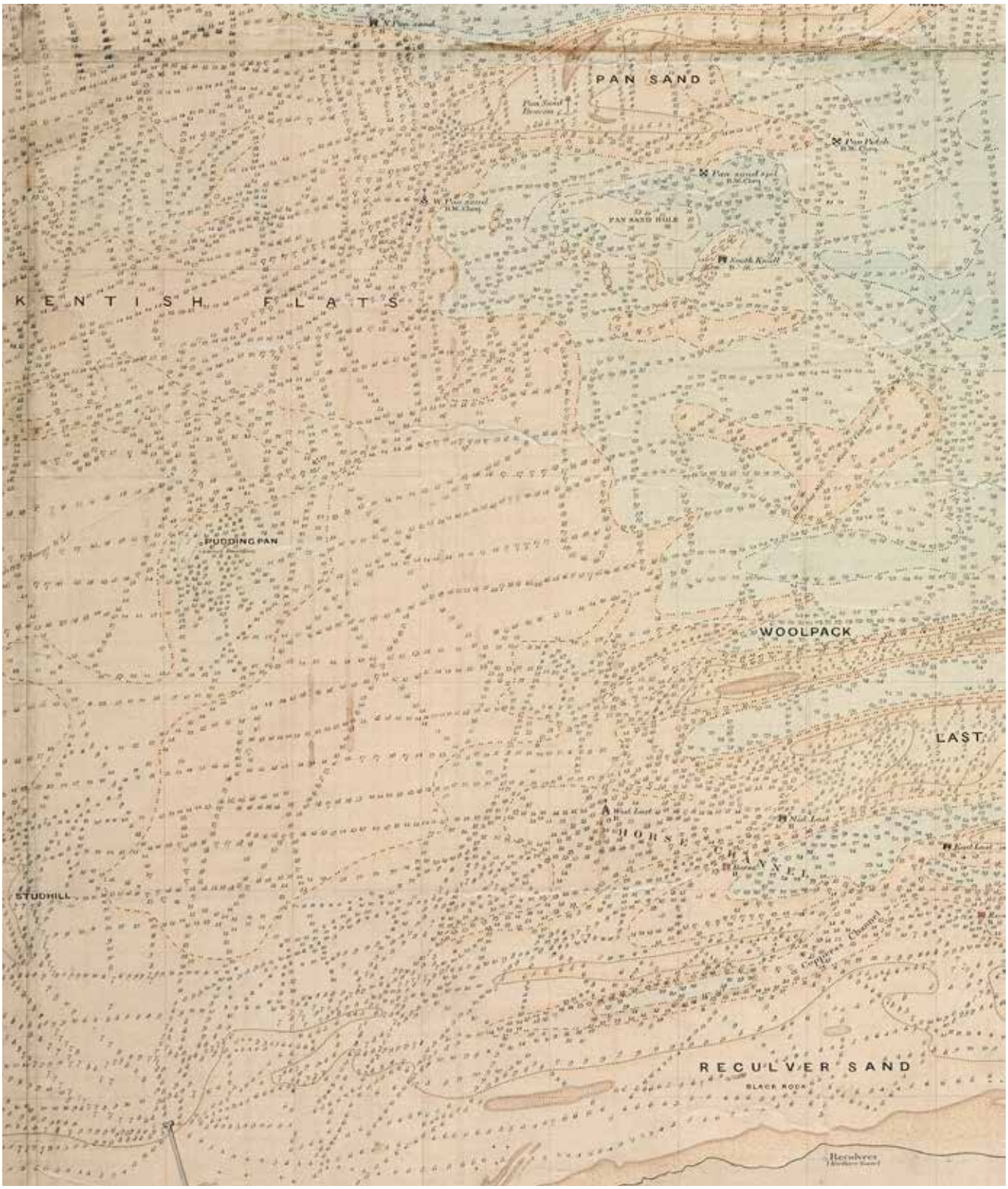


Figure 20 Detail of the survey conducted by Staff Commander Calver in 1862–3. As illustrated in this section, this appears to be the first document on which Pudding Pan (centre left) is identified/mentioned. UK Hydrographic Office, D7006 (3k)

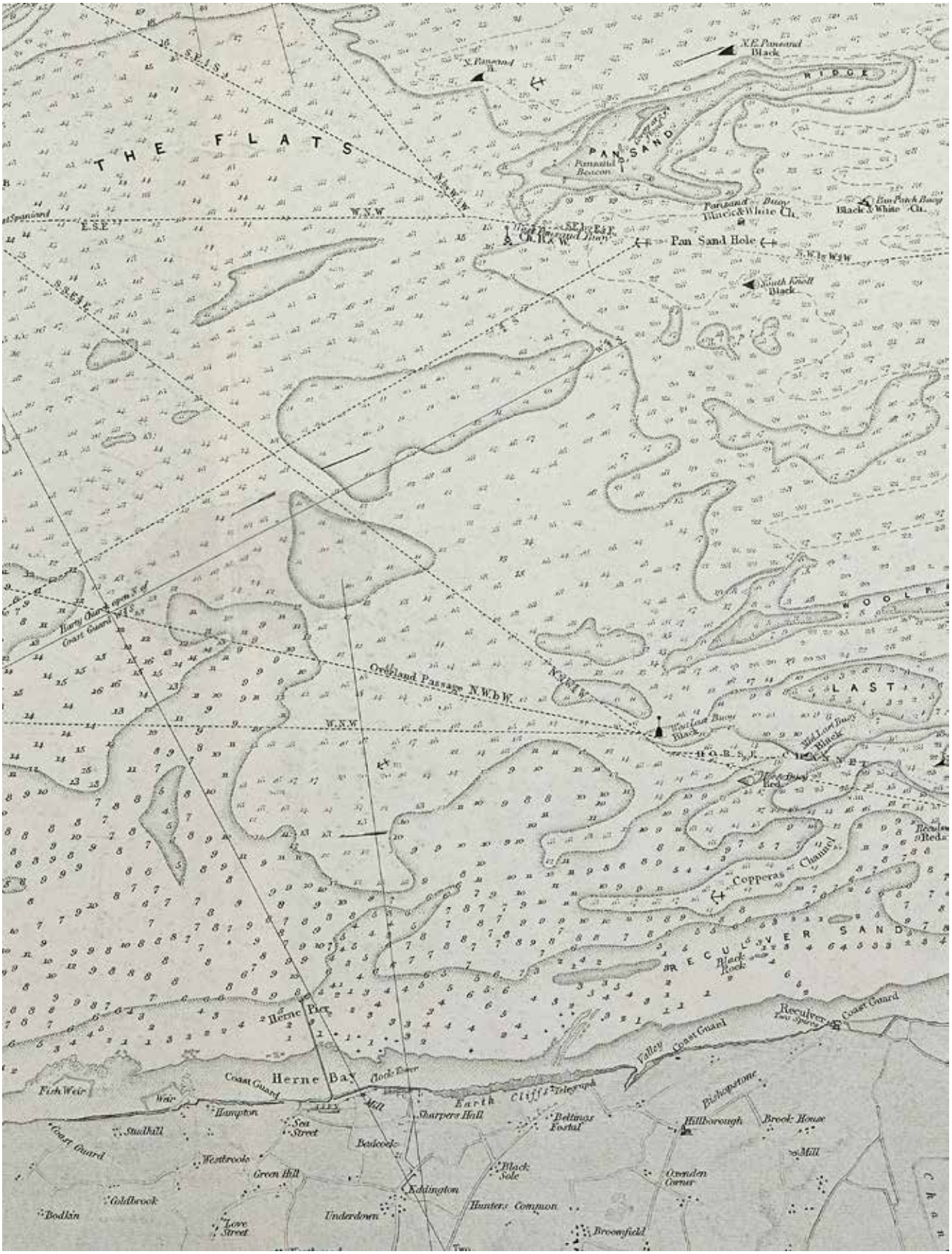


Figure 21 Section of the 1844 chart of Captain Bullock corrected in 1863, the same year that Calver was undertaking a new survey of the area. Although like Calver's survey Pan Sand is marked and labelled, in contrast this chart omits any mention of Pudding Pan in the area identified as such in Calver's survey. UK Hydrographic Office, 1607-A9

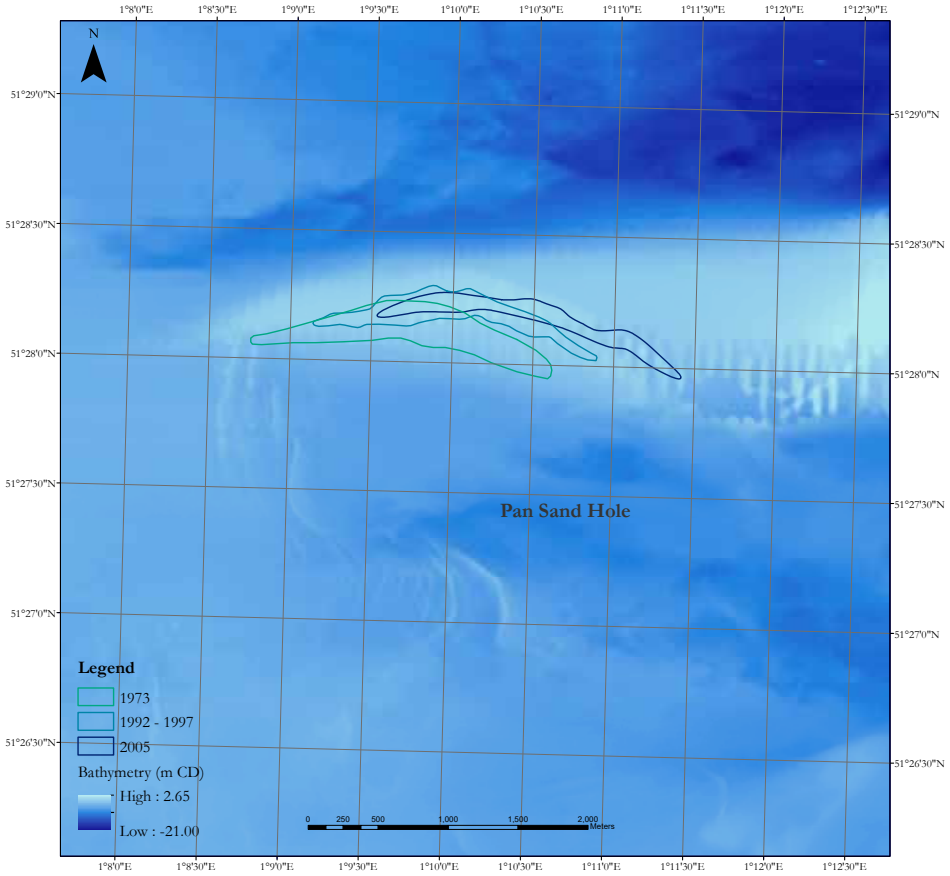


Figure represents the charted area of the main body of Pan Sand above Chart Datum

Basemap bathymetry is based upon data supplied by the Port of London Authority

1:15,000

Figure 22 A comparison of the morphology of Pan Sand (zero contour line) over 40 years as indicated on Admiralty chart no. 1607 (Hall 1973) and its subsequent corrections

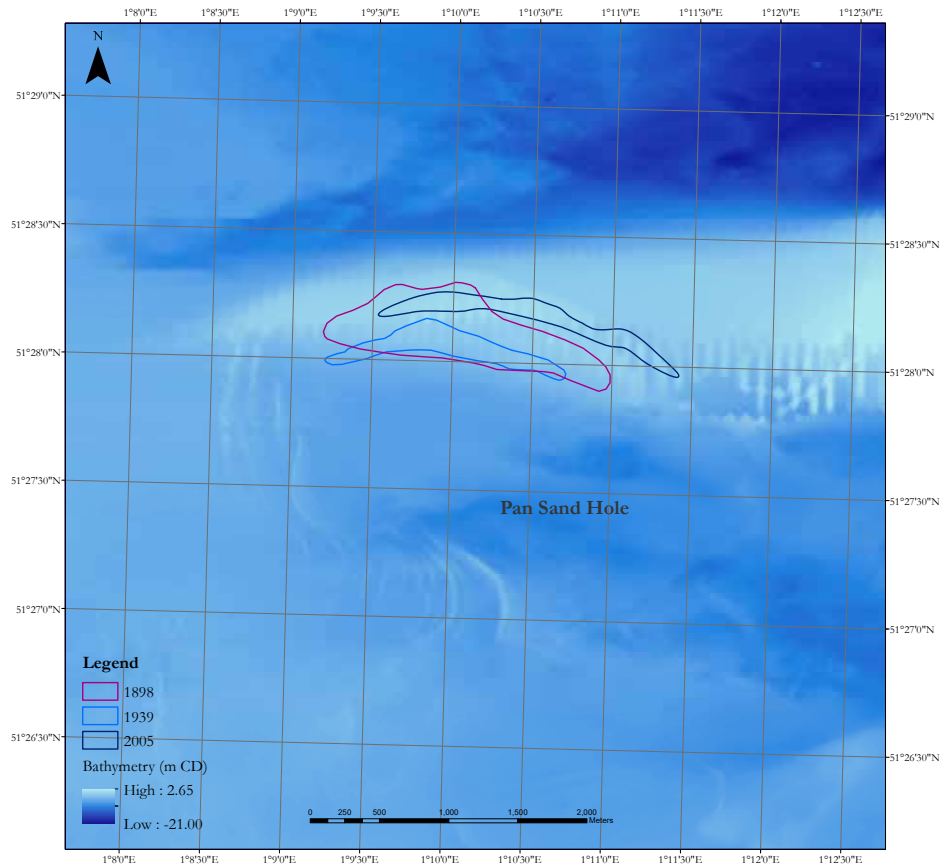


Figure represents the charted area of the main body of Pan Sand above Chart Datum

Basemap bathymetry is based upon data supplied by the Port of London Authority

1:15,000

Figure 23 A comparison of the morphology of Pan Sand at the end of the 19th century (1898) and on the eve of the Second World War (1939) compared to the position on the latest charts

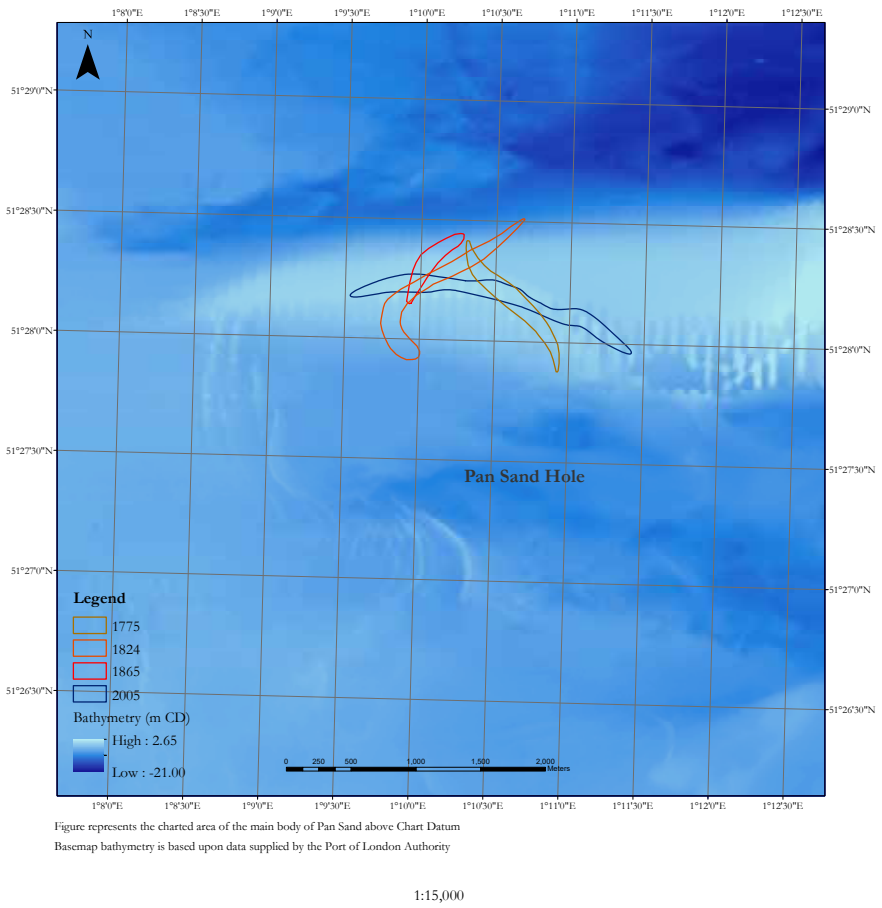


Figure represents the charted area of the main body of Pan Sand above Chart Datum

Basemap bathymetry is based upon data supplied by the Port of London Authority

1:15,000

Figure 24 A comparison of the morphology of Pan Sand over a longer time scale using the location of the sandbank as marked on the charts of Mackenzie (1775), Mackenzie, Spence and Thomas (1824), and Calver (1865) overlaid on the modern position of Pan Sand

ancient writer ever referred to colour when mentioning samian so it is surprising that it has become identified with red-slipped pottery. The 7th-century AD writer Isidore of Seville claimed that pottery vessels were first invented on the island of Samos, hence the name 'samian', but did not state that they were red. He also claimed that the name derived from a clay called 'samian' but neither claim has any independent historical validity (B.R. Hartley 1969: 235; Hayes 1972: 9; King 1980; Evans 1981: 522). Others claim, erroneously, that samian is named after the Latin verb '*samiare*, meaning to polish' (Bédoyère 2000: 18) but it seems more likely that *samiandum* refers to the preparation of the slip from the clay and that *samius* was a general term applied to glossy pottery. Thus, the term 'samian' is more appropriate than '*terra sigillata*', which literally means 'earth with little figures' so should be applied only to decorated wares (King 1980: 142–3).

The pots from Pudding Pan played a significant role in the association of the term 'samian' with red-slipped pottery (**Fig. 25**). Probably the earliest English reference to samian was by Governor (of Massachusetts) Thomas Pownall in 1779, referring to the red Roman pottery fished up from the Thames that he called 'Ionian or Samian'. He cited the 18th-century Dutchman, Samuel Pitiscus, who had claimed that pottery made from 'samian' clay turned red in colour. Pownall later treated as convention his association of this pottery with the 'samian mentioned by Pliny' and others followed suit. Subsequently, Roman red-slipped pottery found in Britain was generally known as samian largely because of this misinterpretation (Tyers 1996: 2; Evans 1981: 522–3, 531, n 12; Hayes 1972: 4). Like the lower case 'c' in china, a lower case 's' is used in samian to denote a distinctive class of tableware rather than a geographical location (Stanfield and Simpson 1958: xxx).

The first and most extensive classification of samian was made by the German archaeologist Hans Dragendorff in 1895, and this remains the standard classification (Johns 1971:18). It was not universally accepted until *c.* 1911 (see Evans 1981: 518). Indeed Reginald Smith (who wrote the early 20th-century analyses of the site) attempted a classification based upon the 'Pudding Pan Rock' assemblage in 1907–9 (designated PPR forms 1–15, with a 16th form that in 1907 had not been recovered from the area; see plate section and **Fig. 43**); it was never adopted, although occasional reference is made to this series in modern samian reports for precise paralleling of specific vessel forms. Following Dragendorff's lead, Déchelette continued his work on the Continent in 1904, while Walters (1908) published a catalogue of the Roman pottery in the British Museum and added a couple of form types. Knorr, Ritterling, Curle and Ludowici further extended the series but some forms were variants of previous classifications (Oswald 1931: xiv). In 1920, Oswald and Price collated this work in a single comprehensive volume (B.R. Hartley 1969: 241; Marsh 1981: 176) but retained the original nomenclature.

More recently, the plain wares of Lezoux, which constitute the bulk of the assemblage under consideration here, have been reclassified in a more systematic fashion, which is updated on a decennial basis (Bet *et al.* 1989; Bet and Delor 2000). This new classification, although 'arbitrary like all classifications' (ibid.: 461), has renumbered the entire known output of the Lezoux pottery workshops, grouping pottery sets consecutively and thus regularizing and harmonizing the catalogue in a more orderly and logical fashion. In addition,

Figure 25 A selection of samian vessels recovered from Pudding Pan and now in the Whitstable Museum collection. Note the excellent condition in which many of the vessels have been recovered which is remarkable given their age and the method of recovery

numbers have been reserved for future discoveries that will fill any gaps in the present assemblage, thus obviating the need to reclassify the ensemble in future years.

Nevertheless, as Bet and Delor (2000: 461) advocate, 'this typology should be used in addition to existing typologies: the typologies of Dragendorff and Déchelette among others, remain unavoidable'. It would be preferable to utilize this new classification system in this study for three very good reasons: first, the samian assemblage from Pudding Pan is composed almost entirely of central Gaulish plain forms so it makes sense to use the most up-to-date classification system; second, this system corrects and clarifies errors made in previous classifications; and, third, it is presented in a far more logical format. This is not to say that this new system is completely faultless; the 'service' labels are completely erratic and forms that may make up sets (e.g. 036 and 054–6) are not consecutively numbered. Although this reordering will be more beneficial in the long term the renumbering is likely to lead to considerable confusion in the short term, not only because the Dragendorff system is so embedded but also in this case because the Pudding Pan assemblage has been previously reclassified (see Smith 1909; Watson 1987). In the interest of expedience this study will use both systems, replacing errors in the old system with the new classification.

Some of the errors that are corrected include forms such as Dragendorff form 46 and Curle forms 15 and 23 that are represented in the Pudding Pan assemblage. Indeed, Bet and Delor (2000: 469; cf. Webster 1996: 57–67) are unequivocal in their criticism, stating that the name Dragendorff form 46, which comprises three definitely different forms (types 042, 044 and 048), 'must be totally banned today'. In addition, there has been considerable confusion between Dragendorff form 31 and form 18/31; Bet and Delor (2000: 470; *contra* S Willis, pers. comm.) believe that only Dragendorff form 31 bowls were produced at Lezoux and they have distinguished three groups (054/055, 056 and 057). Thus, to continue to use the old classification system is to perpetuate these confusions. For example, Watson (1987: fig. 4) conflates Curle forms 15 and 23 when in fact the former has an upturned rim while the latter is downturned. Moreover, the old typology has been amended and updated so many times that it is impossible to utilize without the employment of numerous prefixes to designate which amendment is being referenced. We have therefore reached a stage in our knowledge where the adoption of a new unified system is necessary. This new classification also represents the current state of research into the typology of the plain samian wares of Lezoux, including the latest techno-chronological groups, without the need to allot fixed absolute values. Henceforth, where appropriate this study will use the new numbering system; the equivalent classifications of specific forms of Dragendorff, Déchelette *et*

Figure 26 Artefacts recovered during recent controlled dredging in the area from which Roman artefacts are believed to have been recovered. Several samian sherds were recovered including one complete samian dish, a Dragendorff form 80 and a roof tile, possibly a Roman *imbrex*

al. that are relevant to the Pudding Pan assemblage can be found in a concordance (Appendix 3).

The historiography of Pudding Pan

The first published references to this site (**Table 7**) occurred in 1779 (Pownall 1779), at which time the historian Hasted also mentioned it (Porter 1978), although there was an earlier reference in the Society of Antiquaries' minutes from 1755 (Smith 1907: 271). Jacob (1782: 122) claimed to have been investigating the site since *c.* 1740 and suggested that artefacts were recovered from the site some unknown time before 1720. It seems likely that previously recovered material may have gone unnoticed, as its great antiquity was not recognized. In 1773, John Pownall (brother of Thomas) was shown a collection of samian dredged from the sea off Whitstable by a surgeon from Sandwich (Pownall 1779: 283). He reported that he was shown:

> many fragments, and some entire pieces of Roman pottery, which he informed me had been taken out of the sea upon the coast of Kent, in a particular spot near the entrance of Whitstable bay, by the fishermen of that place; and that it was generally supposed by Antiquaries to be part of the cargo of a Roman ship laden with pots, and wrecked on the coast (Pownall 1779: 283).

Reports suggest that the fishermen of Whitstable used the pottery as tablewares, a practice that continued until relatively recently:

> I at last found an old fisherman, who had in his possession, two or three of these Roman pans, which were in common domestic use. The man informed me, that he had at different times, and more especially in dredging for oysters after tempestuous weather, taken up large quantities of the same and other sorts; but that it was only at one particular place, which he described to be at two or three leagues from the shore, and which was well known to the fishermen by the name of *Pudding-pan-Sand*, or rock (Pownall 1779: 283).

Table 7 Chronology of publications of Pudding Pan

Date	Author
1779	Thomas Pownall
1782	Edward Jacob
1782	George Keate
1861	John Brent
1877	Charles Roach Smith
1885	F.C.J. Spurrell
1887	George Payne
1907	Reginald Smith
1909	Reginald Smith
1932	William Page
1972	Hugh Singer
1978	T.E. Porter
1989	P.R. Sealey and P.A. Tyers
1999	Michael Walsh
2000	Michael Walsh
2002	Michael Walsh

This statement may have been the genesis of the confusion that has largely prevailed until the current study as it states that the material came from one place but conflates two discrete areas (see Jacob 1782: 121).

In the first published account, Thomas Pownall (1779: 290) recounted how his brother, John, was taken to the spot where the pots were found. John Pownall described the location of his dredging survey, which the old fisherman directing him had some difficulty finding, as:

> the entrance of a channel at the back of Margate-sand, now known by the name of the Queen's channel, at about two leagues from the coast … Upon the first hale of the net, along one side of it we brought up a large fragment of brick-work cemented together, which I guessed might weigh about half a hundred weight, together with some small pieces of broken pans: upon a second hale we took up a few small fragments of pans; but upon further trial we brought three entire pans (Pownall 1779: 284).

This must be one of the earliest maritime archaeological investigations. Thomas Pownall's contemporaries were dubious of this account to the point of incredulity. Jacob (1782: 122), for example, wrote:

> The Commissioner therefore was exceedingly successful in taking three intire [*sic*] pans besides fragments in so short a trial, whereas our fishermen hath for above these thirty years dredged upon and around this rock, and yet never procured more than one intire [*sic*] pan, though many fragments of them.

Although it does not authenticate Thomas Pownall's claims, it should be noted that the current study replicated John Pownall's experiment with similar results (**Fig. 26**). If it is to be believed then Thomas Pownall, rather than his brother John, identified the spot as Pan Speck (see **Fig. 18**). Jacob's attempt to replicate the dredging survey in the same year failed to recovery any artefacts (1782: 122).

John Pownall's assurances that the 'mass' of brickwork was Roman led Thomas Pownall to the conclusion that this was a submerged manufactory of the potter Atillianus [*sic*] (**Fig. 27**) as, he claimed, this was the only name that he had seen on all the stamps, a claim contradicted by the editor's note appended to Pownall's paper (see Pownall 1779: 290; *contra* Jacob 1782; Keate 1782; Smith 1907: 271). Moreover, Thomas Pownall accounted for the absence of decorated wares by suggesting that these were holy vessels for use in 'Numa's pious humble institutions', unlike the 'richer vessels of parade and luxury' (Pownall 1779: 288–9). Pownall also suggested that the name Speck derived from the fact that only a speck of the island on which the manufactory stood, as mentioned in Ptolemy's second book of geography, remained visible. Pownall's account is so full of inaccuracies, such as his confusion and amalgamation of Pan Sand and Pudding-Pan Rock and his ignorance of evidence that invalidated his main conclusions, that it cannot be relied upon (see Smith 1907: 271).

As Edward Jacob, FSA (Fellow of the Society of Antiquaries) (1782: 121) pointed out, 'The Pan-Sand is close to and forms the north side of the Queen's channel, consists entirely of sand, becomes dry for some part of every tide, and is never dredged upon by our fishermen. On the contrary the Pan-Pudding Rock is never dry.' Jacob (1782: 122) located 'Pan-Pudding Rock' 'right in the passage from the Narrows

Figure 27 A good example of the stamp of the potter known as Atilianus i using die 5a (ATILIANI.M). Whitstable Museum, W.1988.1000.17

or the Woolpack to the Buoy of the Spaniards'. Like Pownall, the diver employed by Smith (1909: 397) also had problems locating the area, calling into question the very existence of 'Pudding-Pan Rock'. This is hardly surprising, as Pudding Pan, described on the charts as 'cement boulders', does not refer to a solitary outcrop but rather an area spread with small, fairly insignificant rocks up to 250–300mm in size.

John Brent FSA (1861; *contra* Smith 1907: 277) supported the suggestion of a submerged pottery, while Spurrell (1885: 281, n. 2; 284; *contra* Smith 1907: 275; Watson 1987: 35) suggested that one wreck could not account for the quantity of pottery that has been found. He developed the idea of a pottery into a town or village of potters from the abundance of bricks, mortar, stones and tiles! He offered little new supporting evidence for this view other than a claim that 'over thirty whole [roof tiles] of a red colour were obtained on one spot not two years ago' (i.e. in 1883). Each *tegula* measured 445 × 340mm, while the ridge or channel tiles (*imbrices*) measured 445mm. If this claim were true then it would undoubtedly provide the best indication yet of the location of the source of the Roman artefacts. Frustratingly, Spurrell (1885: 282) failed to provide any indication of where this spot might have been although he was the first author to cite both 'Pan Rock' and Pan Sand as the finds locations, and to record that black pots were recovered but ignored as the red pots sold for a 'shilling'. These pots were referred to by Pownall (1779: 287; Smith 1907: 270) as dark Tuscan brown or black, thin, light and of a finer texture than the samian ware. He did not see any complete vessels of this type because their 'thinness and fine texture rendered them so liable to be broken'. The nature of these black-glazed pots will be discussed Chapter 4.

In contrast to the other theories, Reginald Smith (1907) considered the wreck of a cargo-boat freighted with Gallo-Roman pottery sometime in the 2nd century AD an historical event. Smith was the Keeper of Romano-British collections at the British Museum and was also a Fellow of the Society of Antiquaries, whose members had taken a keen interest in the site. Smith conducted the first serious study of the site, compiled the first catalogue of the assemblage and oversaw the first scientific underwater investigation of the site. He also attempted one of the first classifications of samian ware and published drawings of the main forms recovered from Pudding Pan (see **Fig. 43** and plate section). In addition, he not only dated the site and identified the provenance of the samian but also suggested that there may have been more than one source based on the broad date range represented.

Figure 28 The London 555 *amphora* recovered from north of Pan Sand undergoing analysis at the National Maritime Museum. This *amphora* still contained 6,206 olive pits or stones

Smith (1907; 1909) offered three explanations, besides naturally concreted gravel or masonry, for the 'brickwork' recovered by John Pownall: navigation marks on a brick or stone foundation; a small lighthouse; or the ballast of stranded ships. He later concluded that the 'Roman brickwork' was probably cementstone covered with seaweed and marine growths and reports that the roof tiles show no signs of usage, suggesting that they made up part (1909: 406), if not the bulk, of the cargo (Rhodes 1989: 50). The large number allegedly found would discount the notion of a roofed galley area as posited for the St Peter Port wreck (see Rule and Monaghan 1993: 130).

By 1909, Smith had investigated 282 vessels from the site (216 of which were stamped), although two vessels have now been discounted as their provenance is extremely dubious (see below). Smith (1909) had not seen a single waster or vessel spoilt in firing, nor any other paraphernalia normally associated with kiln sites. He suggested that all the pieces were once perfect, finding no signs of usage (*contra* Watson 1987), but that the scour of pebbles had destroyed the foot-rings of large numbers that had been resting on the 'Rock' in an inverted position. He suggested that the recurrence of forms supports a common origin; only one form (PPR form 15) was represented by a single specimen. He concluded (1909: 400, 412) that 'this remarkable series is homogeneous, the work of a group of [contemporary] Gaulish potters, of whom most are known to have worked at Lezoux', dating the wreck to between AD 160 and 190.

Smith reported that:

> ninety-six potters are known to have made figured red ware bowls at Lezoux … There are two names common to the Pudding-pan Rock specimens and the moulds for third century slip ware found at Lezoux, and of the thirty Rock names I have been able to collect at least six are known as those of Lezoux potters who stamped figured bowls as well as the plain ware before us; while seven others are recorded from the Allier district. None of the potters emanated from any other district of Gaul, Italy, Germany or Britain … Fifteen of the potters' names from Pudding Pan also occurred in London finds (1907: 278).

It is not unusual to find a name in more than one form. This is a peculiarity accounted for by the number of stamps required to stamp the pots with the name of the workshop, which resulted in potters using different and sometimes many dies, all of which bore their name, to stamp their pots. The die cutting of the name was perhaps often undertaken by ear or included abbreviations (Roach Smith 1877: 119).

Smith accounted for the absence of decorated wares amongst the Pudding Pan assemblage as a period of transition at Lezoux between moulded decoration on bowls and applied ornamentation. 'After the old style had gone out and before the new had come in, these potters seem to have contented themselves and their customers with plain wares … If either was in fashion when the wreck took place, it would surely have been included in the cargo' (Smith 1907: 289; *contra* Haverfield 1911: 117). He concluded (1909: 412) that the production of figured vases ceased at Lezoux many years before the factory was destroyed in AD 259 and that plain ware only was produced over a certain period. He accepted that applied designs began in the early years of the 3rd century AD so, as neither has yet been recovered from Pudding Pan, he placed the wrecking between 160 and 190 AD. Although Smith's dating of the assemblage was broadly accurate his notion of a period of transition when only plain wares were available has not been observed on terrestrial sites. Moreover, B.R. Hartley (1969: 239) states that moulded bowls were made throughout the history of samian production. The apparent absence of decorated wares will be discussed below. The fact that many of Smith's conclusions remain incontrovertible bears testament to the rigour of his investigations.

Many of the early reports discussed 'Pudding Pan Rock' as though it were an actual outcrop of rock upon which the Roman vessel was wrecked, a notion that is surprisingly enduring (see Bédoyère 2000: 15), and investigators have spent much time looking for this rock as an indication of where the wreck might lie. It was not until Smith's diver visited the site (1909: 397) that this notion was quashed when it was confirmed that the rock referred to an area of 'cement boulders'. Smith postulated (1909: 398) the existence of two wrecks from evidence of pots recovered near Pan Sand that bore potters' names not included in the 'Rock' series (see Payne 1887: 155), such as ACCIVS (nothing similar in *NOTS* 2008–12), CONGI (Gongius 2a; *NOTS* 2009a) and MVXTVL (Muxtullus 7-a; *NOTS* 2010). None of these names were recorded during the current study, possibly because they were no longer associated with the 'Rock' series, probably as a direct result of Smith's study. They are

Date	Investigator	Operation	Outcome/Source
1773	John Pownall	dredger survey	brickwork, 3 pans and fragments
1779	Edward Jacob	dredger survey	no artefacts
1908	R. Smith/Hugh Pollard	dredger and diver survey	3 pottery fragments recovered
1955	P. Stiles/Sheffield British Sub-Aqua Club	diver survey	*Whitstable Times*, 17.9.55
1961	British Sub-Aqua Club divers	geophysical and diver survey	*Whitstable Times*, 6.5.61
1979	P. Mensikov/H. Singer	diver survey	
1985	Marine Archaeological Surveys/Mark Redknap	geophysical survey	*Whitstable Times*, 8.8.85
1988	Kit Watson	geophysical survey	*Independent*, 30.4.88
1997–2002	Roman Shipwrecks Project/Michael Walsh	geophysical surveys	anomalies identified
1998–2002	Roman Shipwrecks Project/Michael Walsh	dredger and diver surveys	1 dish and several fragments
1999–2001	Archaeological Diving Unit/Martin Dean	geophysical survey	anomalies identified
2014–15	M. Walsh/ University of Southampton	geophysical survey	anomalies identified

Table 8 Chronology of site investigations at Pudding Pan

recorded in Oswald's (1931) corpus but their Pudding Pan provenance has been called into question (Atkinson 1942: 143). Their significance will be discussed below. Smith speculated that this second 'wreck' dated to the middle of the 1st century AD, a date supported by the discovery in 1983 of an *amphora* (London 555 type) complete with its original contents of olives found 500m north of Pan Sand (Sealey and Tyers 1989: 53) (**Fig. 28**). Its discovery seems to have been the catalyst that sparked renewed interest in the site after a prolonged period of inactivity.

Besides the surveys conducted by Pownall and Jacob in the late 18th century, and Smith's in the early 20th century, there have been several more recent unsuccessful attempts to locate the site (**Table 8**). Before the current study, these more recent surveys can be characterized as rather half-hearted and unmethodical, with unsurprisingly disappointing results, none of which were properly published, apparently leading to a number of rather cynical publications questioning the very existence of the site (Porter 1978; MAS 1986), as reflected in the title of Singer's (1972) two-part article for *Sub-Aqua* magazine, 'The wreck that never was'. This period culminated, however, in a more detailed and scholarly assessment of the recovered assemblage (Watson 1987).

Watson examined 128 plain samian vessels and reported a further 120, of which eight were not Antonine/central Gaulish. He postulates (1987: 25) that some of this material might be earlier in date, possibly pre-Flavian, that is to say of the mid 1st century AD, supporting the notion of an earlier wreck to the north of Pan Sand. In addition, he locates one *amphora*, four *tegulae*, one *imbrex*, one ARS vessel (form 3B) and, rather surprisingly, one decorated Dragendorff form 37 bowl. He first notices the asymmetric wear patterns and reports that 45 per cent of his study sample shows signs of 'tilt', often at an angle of 30°, while 6 per cent (or eight examples) displays even wear (1987: 30). He argues that the wear patterns suggest that the pots were resting in inverted stacks, which is known to have been employed in Roman times as a convenient method for conveying and storing vessels and is borne out by analysis for the present study.

In summary, we can see that although this site has been 'known' for some considerable time we have still not located the actual source of the material, and there has been much confusion about the area, between Pudding Pan, Pan Sand and Pan Speck. In addition, the known assemblage continues to grow and provide more information. Many of the early theories were rather ill considered and can therefore be discounted. Smith (1907; 1909) suggested that there might be at least two wrecks, one from the 1st century AD, and one from the 2nd century, from which the majority of finds came. The recently discovered 3rd-century material offers the tantalizing possibility of a third source of material. Smith compiled the first comprehensive catalogue of the site while Watson undertook the first site evolution analysis. However, we are still not much closer to discovering the actual source of the material, which remains an intriguing prospect.

Before assessing the enhancement and analysis of the assemblage since the work of Watson, almost 30 years ago, the next chapter will attempt to trace the biography of individual pots and collections of pots in an effort to confirm the Pudding Pan provenance of museum holdings that allegedly derive from there. As might be expected, this has not been wholly successful as many of the biographies are incomplete owing to poor and partial museum accession records. However, an overall impression of the route through which various museums acquired their Pudding Pan material is possible. Where available, museum accession dates provide *termini ante quos* for the collection of pots, again presenting a very rough indication of the rates at which the pots were collected. Although this is very imprecise, as we have no indication of how long a pot has been in a particular collection, in many cases it is the only reliable information we have. It may be possible, with the available evidence, to discern a cyclical recovery of pots, as has been suggested by some (Dean 1984). Are there periods when greater quantities of pottery are recovered, and can this be related to increased oyster dredging? Has there been a noticeable decline in the number of pots recovered since the 19th century and especially since the Second World War as some accounts (Jefferis and McDonald 1966: 172; Singer 1972) suggest?

Chapter 4
The Biography of Pudding Pan Collections

> From the sale of Kemp's collection [1717] till the close of the 18th century, the collectors of London antiquaries were still few … such few antiquaries as were found, passed into collections like those of Strawberry Hill … Things thus remained till within the last 25 or 30 years … From this [excavations for London Bridge *c.* 1830 (Rhodes 1986: 199)] Mr Roach Smith procured some of the chief riches of his remarkable collection … To whom belongs the duty of gathering and preserving collections such as this? Is it the Corporation of London or the trustees of the British Museum? Both, as it would seem, repudiate the noble duty; for both, within a short time, have negatived [*sic*] the purchase of Mr Roach Smith's museum … But the Corporation of London would seem to think that the duty belongs to the trustees of the British Museum; and they; in spite of the pleadings of their own officials, and of eminent men of every kind, ignore it altogether (Anon. 1855).

The previous chapter highlighted, and endeavoured to dispel, many of the more outlandish theories regarding the nature of the source of the central Gaulish samian off the north Kent coast. It is now generally accepted that the site represents either a shipwreck (or wrecks) or a jettisoned cargo but other myths about the site have developed. These have been perpetuated in recent years largely as a result of numerous unsuccessful attempts to locate the site(s) and a lack of serious academic interest. Until the present study the size and composition of the assemblage had been grossly underestimated owing to its dispersal via private collectors to both national and international institutions. An unquantifiable, but possibly significant, proportion of the assemblage undoubtedly remains in private collections. Pots may well have been sold instantly upon landing or on market days by fishermen to as yet unidentified individuals. Evidence, including the site name, indicates that intact and serviceable vessels would have been a welcome addition to kitchen paraphernalia in the 18th and 19th centuries. At the time of Smith's investigations the majority of the vessels he recorded (1907; 1909) were privately owned.

The most often repeated and potentially damaging assumption is that the site has been widely dispersed and no longer exists bar a few isolated artefacts, insinuating that efforts to locate the site are pointless. Without the kudos of a yet-to-be-located mother lode the recovered assemblage is considered uncontextualized and is thus perceived to lack any serious significance, which might explain academic indifference. Offhand comments such as, 'the Pudding Pan cargo was recovered piecemeal in the 18th century so the information that can be derived from it is consequently restricted' (Evans 1981: 527) proliferate, and engender indifference towards the site. However, this study has shown that the known samian assemblage now comprises 526 verifiable samian vessels, as well as a further 32 fragments, making the consignment one of the most significant deposits of Lezoux samian in Britain and certainly one of the largest assemblages of unused samian pottery. In addition, this assemblage is the second most sizeable from a maritime context throughout the Empire while, in the absence of similar evidence, its northern European location significantly increases its importance.

Contrary to popular belief, significant quantities of samian continue to be recovered from the site, which is remarkable given the decline in the volume of fishing since

the late 19th century. This suggests that a considerable, cohesive deposit remains buried in the sands of the Kentish Flats. The assumption that this 'uncontextualized' assemblage has little to contribute to our understanding of the cross-Channel trade in samian will be challenged. Also, the rate at which the pottery has been recovered from the area will be assessed by investigating the biographies of individual vessels. It is difficult to be entirely accurate about when and where the pots were recovered, as although the original collector can often be identified the date of acquisition of a particular vessel has not usually been recorded. However, it is generally known when a collector was actively collecting so perceived cycles in the recovery of vessels can be identified and then compared to the economic cycles of the oyster-fishing industry. This analysis should then establish whether the recovery of pots has been in terminal decline since the Second World War or whether there are other factors that have yet to be fully considered.

The biographies of the known assemblage will be investigated in order to establish the routes by which samian wares arrived in their current locations. Revealing the collections through which particular artefacts passed may provide some indication of the dates when the material was originally found. Tracing the biographies of various collections will also make apparent what proportion of vessels originally held in private collections was eventually acquired by public institutions. This should provide some indication of the proportion of the assemblage that is still held in private collections, thus enabling a more accurate estimation of the recovered assemblage. This work may ultimately confirm or reject a Pudding Pan provenance for disputed artefacts, as there has been a tendency to ascribe this origin to any samian displaying signs of marine growth. These biographies are not easy to compile owing to poor record-keeping and the tortuous route through which some of the vessels have arrived at their final destinations.

It is highly likely that generations of fishermen had fished up samian vessels long before they were identified as Roman pots. The identification of Pan Sands on Tudor charts is highly suggestive that pots may have been recovered as early as the 16th century if not earlier. It is clear from Smith's (1907; 1909) original studies of the Pudding Pan samian, from anecdotal evidence and from recent studies (Watson 1987; Walsh 1999; 2002) that fishermen have recovered several hundred complete or near-complete vessels from Pudding Pan over at least the last 300 years. The majority of the surviving Pudding Pan vessels were originally collected by private individuals and may have passed between numerous private collectors before museum accession. The problem is compounded by the scarcity of detailed accession records, and even when relatively complete records have been kept there is rarely any record of the date at which the pots were recovered from the sea. Accession records generally detail the date at which the last known possessor of the artefact passed it on to a museum collection, with little if any other biographical information. Other than the work of Smith and Watson, little of significance has been undertaken in order to locate the site or to research the recovered assemblage. Reconstruction, if possible, of the biographies of Pudding Pan vessels (for instance, from surviving information of original collectors, sales or bequests to other collections and so forth) prior to their acquisition by the museum in which they are currently housed would be particularly important in identifying those vessels that were recorded in previous studies of the material, especially Smith's investigations.

This study has shown that it is possible to establish where some, but not all, of these privately owned vessels are currently held (see **Table 11**). Rather surprisingly, it has been impossible to ascertain the present whereabouts of some of the larger collections of the most prominent collectors of Pudding Pan material (see below). Other than recent discoveries it has only been possible to establish when a handful of vessels recorded here were originally recovered from the Kentish Flats (see **Fig. 32**). It has also been difficult to ascertain through how many private collections a particular vessel has passed. It is therefore impossible to determine with complete certainty whether samian vessels have been fished up from Herne Bay at a constant rate over the last 300 years, or whether there has been a far more episodic recovery.

In order to locate and record as many as possible of the surviving artefacts reputed to have come from Pudding Pan all the museums identified by Smith and Watson as curating Pudding Pan samian were contacted. In addition, enquiries were made at a large number of institutions not listed in these catalogues in case they held Pudding Pan artefacts. Most notably these included a number of museums and libraries in Kent. Enquiries were also made at universities, public schools and a considerable number of local museums across the UK (see Appendix 4). Indeed, the recent *NOTS* 2008–12 publications recorded institutions that had not been contacted previously, most notably the Powell-Cotton (Quex Park) Museum in Kent, which held 44 complete samian vessels. The recent *NOTS* publications helpfully include museum accession numbers, which, when provided to museums that claimed to have no artefacts from Pudding Pan, subsequently located these artefacts.

While the numbers of enquiries made to institutions both here and abroad have been extensive they have not been exhaustive. It may well be that some public institutions that were not contacted retain collections of Pudding Pan material, some of which may have been given a London provenance by unscrupulous antiquarians in order to increase an artefact's value (Marsh 1979: 125). A number of museums in North America were also contacted, as one anecdotal source had suggested that some vessels from one private collection had gone to Canada (Watson 1987). A samian bowl from Pudding Pan was recently sold on a Californian auction website. The National Museum of Ghana (formerly the Gold Coast), the Gold Coast museums in Queensland, Australia, and in Florida, USA, and Billy Graham's organization in the USA were all contacted for similar reasons. The project has also had some success recording artefacts held by private collectors and Whitstable fishermen. However, it seems highly likely that only a small proportion of the privately held artefacts have been recorded; the publicity following a public lecture about the site and the project, held at Whitstable museum, brought forth more previously unrecorded pottery.

The 526 vessels and 32 fragments from Pudding Pan have been found in 28 museums and other public institutions, and

Accession date	Number of vessels	Vendor/Donor	Notes
6 December 1776	2	D. Rhudde	dredged off Reculver, 1773
1814	37	Charles Townley	possibly bought from G. Keate
10 December 1810	1	no details	no details
2 May 1853	2	William Chaffers, FSA	previously owned by E.B. Price, FSA
1 July 1856	?	C. Roach Smith	Mr Teanby's collection
1870	2	Victoria & Albert Museum	William Gibbs bequest
1901	5	Victoria & Albert Museum	from Museum of Practical Geology
15 November 1903	1	Francis Brent Bequest	no further details
27 July 1908	10	Sibert Saunders	Pudding Pan Rock
25 October 1910	3	Library Committee of the Corporation of London	Pudding Pan Rock
23 November 1920	28	Librarian, Guildhall, London E.C.	Pudding Pan Rock
2 May 1925	1	Society of Antiquaries	possibly donated by J.E. Price
16 March 1937	8	W. Holden	Pudding Pan Rock
10 December 1937	3 fragments	R.A. Smith/PPR Exploration Fund	Pudding Pan Rock
2 May 1950	2	K.B. Clarke	no further details
1 May 1977	1	Geological Museum	donated by Henry Dewey
12 September 1997	1	Museum of London/Guildhall Museum	collected 1865
Total	**104 (+ 3 fragments)**		

Table 9 Accession data from the British Museum

in nine private collections. This represents a minimum number of vessels, as more Pudding Pan samian undoubtedly exists in museums that have not yet been approached. It is also highly probable that some material has not been recognized as coming from Pudding Pan, that old collections have material that has not yet been catalogued to modern standards and that private collectors have not yet made themselves known. Appendix 5 summarizes the known history of some of the samian collections recorded by this project.

The history of collection

The most complete and detailed acquisition records were obtained from the British Museum, which provided accession data for the majority of its sizeable collection (**Table 9**). The initial antiquarian interest in Pudding Pan can be related to the small number of vessels entering the collections of the Society of Antiquaries and the British Museum in the second half of the 18th century. It is possible that two vessels presented to the British Museum in 1776 relate to John Pownall's original investigation of the site in 1773 (Pownall 1779: 283). This is supported by the entry in the British Museum register, which states: 'December 6 1776: Two vessels of red earth supposed to be Roman but more probably Brasilian [*sic*] taken out of the sea by some fishermen dredging for oysters off the Reculver, in the Isle of Thanet, in the year 1773. From Mr D Rhudde, of St Thomas's Street.' The suggestion of a Brazilian provenance for the pots seems to have come from the compiler of the register some 40 years later rather than the prevailing views of the time (J.D. Hill, pers. comm.) but implies that some confusion existed in the late 18th century regarding the origin of these artefacts.

At that time and throughout the 19th century the majority of Pudding Pan vessels were privately owned. For example, Gustavus Brander, a Fellow of the Royal Society, reportedly served 'dessert' for Governor Thomas Pownall on his collection of samian ware some time before the publication of Pownall's paper in 1779 (Smith 1907: 271). If this anecdote is accurate then Brander must have had a fairly sizeable collection of samian ware but there is no record of its entering museum collections despite the fact that he was a trustee and benefactor of the British Museum. Smith (1907: 271) provided details of six vessels in the Brander collection from the postscript added to Pownall's original paper. The case of Brander is interesting as it supports the notion that considerable quantities of samian remain in private collections.

Charles Townley (1737–1805) was an antiquarian and, from 1791, a trustee of the British Museum. His important personal collection of marble statuary was acquired by the British Museum after his death in 1805 through an Act of Parliament, so it entered a public institution rather than other private collections. Townley's collection of drawings, bronzes, gems, coins and other items, including 37 samian vessels from Pudding Pan, was acquired subsequently by the Museum in 1814 (Hill 2002; see Smith 1907: 271).

Another notable 18th-century collector was Revd Bryan Faussett, FSA (1720–76), who lived in Kent and collected 17 vessels. His 'unsurpassed' collection was offered for sale to, but declined by, the British Museum. It was later purchased by Mr Joseph Mayer in 1853 and now forms part of the collection at Liverpool Museum. It is clear that the assemblage recovered from Pudding Pan had already been, or was being, widely dispersed by the mid 19th century.

Charles Roach Smith (1807–90) published a paper on 'Mr Teanby's collection' (Roach Smith 1877), which he subsequently acquired to complement his own collection, assembled in the 1840s. Roach Smith was very active in the Kent area and had been asked repeatedly to take an official

position in the Kent Archaeological Society, which was formed in 1857 (Moody 2008: 14). His collection was acquired by the British Museum in 1856, where it still remains, despite the alleged prevarications quoted at the beginning of the chapter, following an appeal by his friends to parliament (Anon. 1855: 358; see Roach Smith 1877; Marsh 1981: 174). Details of Roach Smith's collection are rather sketchy and it has not been possible to ascertain precisely how many Pudding Pan artefacts passed to the British Museum. In 1987 it was recorded that four vessels were missing from the British Museum collections and four were on loan to the National Maritime Museum (Watson 1987: table 1.6). If we add these eight vessels to the 104 vessels accounted for in the accession records (**Table 9**) it would seem that the British Museum had a total of *c.* 112 vessels in its collections at that time. Assuming that no other vessels had been transferred from the British Museum, then it would seem that the Roach Smith collection included eight Pudding Pan vessels. The Museum's collection now contains 105 vessels (see **Table 11**).

The Victoria and Albert Museum (V&A) twice transferred Pudding Pan artefacts to the British Museum. In 1870, the V&A transferred two vessels bequeathed by William Gibbs, and five vessels which came from the Museum of Practical Geology, presumably sometime before that museum was incorporated into the Science Museum in 1901. Unfortunately, the accession records of the Museum of Practical Geology, now housed at the Natural History Museum, provide no further details. The V&A also transferred two samian vessels to the Pitt Rivers Museum, Oxford in *c.* 1884.

In 1908, Mr Sibert Saunders moved from Whitstable to London and disposed of his entire collection of 56 specimens: 10 vessels were bought by the British Museum for £16 16s 0d; seven were bought by Guildhall Museum, London for £11 5s 0d (LCCCL 1908b); and 39 went to the Royal Institution of South Wales, later Swansea Museum, where 29 still remain (Smith 1909; Moody 2008: 17) – the fate of the remaining 10 is unknown but they were reportedly still at Swansea as recently as 1987 although they were not inspected at that time (Watson 1987: table 1.6). They are included here since *NOTS* 2008–12 records sufficient details and there is no evidence of these vessels entering other institutions so double-counting is highly unlikely.

The seven Saunders vessels that went to the Guildhall Museum were donated to the British Museum in November 1920, together with 21 others, one of which is inscribed, 'Pan Rock, Whitstable 1865'. These were in addition to three donated to the British Museum in October 1910. The Guildhall Museum had previously donated three vessels to Kelvingrove Museum, Glasgow in 1903; one was found in 1861 and another in 1862. These donations formed part of a consignment of 53 'Roman and other archaeological objects' that were duplicates of other museum exhibits (LCCCL 1903b). The Guildhall Museum had, with a few exceptions, endeavoured to maintain a strictly local character (Welch 1901: 4); the 28 Pudding Pan artefacts transferred to the British Museum formed part of a group 'not relating to London' (LCCCL 1920).

It is clear from the Minute Books that the Guildhall Library Committee was happy to redistribute duplicate artefacts to a variety of museums and even to private individuals who had donated objects to the museum or art gallery. The samian vessel recorded by Smith (1909) in Kingston Library and Museum is likely to have come from the Guildhall Museum, as a letter requesting duplicates is recorded from the town clerk of Kingston upon Thames. Similar letters were received from the Corporation of Devonport and from York Museum at about the same time. Plymouth Museum currently has two vessels from Pudding Pan in its collections, which must relate to the Corporation of Devonport's request of 1903 (LCCCL 1904).

It is also recorded that duplicates were offered to the London Museum (later the Museum of London) while others were donated to the Mill Hill School Museum in 1911 (LCCCL 1911); whether these included Pudding Pan material is not recorded. Other entries in the minute books note the refusal to purchase other collections, which included 'ancient' (LCCCL 1897) and Roman (LCCCL 1898) pottery, presumably owing to their 'non-local' origins. These collections could well have included Pudding Pan artefacts as the site was an important source of the complete samian vessels that collectors preferred. Besides these 37 samian vessels donated to other museums, at least four vessels were incorporated into the Museum of London collections when the two museums amalgamated in 1974. Thus at least 41 vessels were redistributed by the Guildhall Museum (**Table 10**).

Other than the Saunders collection, the routes through which the Guildhall Museum acquired its samian are somewhat obscure because the museum's accession records have, as yet, not been located. The original Pudding Pan material must have been acquired after the museum was founded in 1826 (Welch 1901: 3). Until the museum donation books, so frequently referred to in the Minutes, are located – if indeed they still exist – the accession details are likely to remain obscure. However, the Guildhall Museum did publish a number of catalogues of their collections and, although donors/vendors of material are rarely recorded, these do provide some indication of dates when the later Pudding Pan artefacts were acquired. The Museum catalogue of 1903 records six vessels with either a 'Whitstable' or 'Pan Rock, Whitstable' provenance (LCCCL 1903a: 97–100). The 1908 catalogue records 22 samian vessels from 'Pudding-pan Rock, Whitstable' in addition to the six recorded in 1903.

If we assume that the catalogues represent an accurate record of artefacts in the Museum collections, it seems that the three vessels donated to Kelvingrove Museum, Glasgow and the two donated to the Corporation of Devonport in 1903 were additional to those recorded in the 1903 catalogue. This suggests that by 1903 the Guildhall Museum had 11 vessels and acquired an additional 22 between 1903 and 1908, making a total of 33 pieces. Since the museum gave away at least 41 vessels it must have acquired another eight some time after 1908. Some accession notes have been found which record that in April 1865 the Guildhall Museum paid Thomas Gunston £200 for his collection of antiquities and in May 1868 paid £50 to John Edward Price for his small

Date	Donor/Recipient/Recorder	Acquired	Donated	Recorded	Total Museum holding
1865	Thomas Gunston	1			
1868	John Edward Price	10			11
1903	Kelvingrove Museum, Glasgow		3		8
1903	Corporation of Devonport		2		6
1903	Guildhall catalogue			6	
1904	Kingston Library and Museum		1		5
1907	R.A. Smith (1907)			5	
1908	S. Saunders	7			12
1908	Donors/vendors unknown	15			27
1908	Guildhall catalogue			27	
1908	Donors/vendors unknown	3			30
1909	R.A. Smith (1909)			30	
1910–74	Donors/vendors unknown	5			35
1910	British Museum		3		32
1920	British Museum		28		4
1974	Museum of London		4		0
	Total	**41**	**41**		

Table 10 Acquisitions by, and donations from, the Guildhall Museum. Note: '0' indicates that the museum collection has been accounted for completely

collection. Gunston's collection included one pot from Pudding Pan while Price sold 10 from his collection.

Thus the sources of 18 (Saunders (7), Price (10) and Gunston (1)) of the 41 vessels given away by the Guildhall Museum have been identified, while the sources of 23 vessels remain unknown. As stated above, three vessels are inscribed with recovery dates (1861, 1862 and 1865), as are others in the National Museum of Wales (1864), in the Ashmolean Museum (1882) and in Northampton Museum (1884). The similarity of the inscriptions, their close contemporaneity and the association with the Guildhall Museum of some if not all of these vessels suggest that they may have come from one collection (Gunston's or Price's?) and may be the five recorded by Smith at the Guildhall Museum in 1907. Apart from Rhudde's donations to the British Museum, which were recovered in 1773, and the modern discoveries, these are the only vessels for which the recovery dates are known (see **Fig. 32**).

The current study has identified a number of inconsistencies between the museum catalogues and those of Smith (1907; 1909), compiled at around the same time. Rather curiously there is no match between two of the six vessels recorded in the 1903 museum catalogue and the five recorded by Smith in 1907. Similarly, there is no match between 10 of the 22 vessels listed in the 1908 museum catalogue and the 18 recorded by Smith in 1909. This might be explained by poor recording by a museum cataloguer who was unfamiliar with samian ware, although this does not explain the discrepancies in measurements. Even more curious is the lack of correlation between totals from the museum catalogues of 1903 and 1908 and Smith's catalogues of 1907 and 1909.

However, the difference between the 1903 and 1907 catalogues may be explained by the donation of the vessel to Kingston in 1904. This also confirms that the donations to Glasgow and to Devonport were not recorded in the earlier catalogue. The difference between the museum catalogue of 1908 and Smith's of 1909 can also be explained. Smith had previously recorded Saunders' seven vessels so the difference may be accounted for if the museum had acquired an additional three vessels between the compilation of the two catalogues in 1908–9, which seems likely. In addition, the 1908 museum catalogue records 28 vessels from Pudding Pan but appears to be incorrect as it includes the collection from the 1903 catalogue even though one piece had been donated to Kingston Library and Museum in the interim (see **Table 10**). Using these comparisons the dates of acquisition of the additional artefacts can be refined despite the absence of the accession books. For clarification, the Guildhall Museum in Rochester also has nine vessels.

Incidentally, Haverfield (1911: 117) reported that the Guildhall Museum had a Dragendorff form 27 bowl labelled Pan Rock and suggested that on this basis 'Pudding Pan Rock' should be dated before 160 AD as this form largely went out of production and use around that time (Willis 2005, 5.3.2.3, chart 1). The association of this vessel with Pan Rock supports the suggestion that there is a source of 1st century material in the vicinity of Pan Sand. However, this bowl is not included in any of the previous catalogues of Pudding Pan material (Smith 1907; 1909; Watson 1987; Walsh 1998), possibly because it did not conform to the characteristics of the known Pudding Pan assemblage and it was not identified during the present study.

It is reported that in 1930 William Holden had a collection of some 130 examples of 'Pan Rock' ware (Singer 1972: 8) although Holden's nephew (pers. comm.) claims he had only 84 vessels (**Fig. 29**). The latter figure is confirmed by an entry in the British Museum registers dated 16 March 1937 that records the acquisition of part of this collection. It is interesting to note that in 1907 Smith recorded Holden as possessing only eight vessels in his collection, which would imply that the remaining 76 were acquired some time between 1907 and 1937. Holden was a Whitstable jeweller

Figure 29 The private collection of William Holden's nephew recorded by the author in the late 1990s

with a shop at 65 High Street, Whitstable, in which he displayed the finds. He paid the fishermen one guinea per pot according to condition, which was equivalent to one week's work on the Flats.

It is further claimed that upon his death, half of Holden's collection was sold to the British Museum while Whitstable Historical Society purchased the remainder (Porter 1978). However, British Museum records show that Reginald Smith selected only eight examples to supplement the existing British Museum collection, for which he paid £5. The Ashmolean Museum accession books record that a Mrs Eustace Smith of Lyndhurst, Hampshire, purchased some of Holden's collection; whether she was related to Reginald Smith is not known. Whitstable Museum subsequently received the remainder of the collection from the Whitstable Historical Society and currently has 113 vessels in its collection, which appears to confirm that Holden's collection comprised 84 rather than 130 vessels.

Holden's late nephew offered his collection of 14 complete vessels to the author for recording. He was the last surviving member of the Whitstable shipbuilding firm, Anderson, Rigden & Perkins, and started collecting after his uncle's death in the late 1930s. He paid £1 per pot and claimed that he was offered plenty of broken and incomplete pots which he rejected as he was interested only in complete vessels. He unwittingly replicated Brander's dinner party, serving a meal using samian ware. The Whitstable Museum collection was augmented by donations of some 21 vessels by Wallace Harvey (a local historian and president of the museum trustees) and his family after his death in 2001 (**Fig. 30**). Some of these vessels may have been remnants of the Historical Society's collection as Harvey was also a founder member and president of the society (Harvey 1993). The source of the remaining 23 vessels in Whitstable Museum's collection is unknown but they are likely to have come from local fishermen.

Mr F.G. Hilton-Price was a director of the Society of Antiquaries and had 12 vessels in his possession (Smith 1907), some of which were sold at auction at Sotheby's in 1911. Three vessels went to the Jewry Wall Museum, Leicester, while six went to the National Museum of Scotland. The fate of the three remaining vessels is unclear. Hilton-Price was one of the contributors to Reginald Smith's fund to explore the 'Rock', as was Mr F. Bennett-Goldney, FSA, mayor of Canterbury in 1909 (Smith 1909: 395–6). Bennett-Goldney's collection of nine vessels is now in Manchester Museum, having been acquired from a Mr Sharp-Ogden in 1926.

Professor F. Haverfield, FSA was another contributor to the exploration fund. He had one Dragendorff form 79 plate (Smith 1909), which he bought in Whitstable in 1908, and which subsequently entered the Ashmolean Museum collections in 1920. It is clear that many Fellows of the Society of Antiquaries were keen collectors of Pudding Pan samian ware. Indeed, the Society of Antiquaries had its own collection of seven vessels from Pudding Pan (Smith 1907). Five of these are still in the Society's possession, donated by Mr J.E. Price, the collector who sold 10 Pudding Pan samian vessels to the Guildhall Museum in 1868. The Society donated one vessel to the British Museum in 1925, which could well have come from the same source, while the fate of one vessel is currently unknown.

The Ashmolean Museum has 16 samian vessels and two Roman roof tiles from Pudding Pan. Three of the artefacts, including the roof tiles, were not located by the current study but the accession records are fairly complete with details of the provenance of all but three of the artefacts. Mrs Smith (cited above) presented five samian vessels to the museum in 1909 and two more in 1910 together with two *tegulae*. In 1909, she also donated to the British Museum one *tegula*, one *imbrex* and two *amphora* sherds that had been dredged from Pudding Pan. It is not recorded whether Mrs Smith also purchased these items from William Holden but it would seem likely.

Figure 30 President of Whitstable Historical Society, Wallace Harvey, pictured with his collection of samian and *mortaria* recovered from the Kentish Flats. Whitstable Museum Trust

The Ashmolean purchased another samian vessel from H.J. Nicholls of 17 High Street, Whitstable in 1912 for 15 shillings. In 1925, Professor F.W. Griffith presented a Dragendorff form 36 bowl to the museum that came from the collection of Sir Erasmus Wilson and had been recovered in 1882. In 1938, Professor R.G. Collingwood presented a Dragendorff form 80 dish to the Ashmolean, and in 1948 the museum bought a Dragendorff form 35 dish at a Sotheby's sale (catalogue 20/21 December 1948, lot 48) from the collection of Revd E.A. Sydenham. The collection of 44 vessels recently recorded at Powell-Cotton Museum was acquired by Major Powell-Cotton on 10 October 1928 from Valentine Sinclair, who ran the Olde Northcote Curiosity Shope (the White Swan) in St John's, Canterbury.

Anecdotal evidence, reportedly originating from the Museum of London, of Pudding Pan material in a North American museum collection refers specifically to the 'Royal Museum of Calgary' in Canada. There are two possible explanations as to how this material became so widely dispersed. The diver whom Smith (1909: 396) employed to explore the 'Rock' was due to leave for Canada shortly after visiting Pudding Pan and could have taken artefacts with him. Alternatively, Pudding Pan material may have been included in the sales of G.F. Lawrence, a sometime 'Inspector of Excavations' and antiquities dealer. Lawrence was appointed temporary assistant at the Guildhall Museum in 1901 (LCCCL 1901), primarily to catalogue the collections (LCCCL 1903a; 1908a). In addition, he acted as an agent for the London Museum, which was founded in 1911 and acquired large groups of samian, particularly from sites being excavated in London in the 1920s. He also sold liberally elsewhere – particularly, and crucially in this context, to the Royal Ontario Museum, Toronto, in the late 1920s (Marsh 1981: 176). It is possible, bearing in mind the London Museum connection, that this anecdote refers to Lawrence's sale in the 1920s. Whether this sale included Pudding Pan material is unclear but seems highly probable given that Pudding Pan seems to have been one of the primary sources of complete samian vessels at the time.

However, the Royal Ontario Museum has responded that it has no Pudding Pan material in its collection. A 'Royal Museum of Calgary' (Watson 1987) does not appear to exist, but enquiries at other museums in Calgary have also suggested the Royal Ontario Museum, as other museums in Calgary seem unlikely repositories. Incidentally, the Museum of London's collections database also records a Dragendorff form 27 cup from Pudding Pan on loan to the National Museum of the Gold Coast in 1956 (it seems most likely that this refers to what is now known as Ghana although there are 'Gold Coasts' in Australia and in the USA). The fate of this cup remains unclear, as enquiries at all Gold Coast institutions have elicited no positive response. Finally, 30 of the vessels recorded here are in the possession of current fishermen and were recovered by them in the last 30 or so years, while a further seven have been recovered during recent investigations.

Three vessels recorded at the Cambridge University Museum of Archaeology and Anthropology should be discounted as two that came from an Irish collector are of unknown provenance and the provenance of the third is given as Upchurch. In addition, the one stamp that is semi-legible (NI … … VS) does not relate to any others from Pudding Pan; neither does one of the forms, a Ritterling form 1. Obviously this alone does not exclude these vessels as potentially deriving from the Pudding Pan assemblage but, given the dubious provenance, the association with Pudding Pan is extremely unsecure.

Location	1907	1909	Total	Current	Identified	Missing
British Museum	36		36	105	yes	0
Bethnal Green Museum	5		5	10	now in Museum of London	0
Guildhall Museum, London	5	18	23	0	28 to British Museum; 3 to Kelvingrove Museum Glasgow	0
Free Public Museum, Liverpool	29		29	27	2 unaccounted for	2
Royal Museum, Canterbury	19		19	10	probably to Whitstable Museum	0
Municipal Museum, Maidstone	8		8	41	yes	0
Society of Antiquaries of London	7		7	5	1 to British Museum	1
G.M. Arnold, FSA	25		25	0	18 to Maidstone Museum; 9 to Guildhall, Rochester. Note: Arnold collected 2 more vessels after 1909	0
Sebastian Evans	14		14	?	6 to Folkestone Museum	8
Dr J.W. Hayward	4	4	8	?	no	8
W. Holden	8		8	0	bought by British Museum	0
F.G. Hilton Price, Director of the Society of Antiquaries of London	12		12	?	3 to Jewry Wall Museum, Leicester; 6 to National Museum of Scotland	3
Sibert Saunders	54		54	0	7 to Guildhall Museum; 10 to British Museum; 39 to Swansea Museum	0
V.B. Crowther-Benyon FSA	3		3	0	3 to Jewry Wall Museum, Leicester	0
Christ Church Library, Oxford	2		2	0	2 to Ashmolean	0
Pitt-Rivers Museum	3		3	2	1 unaccounted for (Ashmolean?)	1
Alnwick Castle Museum	2		2	?	?	?
Ashmolean Museum	1		1	16	yes	0
Dorset County Museum	1		1	?	?	?
Cambridge Museum of Archaeology and Anthropology		2	2	3	yes	0
Kingston Library and Museum		1	1	0	1 to British Museum via Museum of London	0
Lady Armytage		5	5	?	no	5
Major Brocklehurst		1	1	?	no	1
Professor F. Haverfield FSA		1	1	0	1 to Ashmolean Museum	0
F.J. Sparshott		9	9	?	1 to Birmingham Museum	8
John Sutherland		1	1	?	no	1
C. Warner		2	2	?	no	2
Totals	**238**	**44**	**282**			**40–3**

Table 11 Reginald Smith's corpus published in the *Proceedings of the Society of Antiquaries*, vols 21–2 (see Smith 1907 and 1909). Note: '0' indicate the collections for which every artefact has been accounted

Thus the original collectors of 401 (76 per cent) of the 526 samian vessels recorded in this study have now been traced. The corollary is that the biographies of 125 vessels or (24 per cent) of the known assemblage remain obscure, as the information was either never recorded or is now missing. This may be a consequence of the circuitous routes, via numerous private collections, by which many museums have acquired their Pudding Pan collections. The accession records for many of the vessels are either incomplete, can no longer be located or were not completed at the time of acquisition. This not only presents difficulties in determining how a museum acquired a particular pot but also calls into question some of the artefacts that may have been given a Pudding Pan provenance in error. However, as stated previously, it is usually possible to identify impostors.

Comparison with Smith's catalogues

Without complete and accurate records of individual vessels it is difficult both to establish the exact size of the assemblage recovered to date and to ascertain with any degree of certainty which of the vessels were previously recorded by Smith, meaning that we cannot even be certain whether some of the vessels recorded by the current study are the same as, or additional to, those recorded by Smith in 1907–9. This clearly has a major impact on the size of the known assemblage. Of the 282 vessels inspected by Smith, 143 (51 per cent) were in private collections in 1907–9, although by 1909 Saunders' collection of 54 had been sold to museums, leaving only 89 (or 31 per cent) of this sample in private collections. By tracing the biographies of the vessels recorded for the current project it has been possible to identify all but between 40 (14 per cent) and 43 (15 per cent) of the vessels recorded by Smith in 1907–9. The discrepancy arises from a lack of response from two public institutions that have not confirmed whether they still have any artefacts in their collections (**Table 11**). It would seem likely that they have so we can assume that the lower figure is more accurate.

It is interesting to note that four private collections – those of Sebastian Evans (eight vessels), F.J. Sparshott (eight vessels), Dr J.W. Hayward (eight vessels) and Lady Armytage (five vessels) – account for 29 (73 per cent) of these missing vessels. It

Samian form (Bet and Delor (2000) form)		31 (055)		31r (54/56)		33 (036)		35 (014)		36 (15A/15P)		38 (088)		46 (42/4)		79 (032A)		79r (032P)		80 (031)		C15 (045)		C23 (043)		Lud Tg (029)		Others	
No.	Potter	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	W	Total
1	Aestivus	14	**20**																										20
2	Albucianus	11	**19**																										19
3	Arncus		**3**			8	**14**																						17
4	Asiaticus ii																										**1**		1
5	Atilianus i	**2**	1			3	**4**					1	**1**			12	**19**												26
6	Belsa (Arvenicus)																	2	**4**										4
7	Caletus	3	**14**			5	**15**																						29
8	Campanus ii						**1**									2	**4**												5
9	Caratillus ii															4	**13**												13
10	Cassius ii	1																											1
11	Catianus ii															2	**2**			6	**7**					1	**3**		12
12	Cintusmus i			2	**3**	10	**13**					3	**3**																19
13	Cracina															1	**2**												2
14	Crispinus ii				**3**																								3
15	Datius										1																		1
16	Decmus ii	2	**4**			3	**21**																						25
17	Doeccus i																					1	**1**						1
18	Firminus i-Arean																				**1**								1
19	Gaius i															1	**2**												2
20	Genitor ii	*	**1**	**1**																									2
21	Gippus	**1**				*																							1
22	Iullinus ii											1	**2**																2
23	Iustus ii			3	**4**																								4
24	Maccalus		**4**		**1**							**1**																	6
25	Macrianus			1	**1**																								1
26	Mainacnus			8	**14**	1	**2**														**1**								17
27	Maior i	1	**1**	**7**	5																								8
28	Marcellinus ii				**2**																								2
29	Marcus v			**2**	1								**1**																3
30	Martinus iii															2	**2**												2
31	Mascellio i					1	**1**																						1
32	Maternianus i	1	**1**	**2**	1	16	**23**																						26
33	Maternus iv	1	**1**			**7**	6																						8
34	Maulinus																**2**												2
35	Mercator iv																**1**												1
36	Namilianus				**1**	1	**7**						**1**																9
37	Patto	3	**9**			2	**4**																						13
38	Paullus v				**1**											5	**9**										**1**		11
39	Primanus iii			**3**	2																**1**								4
40	Priscus iii		**1**																										1
41	Quintus v	1	**3**			7	**7**										**1**												11
42	Sacrillus															3	**4**												4
43	Saturio ii				**1**																								1
44	Saturninus ii	11	**21**	15	**22**	3	**5**										**1**		**1**										50
45	Severianus i					2	**7**											1	**1**										8
46	Sextus v											2	**3**																3
47	Vitalis i		**1**																										1
	Rosette/circles													**11**	10							4	**8**		**3**			**3**	25
	No stamp							10	**22**	20	**45**		**1**						**2**			1	**1**		**1**			**1**	73
	Illegible stamp		**14**	3	**6**	6							**2**	1	**1**	3	**2**	1			**2**	3	**1**	1	**1**			**8**	37
	Total	121		74		131		22		46		15		12		64		8		12		11		5		5		12	538

Table 12 Comparison of samian forms/stamps recorded by Smith (S) (1907; 1909) with those recorded during the present study (W). Numbers in bold represent the greatest number of each type (stamp/form)

Source	Date	Total	Adjustments	Amended total
Smith	1909	282	- 2 from Cambridge University Museum of Archaeology and Anthropology of very dubious provenance	280
Watson	1987	182	+ 62 reported but unseen	244
Walsh	1998	327	None	327
Walsh	2006	497	- 29 fragments counted as if complete vessels	468
Current	2015	510	+ 16 reported but unseen including 10 missing vessels from Swansea Museum	526
Current	2015	526	+ 12 recorded uniquely by Smith (1909)	538
Current	2015	538	+ 40/43 recorded by Smith but currently untraced	578–81
Current	2015	526	+ 31 per cent in private collections in 1909	*c.* 689

Table 13 Summary of minimum numbers of vessels from Pudding Pan

may well be that at least some of these vessels have ended up in museum collections but the accession records are lacking. Indeed, nine vessels from the collection of G.M. Arnold have only recently come to light. However, given that Smith suggested there were many more vessels around at that time, and that William Holden had increased his collection almost ten-fold from the time of Smith's study, it is possible that these private collectors may have amassed much larger collections. This seems to confirm that considerable quantities of samian remain in private collections, thereby obscuring the precise size of the known recovered assemblage. For example, if we use the number of vessels recorded by the current project (526) and assume that 31 per cent of the assemblage remains in unknown private collections (as found by Smith (1909)) then the recovered assemblage could feasibly amount to some 689 or more vessels.

Tracing all but 40 of the 282 vessels recorded by Smith in 1909 must provide some indication of the probable size of the recovered assemblage. If these 40 vessels have entered museum collections without accompanying detailed accession records then they could well have been recorded by the present project, so we can say with justifiable certainty that the known assemblage numbers at least 526 samian vessels. If, however, these 40 artefacts remain in private collections then the assemblage numbers at least 566 vessels. Given the numbers of vessels in private collections that have been revealed following recent appeals and, more critically, by recently published information on collections in public institutions (*NOTS* 2008–12), it seems highly likely that there remain a considerable but unquantifiable number of samian vessels in private collections and possibly in public institutions. Importantly, we can be confident that the assemblage has now reached a statistically significant quantity.

Alternatively, **Table 12** compares potters' stamps against samian forms as recorded by Smith (S) with those recorded by the current project (W). By taking the greatest number (emboldened) of each type (stamp/form) recorded by Smith or by the current project we can deduce a minimum number of vessels recovered from the site (**Table 12**). Obviously this is a conservative estimate as each party may have uniquely recorded some of the vessels, but we can be confident that 538 vessels represents an absolute minimum from the site. The disparity between the forms/stamps recorded by Smith and by the current project now numbers only 12 specimens, although it must be stressed that both parties may not have recorded the same vessels. This table highlights the tremendous progress in enhancing the assemblage from Pudding Pan; Smith (1909) had recorded 280 vessels (excluding the two from Cambridge University Museum of Archaeology and Anthropology) whereas the total now amounts to some 526 vessels plus 32 fragments. If we add the 40–3 vessels recorded by Smith that we have been unable to trace then the total assemblage stands at between 566 and 569 vessels. If we assume a recovery rate of 5 per cent, based on other sampling strategies, then the recovered assemblage could represent a deposit of almost 12,000 vessels at the source, which would not be excessive for a Roman freighter (see below), although obviously this is highly speculative.

These figures assume that the material has been accurately recorded by both studies and that stamps that are illegible now were also illegible to Smith, although they may well have deteriorated in the intervening period of over 100 years. The most notable finding from this comparison is that there are a number of forms/stamps that have been recorded by the present study that were not recorded by Smith (1909). This might indicate that the nature of the recoveries from the site is changing, a notion which will be explored in greater detail below.

Table 13 summarizes the total number of vessels recorded from Pudding Pan at different times. The absolute minimum number of vessels known to have been recovered from the site to date is 538, which is achieved by adding the 526 vessels physically inspected and recorded for this study to the 12 vessels uniquely recorded by Smith (1909), as identified above (see **Table 12**). It is important to stress that 538 vessels represents an absolute minimum. If we include the 40 vessels recorded by Smith that remained in private collections in 1909 and which remain untraced then this figure rises to 578 vessels, or 581 vessels if the three unconfirmed vessels are included (see **Table 11**: column 7). The proportion of vessels in private collections in 1909 represented 31 per cent of the total known assemblage; if this figure is extended to the current known assemblage, a figure of 689 vessels is produced. This figure is of course highly conjectural and could still be considerably lower than the actual number of vessels that have been recovered.

Recovery rates

The rate at which samian has been recovered from Pudding Pan is crucial as it reveals the nature, extent and condition of the source/deposit. Given the vagaries of museum accession

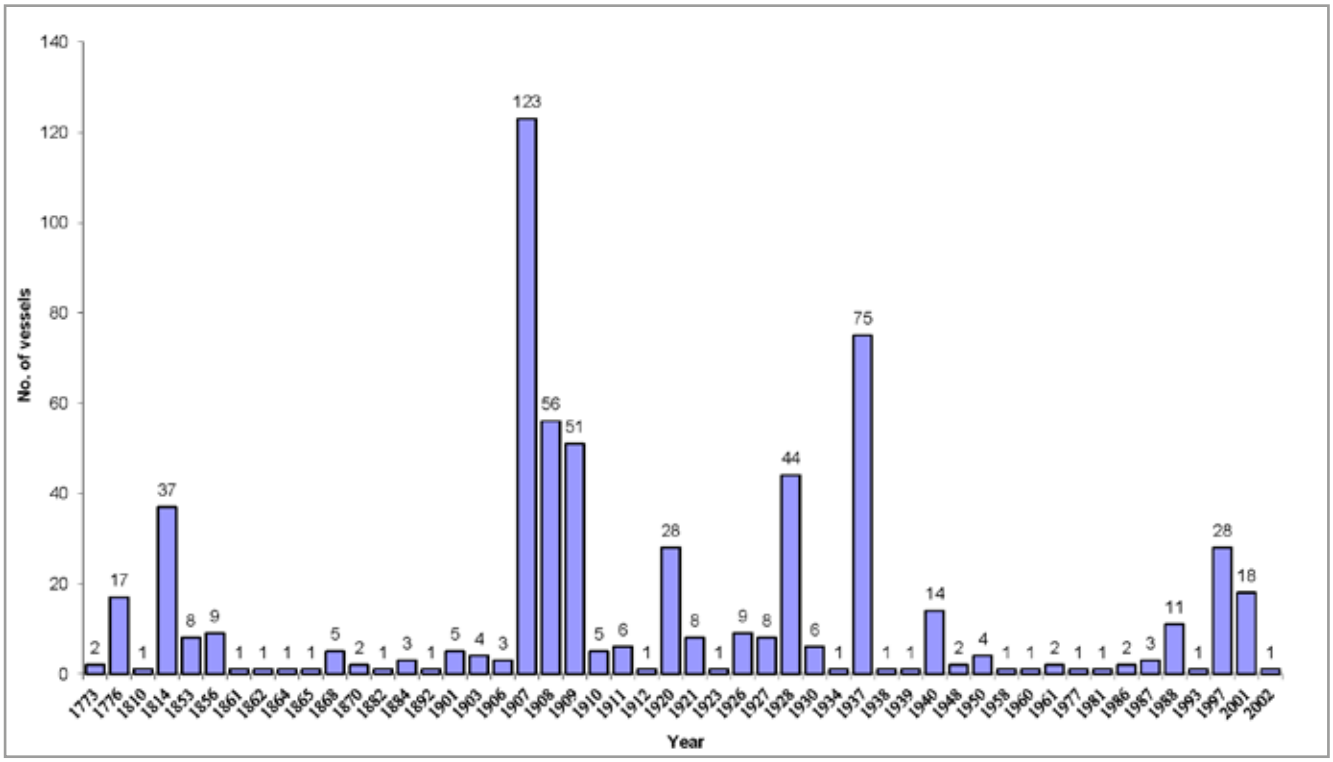


Figure 31 Dates at which pots were first recorded

records, however, it is difficult to identify specific variations in the rate at which pots have been recovered from the sea although general trends are apparent. Consequently, it is not easy to ascertain whether recovery has occurred at a regular rate over the last 300 years, or whether it has been more sporadic. Was there a peak period for the recovery of samian, as suggested by Spurrell (1885: 282), followed by a slow, if not terminal, decline as some propose (Singer 1972), or has the recovery rate been more uniform and steady? Jacob (1782: 122; *contra* Keate 1782: 128) complained that he had seen only about 60 vessels in the 40 years he had been searching. If the general perception that fewer pots are recovered nowadays is accurate, this might imply that the source has been exhausted, in which case we could be chasing a chimera by continuing to search for it. On the other hand, the perceived decline might well be accounted for by such factors as less fishing activity, a change of fishing techniques or fishing areas, or simply a lack of academic interest. Equally, natural phenomena such as shifting sands (Dean 1984), stormy weather (Jacob 1782: 123) or both (Keate 1782: 127) might explain any variation in recovery rates.

Figure 31 represents the dates at which 616 vessels known to have come from the site were first recorded and reveals a number of interesting features. There is clearly some double counting here as this figure is larger than the known assemblage but this is undoubtedly a result of vessels changing hands and therefore being counted in more than one collection. As stated previously, there is not enough detail in the accession records to overcome this problem. The graph is, however, sufficiently accurate to illustrate the main trends in the recovery of artefacts from Pudding Pan. There are three distinct periods when considerable numbers of pots were initially recorded: the first occurred in the late 18th to mid 19th century, relating to the initial interest in the site; the second and by far the largest took place in the first half of the 20th century, and correlates with renewed interest in the site stemming from Smith's investigations in 1907–9; while the third occurred in the late 20th century in connection with the present study.

These three distinct periods provide the greatest challenge to the notion of sporadic or declining recovery, reflecting as they do phases of intense interest in the site. The dominant spike in 1907 and supplementary surge of 1909 result directly from Smith's original collation of the recovered assemblage. These studies have had a disproportionate impact, partially because Smith's was the first serious study since the site was discovered and therefore represents the culmination of perhaps two centuries of collection. The other prominent peaks relate to the transfer of large private collections into public institutions as detailed above: Charles Townley's in 1814; Revd Bryan Faussett's in 1853; Sibert Saunders' in 1908; Valentine Sinclair's in 1928; and William Holden's in 1937. The present study has had a similar impact by more than doubling the known assemblage although it is not as evident as, where available, the artefacts have been presented here by date of accession rather than the date at which they have been catalogued.

The other interesting feature of this graph is the two distinct periods when relatively few pots were recorded, the first spanning the second half of the 19th century and the second the mid to late 20th century. The latter period appears superficially to confirm the belief that far fewer vessels were recovered after the Second World War although this has been challenged by the present study, which has recorded significant quantities of samian recently recovered from the sea. In contrast, the earlier lull is very surprising given the overwhelming anecdotal evidence regarding the quantities of pots recovered at that time. However, it seems fair to assume that the 139 vessels recorded in public

institutions by Smith were collected throughout the 19th century and may have spent some time in private collections prior to accession. Large collections obviously took some time to accumulate and the private collections that entered the public domain in the early 20th century must have been amassed at least towards the end of the previous century. It would seem therefore that these lulls represent lack of archaeological interest in the site rather than a dearth of vessels recovered from the sea.

The problem with this graph is that it presents two different types of data – dates when private collections first became known and museum accession dates – neither of which necessarily bears any relation to the date at which vessels were fished from the sea or indeed were first collected, so it provides little precise evidence of recovery rates. **Table 9** records details of at least 105 vessels including fragments acquired by the British Museum but excluding Roach Smith's collection of at least seven vessels. Given that only 105 vessels plus fragments were recorded in the British Museum collection by the current project it seems likely that some vessels have either gone missing or have been passed to other institutions. Equally, some vessels may have been given a Pudding Pan provenance in error, while others may have been misidentified as being from other sites. Despite this it is clear that we know from where a very large proportion of these vessels have come.

Although we do not know precisely when some of the more prominent collections were accumulated we do have sufficient information to produce a relatively accurate picture. For example, Charles Townley amassed the nucleus of his eclectic collection during three Grand Tours, from 1767 to 1768, 1771 to 1774 and 1776 to 1777. The earliest recorded vessels were those of Rhudde, which were recovered in 1773, although the Revd Bryan Faussett had accumulated 17 vessels by 1776, so it is possible that Townley had started collecting Pudding Pan artefacts before his first Grand Tour. Townley died on 3 January 1805 so we can assume that he amassed his collection some time between 1760 and 1804. It is recorded in the Townley archive that he bought some of George Keate's collection at a Sotheby's sale on 14–15 January 1801. This is the same George Keate, FRS, FSA who published a paper on Pudding Pan (1782) and had collected at least 10 or 12 pieces from there in 1776 (see Smith 1907: 274; Hill 2002). In addition, it is recorded that Roach Smith amassed his collection between 1840 and 1850 (Roach Smith 1877).

In the absence of accurate data any graphic illustration of British Museum acquisitions would be meaningless although we do know that there would be two peaks, one representing the accession of Townley's collection in 1814 and the other from November 1920, when the British Museum acquired the Guildhall Museum collection. In neither case are there sufficient details of when the vessels were actually recovered but it would seem that the collections were accumulated over a considerable period of time.

It is possible, however, to detect some broad trends. For example, since 1907 museums have considerably enhanced their collections of Pudding Pan artefacts (Page 1932: 164). From that date the Guildhall Museum collection increased by 75 per cent while the British Museum acquired almost 60 per cent of its Pudding Pan collection, which included the Guildhall donations, following Smith's publications. Had the British Museum purchased all the vessels offered to it (Saunders' remaining 39 and Holden's remaining 76) then 81 per cent of the collection would have been acquired since 1908. This clearly shows the major impact Reginald Smith's original study of the Pudding Pan samian had as a catalyst for museums to acquire Pudding Pan material from existing private collections. It also challenges any suggestion that most vessels were recovered in the late 18th and early 19th centuries.

The fact that almost 44 per cent of this sample post-dates 1920 also challenges the notion that only a small quantity of pottery has entered museum collections since the First World War, although it is fair to say that the Guildhall collection that comprises the bulk of this later material was collected before the war. This seems to support Smith's (1909) claim that there was a good deal more samian about in the early 20th century. Spurrell's claim (1885: 282), however, that an average of two or three dozen samian pans were dredged each year from Pudding Pan and Pan Sand seems a gross exaggeration, as no corresponding entry of so many vessels to any collection in any one year has been found. The only detailed empirical evidence we have comes from William Holden, cited above, who averaged an impressive collection rate of over 2.5 vessels per year between 1907 and 1937.

So, is the source of the Pudding Pan material in terminal decline or are perceived lulls in collection a manifestation of some other phenomenon? There does seem to have been a rather lean period after the Second World War, although anecdotal evidence suggests that even then a recovery rate of one pot per year was not uncommon (Jefferis and McDonald 1966: 172). Moreover, local fishermen have been finding complete samian vessels and sherds consistently over at least the last three decades, which implies that the source is far from exhausted.

The impression from the above analysis is that samian ware has been recovered at a fairly constant rate over the last 300 years despite anecdotal evidence to the contrary. The belief that there was a peak period for samian recovery in the 18th and early 19th centuries, since when there has been a steady decline, seems erroneous although the huge impact of Smith's research is due in no small part to the recovery of artefacts throughout the previous century. Certainly the numbers recorded in recent years by the current project compare favourably with the numbers recorded by previous investigators, which is remarkable given the prevailing belief that the source has long been exhausted (see Jefferis and McDonald 1966: 172). This evidence seems to point to factors other than the depletion of the source material for any perceived variations in the quantities of samian recovered.

Possible explanations for variations in recovery rates

There are a number of phenomena other than exhaustion of the source material, including natural, economic and even academic factors that might explain the variation in the rate of recovery of samian ware from Pudding Pan. For example, local fishermen have a theory that the shifting sands uncover and re-cover the wreck every 40 years or so, which seems to be reflected both in the recovery of artefacts from Pudding Pan (Dean 1984: 78) and in the periodic publications of the

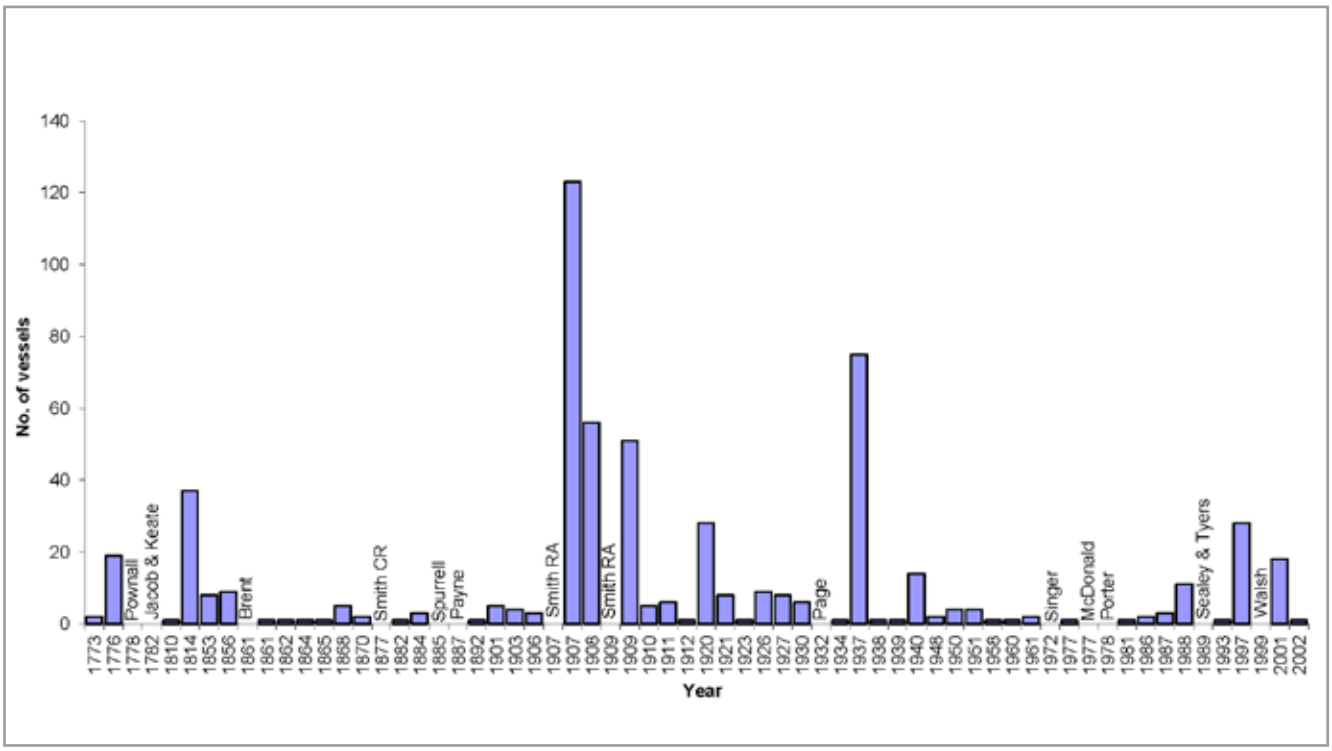


Figure 32 First recorded dates of individual samian vessels with dates of published papers. The red columns denote vessels that have specific recovery dates inscribed on them

site. Although historic charts appear to show that the sands have shifted considerably over the centuries (see **Fig. 18**), this perceived 40-year cycle is challenged by the evidence presented here.

However, rather than reflecting variations in recovery, publications appear to mirror variations in academic interest in the site. For example, the apparent 19th-century lull is reflected in the publication of only one paper between the late 18th and late 19th centuries (Brent 1861). Either this undermines the belief that large quantities of pottery were recovered throughout the 19th century or it supports the idea that significant quantities of material remained in private collections. Similarly there is no scholarly interest in the site from 1932, when details were published in the County History (Page 1932), until the recovery of an *amphora* full of olive pits (stones) in 1983 (Watson 1987; Sealey and Tyers 1989) thus reflecting the post-Second World War lull. Of course, there is circularity in this argument as interest may have waned because pots were not being recovered at the time. The three publications in the 1970s (Singer 1972; McDonald 1978; Porter 1978) are not particularly scholarly and all are somewhat sceptical about the existence of the site or our ability to locate it, possibly reflecting a rather protracted barren period (cf. Jefferis and McDonald 1966: 170ff).

Figure 32 combines the dates of the most significant publications with the dates when the vessels became known and amply illustrates the correlation between the perceived lulls and academic interest, with publications acting as catalysts for renewed interest in the site. These supposed lulls in artefact recovery are therefore more likely to reflect inactivity by researchers as interest in the site waxes and wanes with succeeding generations.

The recovery of samian may also be linked to variations in fishing activity over the site. Without more complete details it is difficult to determine the precise relationship between the two but the recovery of samian vessels from Pudding Pan must be inextricably linked to the health of the oyster-dredging industry, as this is the method by which the vast majority of artefacts have been recovered. It is inevitable therefore that the recovery of pots will reflect the economic cycles of the oyster industry. The level of activity in a particular area is dictated by the condition of the oyster beds and by the general demand for oysters. In the 19th century, the increase in urban populations resulted in a massive increase in oyster consumption, as there were more working-class mouths to feed as cheaply as possible. Charles Dickens observed that poverty and the eating of oysters went hand in hand: 'In modern times a penchant for oysters and smoked salmon betokens a socialist palate with a capitalist pocket. Things were not always so' (Wilkins 2001: 89).

In England the number of dredgermen and oyster-supply companies increased to meet the burgeoning demand, until supply could no longer be sustained from traditional English beds. In healthy, well-stocked beds the oysters are all very close together 'like a road newly covered with granite stones' but once a stock becomes heavily fished the average distance between individuals increases and fertilization becomes less certain (Wilkins 2001: 23). No natural beds could therefore withstand the levels of exploitation in the 19th century. In addition, in both the late 17th–early 18th and late 18th–early 19th centuries and for some years after that the oyster fishery off the north Kent coast suffered severe setbacks owing to frost, which forced the yawls to work much hitherto-unworked ground in order to make up their catches (Singer 1972: 17).

The fishing smacks therefore went further afield to the offshore beds in the English Channel and in Irish waters. As supplies declined in England, more and more oysters

from County Wicklow in Ireland were bought by English dealers to lay down on the depleted Kent and Sussex beds. Over 30 million oysters a year were bought in the 1860s but this number had reduced to below 10 million by the 1870s and fewer than half a million by the 1890s, clearly demonstrating the depletion of the Wicklow beds in little more than 30 years (Wilkins 2001: 99–100). Thirty million oysters a year equates to 82,200 oysters a day, which is an extraordinary quantity, providing some insight into the general scale of dredging operations in the mid 19th century.

If we assume that this quantity was required to sustain an established industry, it would be no surprise to find that the majority of pots were recovered in the first half of the 19th century, when dredging off the north Kent coast was at its most intensive. Singer (1972: 17) suggests that the over-exploitation that forced boats to seek out new oyster beds accounted for the supposed decline in the number of pots recovered since a perceived peak in the early 19th century. He claims that the area from which most pots have come has been avoided since the early 1900s and definitely since the 1940s, which he thinks accounts for the absence of any recent finds. The suggestion that the area from which pots have been recovered may have been avoided at certain times is plausible and could account for some of the lulls in artefact recovery, although the suggestion that this was especially so after the 1940s is contradicted by this study. However, current Whitstable fishermen claim that the area has always been fished although the number of boats fishing the area has declined considerably since the turn of the century, when about 80 vessels worked the Flats rather than the handful that now work the area. Ironically, there is almost no oyster dredging in the area at the moment as the price of oysters has dropped to a level which makes dredging uneconomical (P. Edwards, pers. comm.).

For a valid comparison, allowance must be made for the transition from the use of sailing yawls and hand-pulled dredges to the use of motorized vessels with winch-operated dredges scouring the seabed; this change has in part resulted in fewer boats covering a wider area using larger dredges in modern times. Even allowing for the far greater efficiency of modern vessels, the sheer scale of the late 19th-century operation means that modern developments must have resulted in a far smaller area of the seabed being dredged, so the likelihood of ensnaring a Roman pot must be greatly reduced. This is borne out by the difference in the volume of oysters landed at the industry's peak compared with today's considerably reduced catches.

The numbers of trading ships recorded at Whitstable also offers some indication of the fluctuations in the economic fortunes of Whitstable harbour even though small local fishing vessels are not listed. The earliest records found date from 1662 and reveal a well-established east coast trade including coal from Sunderland and, more surprisingly, a few oranges and lemons from further afield (Harvey 1993: 8). The evidence from the 18th century is sketchy, as few records have survived if indeed they were kept at the time. However, a document from 1701 that lists ships belonging to the ports of Kent indicates that Whitstable was one of the main ports with 33 ships totalling 701 tons burden. Records also indicate 31 ships registered at Whitstable in the later 18th century (Harvey 1993: 50).

The number of recorded vessels in the 19th century is of a completely different order of magnitude, with 484 ships owned and traded from Whitstable. In addition, 28 slipways were recorded on the seafront. Ships from Whitstable sailed around the world returning with Greek currants, Spanish oranges and lemons, North African dates and figs, West Indian pineapples and bananas from the Azores. The colliers that in winter brought coal from Sunderland and the Tyne for the gas works, the railways and for domestic use brought ice from Norway in the summer (Harvey 1993: 55). The coal that still litters the seabed bears testament to the cruel fate that befell some of these vessels so close to home.

Thus a variety of sources confirm that the oyster industry off the north Kent coast reached its zenith in the first half of the 19th century when possibly a hundred or more fishing boats dredged for oysters on the Kentish Flats. Compared with the one or two boats that still ply their trade in this area it is little wonder that more artefacts were recovered at that time. Indeed, considering the difference in the scale and volume of dredging then compared to the present day, it is surprising that any pots at all are still recovered, which must indicate that a considerable deposit remains buried. The perceived variation in the rate of recovery of artefacts is therefore more likely to reflect fluctuations both in fishing activity and in the interests of antiquarians and archaeologists rather than the denudation of the deposit or cyclical movements of sand exposing and covering the wreck (see Chapter 3).

Given the varying levels of activity it is equally surprising that the difference between the numbers of pots recovered in the early 19th century and now is not far greater. This may confirm the notion that far larger numbers of vessels have been recovered than are currently in the public domain as they remain in private collections, possibly handed down through generations so that their true significance has been lost. The resurgent interest in the site (including the current study) generated by the discovery of the intact so-called London 555-type *amphora* that contained the remains of olives in *defrutum* (Sealey and Tyers 1989) has clearly illustrated that, despite the massive decline in fishing activity, significant quantities of samian and other material continue to be recovered from the site and must point towards the existence of a substantial body of material still buried on the Kentish Flats.

This most recent study of the Pudding Pan site has been the most prolonged ever undertaken and this is reflected in the considerable enhancement of the assemblage. Given the difficulties that must be overcome in order to locate the site, the transient interest of succeeding generations of archaeologists is understandable. Having explored the biographies of the samian vessels and the rates at which they have been recovered we shall now look in detail at the recovered assemblage.

Chapter 5
The Pudding Pan Assemblage

> Now the anchors held no longer, and no bailing could keep the torrential waters out. Horses, baggage, animals, even arms were jettisoned to lighten the ships as they leaked at the joints and were deluged by waves. The North Sea is the roughest in the world (Tacitus, *Annals* II.23).
>
> When I first saw these vessels, I was disgusted at the coarseness of the manufacture, but since I learnt … that an *affected poverty* in these was the spirit of the Ritual, I have found myself satisfied in viewing them as strictly orthodox relics (Pownall 1779: 288).

This chapter will present a detailed catalogue of the known artefacts recovered from the environs of Pudding Pan, concentrating on a description of the artefacts and the locations from which they have been recovered, with some general comments regarding the way in which the vessels appear to be lying on the seabed and the process of manufacture. As the locations from which artefacts have been recovered may bear little relation to the point at which they were first deposited the following chapter will interpret these data in terms of the nature and location of the deposit. It will examine the type of material that has been recovered and to what extent it is homogeneous in terms of type, form, date and provenance. The form and manufacturing stamps have been recorded and identified in order to ascertain the date and provenance of each artefact. This information will help determine whether the material came from one source or from many.

The long history of artefact recovery inevitably raises questions regarding the attribution to Pudding Pan of some of the more abstruse discoveries. On the one hand, there appears to have been a tendency to attribute any artefact with marine encrustation to the site. On the other, there has been a popular misconception that only samian has been recovered from Pudding Pan and the other fishing grounds used by the Whitstable fishermen (Frere 1987: 281). It is now clear, however, that in addition to a considerable samian assemblage an abundance of other material, including *amphorae* and *mortaria*, dating from the Roman period and later has been recovered.

This confusion is compounded by the method of recovery of the artefacts by oyster dredge and fishing trawl, which not only obscures the location of the source(s) but also complicates any attempt at interpretation. Unlike the find-spots of the samian those for some of the *amphorae* and the *mortaria* were reasonably accurately recorded. The identification of any notable variations in the date and provenance of the broad range of artefacts recovered should indicate the likely number and probable locations of the source(s). These data will be used in succeeding chapters to determine the nature and condition of these sources and to propose whether the material represents a number of shipwrecks, jettisoned cargoes or casual losses.

Since the original pilot study for this research (Walsh 1998) work has continued to establish the full extent of the site assemblage (Walsh 1999; 2002). The large proportion of complete or near-complete samian vessels enables analysis of manufacturing processes and methods that would not be possible in a more fragmentary assemblage. The samian vessels have been recorded at one of two levels of detail. Every vessel has been recorded in terms of form, potter's stamp and rim size where this information is available.

Various statistical analyses have then been undertaken for the whole assemblage, for specific potters and for specific forms with comparisons to contemporary terrestrial assemblages in order to identify any significant variations.

In addition, more than 400 samian vessels have been recorded in far greater detail including wear, marine growth and damage as well as a range of measurements to investigate differences in size and vessel proportion between potters. Besides recording the standard samian forms, the basic dimensions of each vessel were recorded including vessel height, rim and foot-ring diameter as well as measurements of the maker's stamp and specific features of different vessel forms. Not every vessel was recorded in this detail owing to constraints of time and resources and because some vessels were missing at the time of inspection while others were reported to the writer by third parties. However, as the main group of samian is composed of a limited range of samian forms bearing a small range of potters' stamps, not every vessel needed to be recorded to this level of detail to create a statistically valid sample. This detailed study included material collected at different times over the last 300 years in order to highlight any variation in the forms and potters found over time and to ascertain whether different levels of the buried pottery stacks are being exposed.

Analysis of the wear, marine growth and damage to the vessels provides evidence of the post-depositional disturbance that the vessels have undergone since they were originally lost. This enables interpretation of site evolution processes to determine the way in which vessels have been packed. For example, the work of individual potters may display unique but uniform wear specific to that potter thus implying segregated packaging. Study of a larger sample should confirm and improve the model proposed in the pilot study (Walsh 1998) that accounted for the wear, growth and damage sustained by the vessels.

In contrast to this model, it has been suggested that vessels have undergone significant post-depositional movement spreading 'several square miles' as a result of shifting sands (Singer 1972; Rhodes 1989: 50). This is supposedly supported by inconsistencies in the wear and growth patterns (Watson 1987: 56–7), but which hypothesis is more accurate? There might be other explanations for the seemingly broad distribution of vessels, such as multiple sites. Particular types of marine growth on the vessels might indicate particular marine habitats that would help to decide in which area to search for the sources. There may be variations between different forms in terms of wear patterns and marine growths, or variations over time in terms of wear, damage and marine growth between vessels collected in the 18th century and those collected in the 20th century. But what do these variations mean?

Ultimately this analysis should enable far more accurate interpretation of the material, confirm the existence of more than one source and dispel the notion that one cargo has been widely dispersed. It will also enable interpretation of the cargoes: when and where they were made, how they were conveyed and details of their deposition. We may be able to determine whether the cargoes were homogeneous or heterogeneous. If the latter, what else might the ships have been carrying? The main samian assemblage could improve our knowledge of the production of samian. We may be able to ascertain the likely destination of the cargo from the forms/stamps represented in the assemblage and by investigating where else these samian forms and potters' stamps have been found. Succeeding chapters will explore the significance of any variations between this material and similar deposits of unused samian from terrestrial sites, and between this site and similar maritime sites in the Mediterranean.

Samian ware

The task of recording the recovered assemblage from Pudding Pan continues the work of Smith (1907; 1909) and Watson (1987). The pilot study for this research (Walsh 1998) revealed considerable confusion over the precise number of samian vessels recovered from Pudding Pan owing to possible double counting of artefacts recorded by earlier investigators. Various methods were used in the pilot study to rectify this problem, which resulted in a total of some 327 vessels. Having contacted all the museums and other institutions listed in Appendix 4 the current project has re-recorded all the vessels previously listed.

We can now be confident that the catalogue in Appendix 1, which includes 526 complete or near-complete samian vessels and 32 sizeable fragments (estimated vessel equivalents have not been calculated as this information has not been recorded in every case), is an accurate reflection of the minimum number of recovered pots currently in existence as recorded during this study. As shown in the previous chapter, there are an additional 12 vessels, uniquely recorded by Smith (1909), which it has not been possible to trace; thus the minimum number of vessels recorded from the site totals at least 538 vessels. This represents an increase of some 211 vessels (65 per cent) in the size of the known assemblage since the completion of the pilot study (Walsh 1998).

The homogeneity of the group is remarkable and many of the conclusions drawn by Smith (1909) more than a century ago hold true today. In the past this has been used as evidence that the source was exhausted long ago but the current study has adequately dispelled that notion. This homogeneity is highlighted by **Figure 33**, which compares the current recorded assemblage with that of Smith, arranged by form. This graph not only illustrates the close parity of forms recorded by Smith and by the current project but also highlights the progress that has been made in enhancing the assemblage.

Figure 34 illustrates a similar comparison by potters' stamp between this study and Smith's (1909), again displaying a pattern where far greater numbers of most stamps have been recorded by the present study than by Smith. One of the most notable differences is the greater number of illegible stamps recorded recently. This seems primarily because of the greater numbers of Dragendorff forms 31 and 31r that have since been recorded, which seem more susceptible to damage in the area of the stamp owing to its location on a raised point or *omphalos* in the centre of the bowl (**Fig. 35**). Indeed, in some instances this damage appears to have occurred during production (**Fig. 36**). Moreover, some stamps may have been damaged through

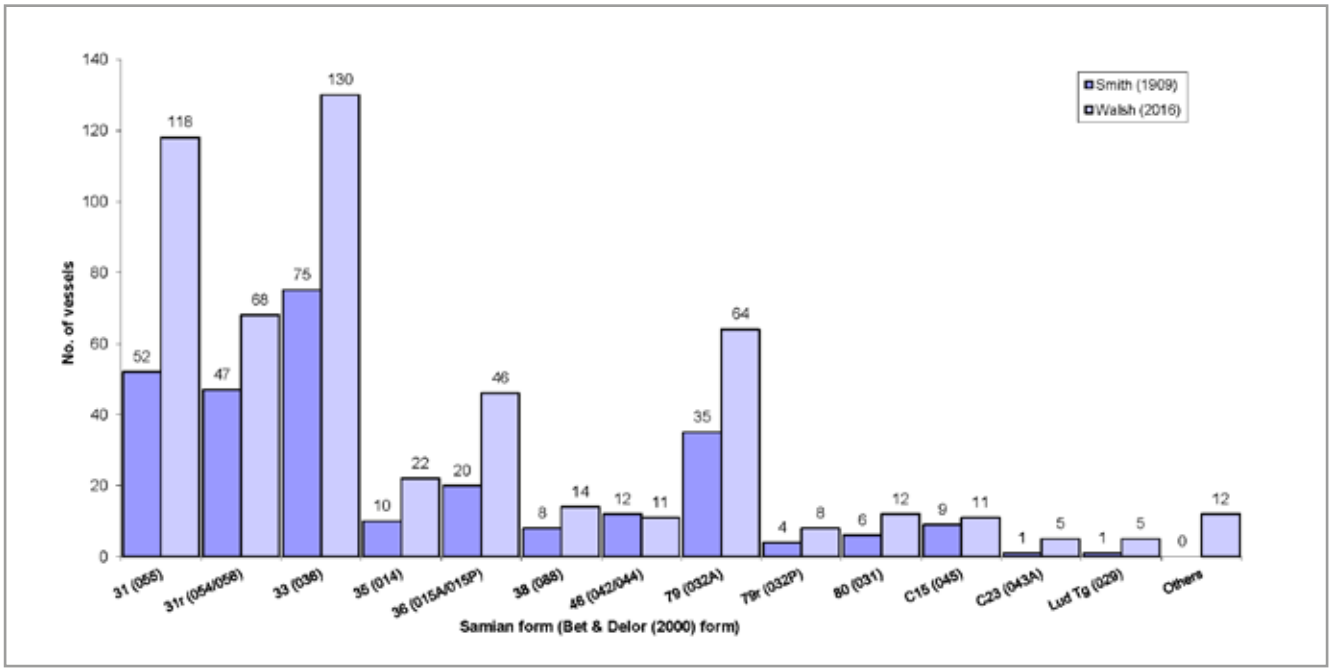


Figure 33 Comparison of forms recorded by Smith (1909) with those recorded during the current study

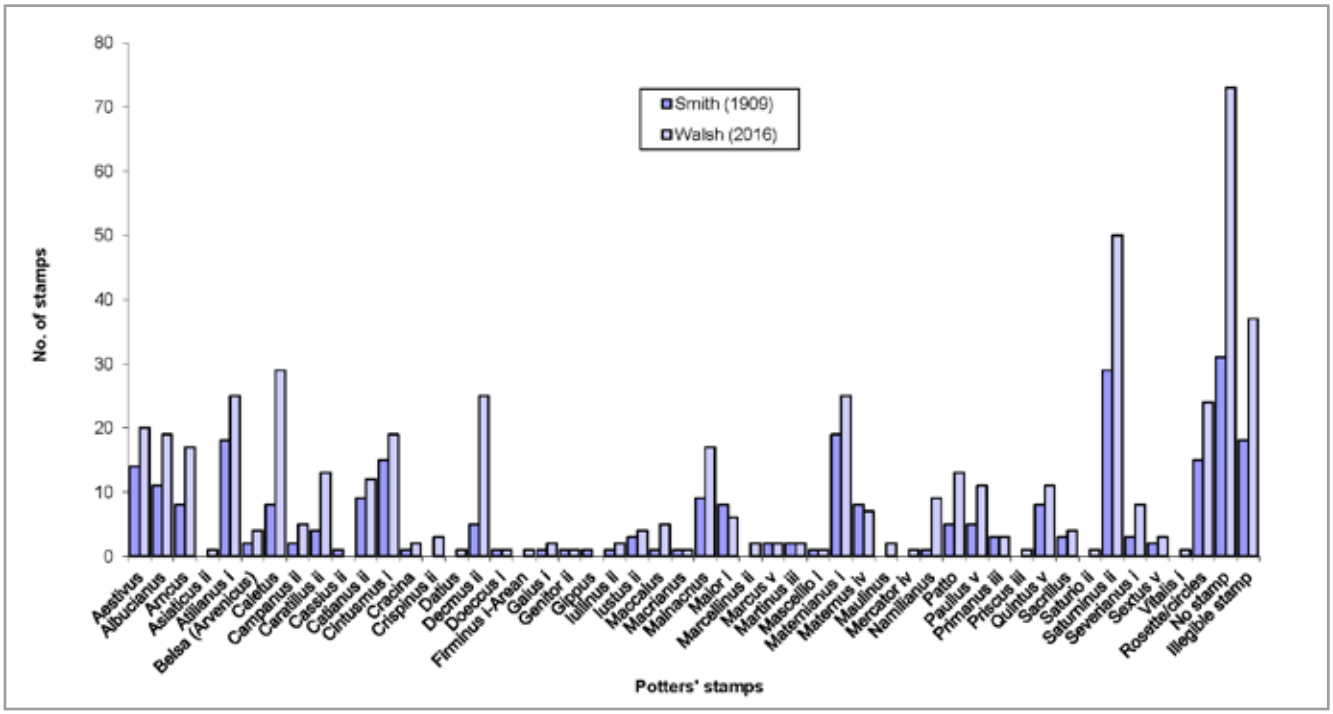


Figure 34 Comparison of stamps recorded by Smith (1909) with those recorded during the current study

poor handling and storage, as very few vessels appear to have received any form of curation since their recovery (**Fig. 37**). Earlier investigators may, on the other hand, have concentrated on the legible stamps or may have been more adept at reading stamps than the present writer. However, the key point is that the differences do not indicate any significant variation in the range of artefacts or stamps being recovered at any one time.

Although these graphs indicate some variation between the forms and stamps recorded by Smith and by the current study this does not support variation in the collection patterns over time. The data generally refer to the point of accession by a public institution rather than that of discovery, and the two do not correlate. However, there are sufficient data to indicate temporal separation between the recovery of fairly sizeable groups of vessels so that analysis of any variation in recovery over time can be undertaken, which will be explored in greater detail below. Such variations would be very interesting as potential indicators that either another level of the 'wreck' or a new container of vessels was being eroded.

Dating of samian forms

The forms recovered from the Kentish Flats appear to indicate two discrete sources of material (**Fig. 38**). The cup and dish set Dragendorff form 46 and Curle form 15 are

Figure 35 Typical damage to the *omphalos* of a Dragendorff form 31 bowl obscuring the potter's stamp. Whitstable Museum, no. W.1988.1000.17 (not to scale)

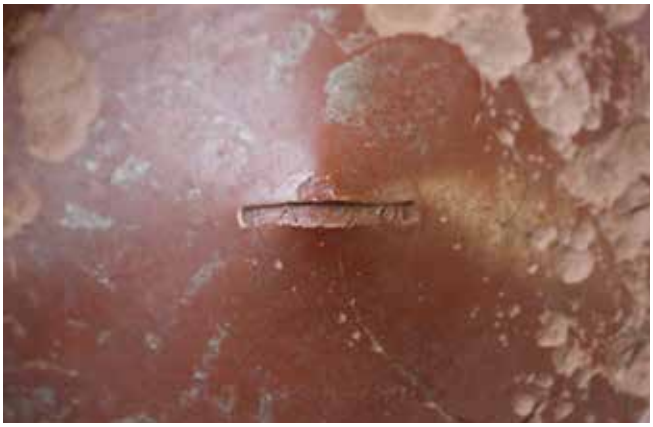


Figure 36 Pre-firing damage to stamp of Pattus on *omphalos* during production. Whitstable Museum, no. 61 (not to scale)

considerably earlier than the other forms. They appear in the late 1st century AD and, although they continue to the end of the 2nd century, they are most common in the pre-Antonine period, thus notably earlier than the dates derived from the potters' stamps. Few of the Dragendorff form 46 or Curle form 15 samples from Pudding Pan were stamped with potters' names and only one name, Doeccus i, was legible. Curle form 23 was another early form, made from the late Flavian period until the end of the 2nd century. Although not conclusive, owing to the broad date range and the possibility that a later ship could be carrying older styles of pottery, these forms, together with the Dragendorff form 27 from Pan Rock reported by Haverfield (1911: 117) might suggest a late 1st–early 2nd-century AD source.

In contrast, Dragendorff forms 31 and 33 are especially characteristic of the later Antonine period, when they are the most common samian form. Dragendorff form 38 appeared *c.* AD 135, Dragendorff forms 31 and 33 *c.* AD 150 and form 31r slightly later in *c.* AD 160. All continued until exportation from central Gaul ceased, probably at the end of the 2nd century AD (Webster 1996). However, it should be noted that the end of central Gaulish samian importation remains unresolved and problematic. There is a suggestion (King 1981; Monteil 2005: 123; King 2013), not supported by most other samian specialists (S. Willis, pers. comm.), that the importation of central Gaulish samian continued into the early 3rd century AD (for a full discussion see Monteil 2005: 98–9; *NOTS* 2008a: 5). The style of Dragendorff form

Figure 37 Typical damage caused by the salt absorbed by the vessel owing to submersion in sea water for millennia. This has caused the slip to delaminate resulting in an extensively pock-marked surface. Whitstable Museum, unnumbered (not to scale)

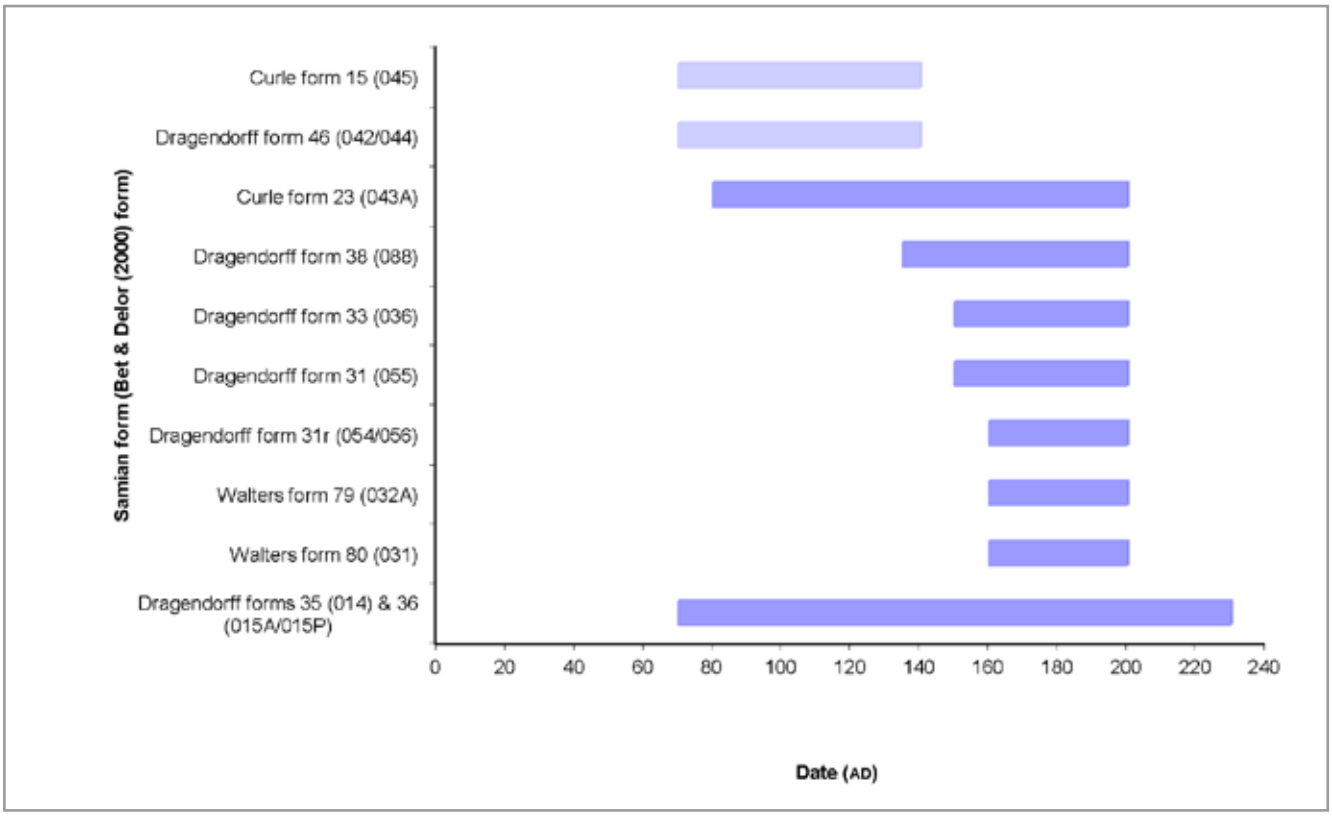


Figure 38 Comparison of basic form dates

33 cup recovered from Pudding Pan dates specifically from the mid–late 2nd century AD. Matching cup and dish forms 35 and 36 are difficult to date closely as they rarely bear potters' stamps and both forms have a long currency in use from the beginning of the 1st century AD and continuing through the Antonine period (S. Willis, pers. comm.), with Dragendorff form 36 more common in the late 2nd century AD. One of the disadvantages of a largely intact assemblage such as Pudding Pan is the inability to examine fresh breaks, as vessel fabric is a key determinate of basic date.

Dragendorff forms 79 and 80, a dish and cup set belonging exclusively to the second half of the 2nd century AD, are another example of the manufacture of matching sets of vessels (B.R. Hartley 1969: 245–6). These forms are unequivocally indicative of a mid–late 2nd-century AD source, fully compatible with the dates of the potters' stamps. Unfortunately, the locations from which individual samian vessels have been recovered are so vague and confused that it is impossible from this evidence to distinguish between two sources or to hypothesize, beyond the general area of the Kentish Flats, on their precise location.

Figure 39 illustrates the predominance of Dragendorff forms 33 and 31, which each constitute approximately one quarter (24.3 and 22.5 per cent respectively) of the samian assemblage recovered from Pudding Pan, thus supporting a later Antonine date for the main consignment. The early Dragendorff form 46 and Curle forms 15 and 23 constitute a small proportion of the assemblage, representing just over 5 per cent of the total assemblage. However, their presence is still significant as it seems unlikely that a ship would have been carrying unused vessels that were almost 100 years old at the time of the sinking, thus supporting the notion of an earlier source of material dating from the late 1st/early 2nd century AD. The relative frequency of the different forms will be compared with similar deposits of unused samian from terrestrial sites in the next chapter.

Care must be taken with dating unused samian deposits, as they might not correlate with traditional samian dates; the dates ascribed to samian stamps represent the aggregate dates of loss that occur during some unknown and unknowable period after the date of manufacture (Millett 1987: 103; see also King 1981; 2013: 1). So, like the Boudican horizon studied by Millett (1987: 104), the Pudding Pan deposit represents a cross-section of material in transit, whose lifespan has been prematurely terminated, rather than rubbish discarded at the end of its useful life. Consequently Pudding Pan material, like Boudican pottery 'shop' deposits, would appear much newer than that from contemporary rubbish deposits or similarly dated destruction deposits from occupation sites (Millett 1987: 106).

To illustrate this point further, Dragendorff forms 31 and 31r are usually indicative of a later 2nd-century AD deposit. It is generally the case that the higher the proportion of Dragendorff form 31r the later the group, usually post-dating *c.* AD 160, as at Pudding Pan. However, the unusual nature of shipwrecks must be taken into consideration as the process of wrecking results in the premature deposition of artefacts in the archaeological record (Millett 1987; Willis 2005: 5.3.2.1–4), so the traditional dating of the Pudding Pan deposits must be used with some caution. The time lag between production and deposition seems dependent upon a site's access to fresh samian supplies: at non-military sites, including major civil centres, where there is perhaps a slower turnover of samian, groups of stratified samian may appear older than contemporary groups at military sites (Millett 1987; Willis 2005: 5.4.1).

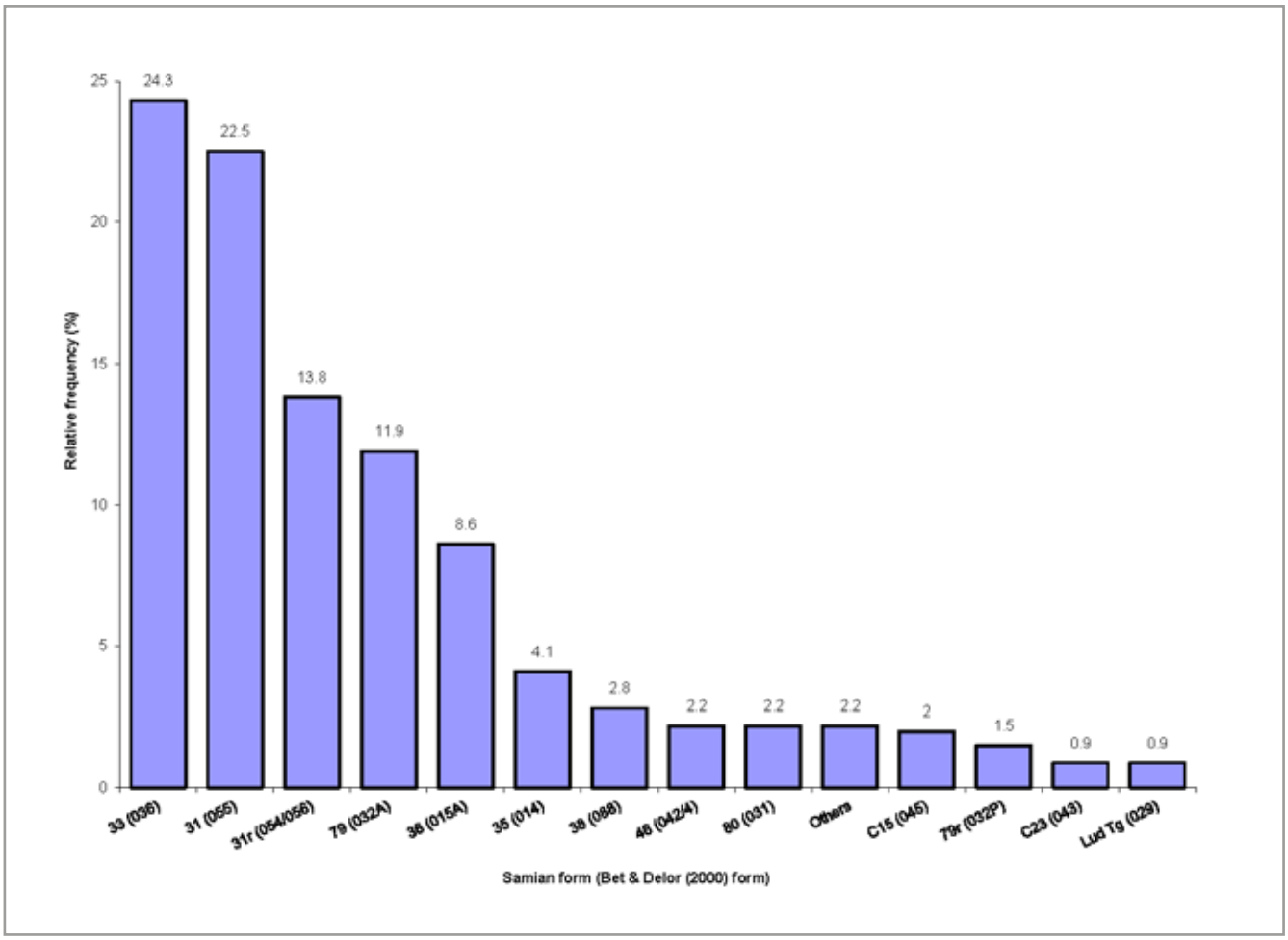


Figure 39 Relative frequency of samian forms from Pudding Pan

Potters' stamps

Of the 526 vessels recorded from the site, 392 (74.5 per cent) were stamped with a potter's name, while 24 vessels (5 per cent) were stamped with a rosette-type or concentric-circle motif. Despite an increase in the number of vessels recorded since the last study (Walsh 2006) the number of illegible stamps has reduced by almost one half, largely as a result of the publication of *NOTS* 2008–12. Thirty-six stamps (7 per cent) are illegible, usually owing to damage in the area of the stamp rather than reflecting the quality of the stamp. Twenty of the 37 illegible stamps (54 per cent) were found on Dragendorff forms 31 and 31r, as the stamps on these forms conventionally occur on the raised point or *omphalos* in the centre of the bowl, which is vulnerable to damage in a manner unlike any other samian form. In some cases poor curation has resulted in the delamination of the slipped surface of some vessels, thereby rendering stamps illegible.

Seventy-three vessels (13.5 per cent), predominantly Dragendorff forms 35 and 36, were not stamped, while the area where the stamp would usually be found was missing from eight sizeable sherds. By far the most prolific stamp is that of Saturninus ii 8a, which occurs on 50 vessels; the stamps of Caletus 2a (29 examples), Atilianus i 5a and Maternianus i 3a (26 examples each) and Decmus iv 3b (25 examples) are the next most frequent (**Fig. 40**). Stamp identifications are based on *NOTS* 2008–12.

These stamps, impressed in the centre of the internal surface of many plain samian forms, represent the workshops or the people who worked in them and were applied by the bowl-maker. As the working life of a given potter must have been limited their stamps are of great value for dating (B.R. Hartley 1969: 249). Assemblages like those found at Inchtuthil legionary fortress (B.R. Hartley 1985), the Colchester pottery shops (Millett 1987) and the Pompeii 'hoard' (Atkinson 1914) have provided an accurate chronological framework enabling the dating of decorated sherds within 10 or 20 years, although plain ware forms changed less rapidly so cannot be dated as accurately.

Most of the potters represented in the Pudding Pan assemblage are associated with workshops at Lezoux and the neighbouring areas. There are also some anomalous stamps, which will be discussed below. Generally the potteries at Lezoux were in operation from approximately AD 40 to 200 although their products only began to reach Britain in significant quantities from the early 2nd century AD. From this time centres in central Gaul began to proliferate with kilns at Les Martres-de-Veyre exporting between *c.* AD 100–20, before Lezoux became the main kiln centre from *c.* AD 120, reaching peak production in the mid–late 2nd century AD (King 2013: 121). After AD 160, Lezoux products seem to have been restricted to the Loire, Seine and Danube river systems and to Britain. Some believe that by AD 190–200 large-scale export to Britain had ended and production had virtually ceased (B.R. Hartley 1969: 238; Marsh 1981: 212; cf. King 1981; 2013: 1). East Gaulish wares continued to be imported until the mid 3rd century AD (see Marsh 1981: 189 fig. 11.7).

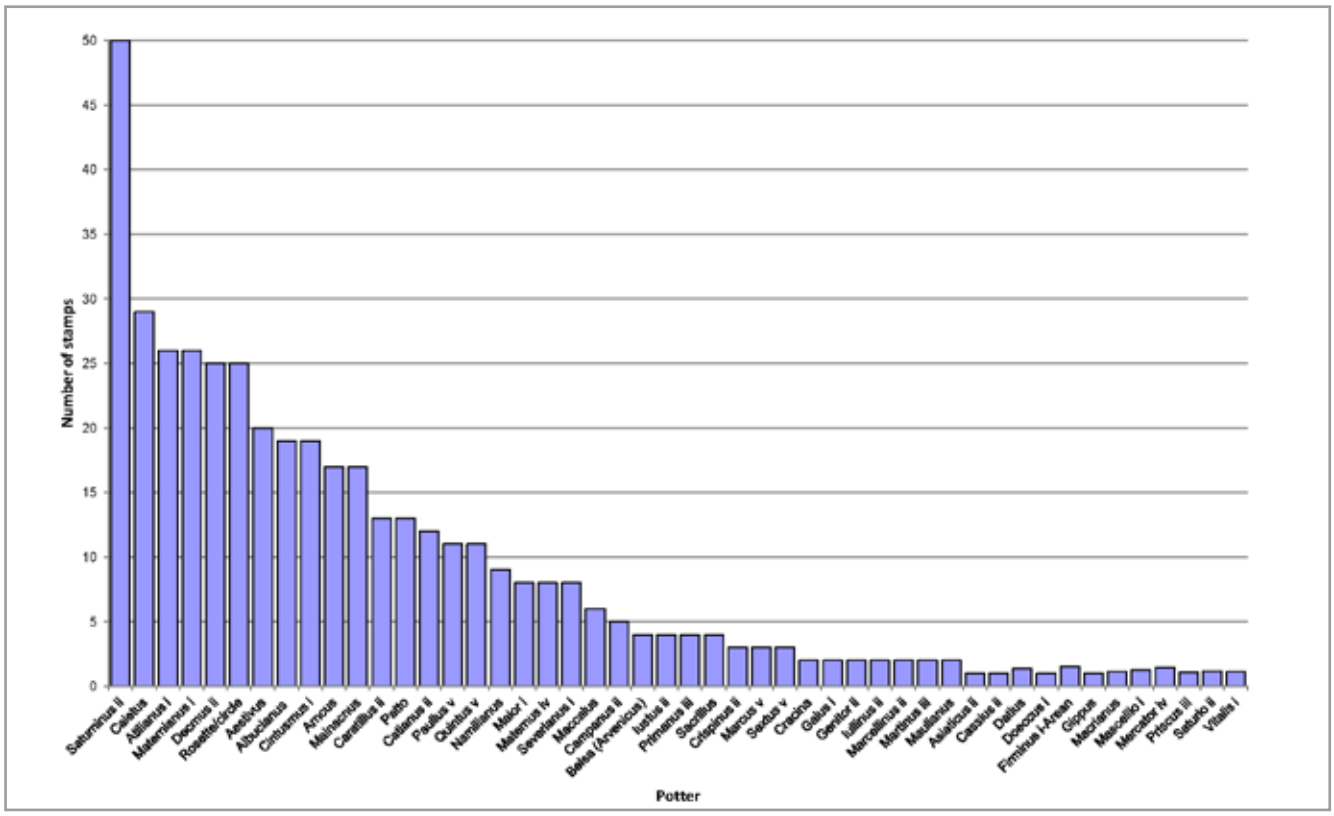


Figure 40 Total numbers of stamps per potter from Pudding Pan

The date of the main Pudding Pan consignment was previously narrowed to *c.* AD 170–200 (Rhodes 1989: 50) and probably to AD 175–95 (B.R. Hartley 1972: 36). With the stamp dating evidence from the recently completed index of samian potters, however, a date of AD 180–200 or very possibly AD 185–200 (*NOTS* 2008a: 5) now seems most likely. There are 29 recorded examples of the 2a die of Caletus, which appears to have been in use from *c.* AD 180–200, thus providing a *terminus post quem* of 180 whilst the majority of stamps seem to have gone out of use by AD 200. If this was a consignment of plain samian wares lost *en route* from producer to end user then it seems reasonable to assume that the date at which the bulk of the stamps went out of use provides a *terminus ante quem* for this deposition.

There is an inconsistency here though as 19 examples of the 5a die of Cintusmus i have been recorded from the site. Since this die was in use from AD 160 to 180 (*NOTS* 2008c) the *terminus post quem* of 180 is challenged. One or two examples of Cintusmus' work could be interpreted as ship's equipment but the number of dies recorded for both these potters would suggest that their pottery formed part of the primary cargo. This may be explained by the leeway that must be afforded to the imprecise dating of the potters' dies although it might be inferred that the logical deduction is that the sinking occurred around the year 180.

Only one stamp die from the assemblage seems to have been in use much beyond AD 200. The 2a die of Datius appears to have been used over a long period, from AD 160 to 240, so it falls within the posited dates. However, since Datius is the only Rheinzabern potter associated with this assemblage this solitary vessel might perhaps be better associated with the later material recovered from the area. Interestingly, this vessel is alleged to have been recovered from 'Pan Shoal', which might provide some indication of the possible location of an early 3rd-century AD source (*NOTS* 2008c). Another heavily abraded example was tentatively identified as the 2a die of Dessius, which dates from *c.* AD 200 to 260 (B. Dickinson, pers. comm.), although the identification is by no means secure and it has thus been excluded from the current catalogue. Even if the identification is accurate it could just represent a very early export of this potter's work. Alternatively, this vessel might likewise have come from the early 3rd-century AD source, or could just have been ascribed to Pudding Pan in error.

Thus the Pudding Pan assemblage coincides with the period at which central Gaulish exports to Britain seem to decline. It is possible that losses such as Pudding Pan contributed to the decline of the central Gaulish samian industry, particularly if the site does represent a complete consignment of plain samian wares comprising tens of thousands of pots. Presumably the loss of such a considerable cargo would have had a significant financial impact, particularly if it was one of a number of such incidents. As we have seen (Chapter 1) graffiti indicate that samian bowls were not inexpensive.

A shipload of *c.* 10,000 vessels was the equivalent of 6,000 man-days (120,000/20) or more than 16 years' salary, but the annual output of the Gaulish samian industry must be estimated in millions of vessels (Rhodes 1989: 46). Assuming the possibility that at the time of loss the cargo was still the property of the manufacturers rather than *negotiatores* (commercial financiers/dealers/traders), such losses may have impacted on individual potters or workshops directly though it is unlikely to have had a significant detrimental effect on the central Gaulish samian industry in general. Perhaps the risks of exporting to Britain subsequently

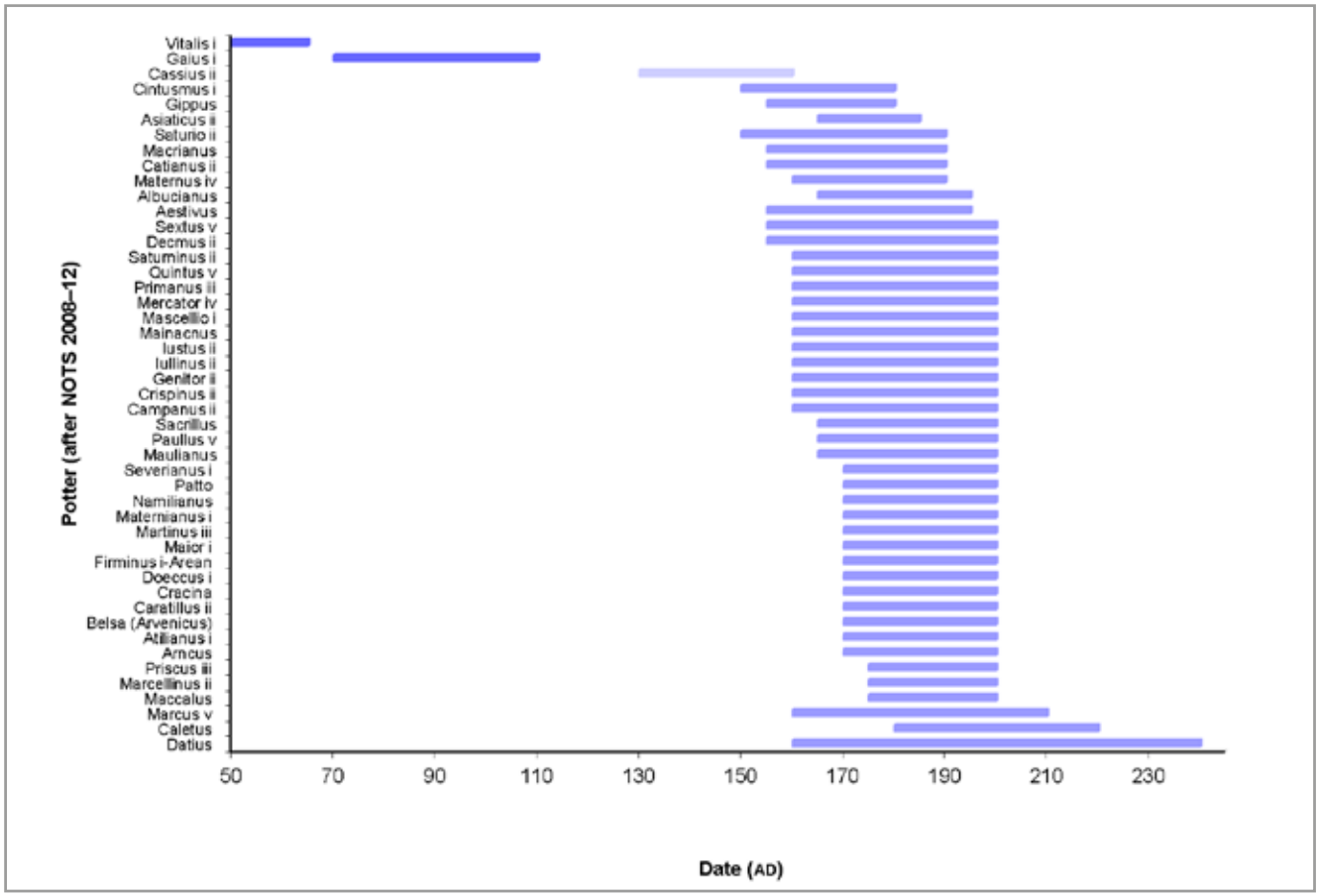


Figure 41 Comparison of the dates of potters' stamps

seemed too great, although this must have been an endemic problem for Roman merchants and *negotiatores*, as evidenced by the considerable number (more than 150) of altars found at Domburg and Colijnsplaat, near what were presumably important harbours, devoted to the goddess Nehalennia. These votive altars were set up by *negotiatores* trading between the Rhineland and Gallia Belgica on the one hand and the coastal regions of Gaul and the east coast of Britannia on the other in honour of a safe passage (Hassall 1978; Middleton 1979: 95).

The samian stamps may have been for quality control within a large workshop, or to distinguish between the products of different potters or workshops within a large communal kiln (Webster 1996: 7). It is also conceivable that stamps may have been used as a check on the output of individual workers (Johns 1971: 15) in cases where several potters were making vessels of the same shape. At Pudding Pan the small rosette-type stamps all appeared on the less common Curle forms 15 and 23 and Dragendorff form 46 and may have served a similar purpose, as the mark of a particular potter. The less frequent appearance of name stamps on unusual forms appears to confirm that only one potter made these forms, thus obviating the need for identification (Johns 1971: 16).

Figure 41 illustrates the dates of all the potters' stamps found at Pudding Pan, based on *NOTS* (2008–12). In *NOTS* (2008–12) the identification of the stamp uses a Roman numeral (i, ii, iii) to identify a potter whose name is used by more than one individual while a number and letter are used to indicate individual dies. The dates of the stamps are strikingly uniform with all but three (discussed below) of the 47 potters represented dating to the second half of the 2nd century AD, although, as stated above, one stamp continues in use significantly into the 3rd century AD. The earliest usage is dated to AD 150 while 39 of the 47 stamp dies appear to have gone out of use within 10 years of AD 200. Thus, excluding the outliers, the entire assemblage of these potters' products could have been included in the main Pudding Pan consignment dating *c.* AD 180–200. It is possible that some of the earlier potters' products could have come from an earlier source lying elsewhere on the Kentish Flats. The link between the dates of the potters' operations and those of deposition depends on the assumption that the vessels were shipped across the Channel shortly after they were manufactured. This seems a reasonable assumption if the deposits do represent shipments of pottery. Indeed, the larger the assemblage grows whilst retaining the homogeneity discussed above the safer this assumption seems although other explanations are possible and will be discussed below.

Combinations of forms

Smith (1907: 283) found that the names of 21 potters were represented on only one form; eight potters were represented on two forms; two potters were represented on three forms; and three potters were represented on four forms. Of the 47 named potters represented in the current Pudding Pan assemblage, 27 names (57 per cent) are found on single forms, 11 of whom produced Dragendorff forms 31/31r while nine produced Dragendorff forms 79/79r; 13 names (28 per cent)

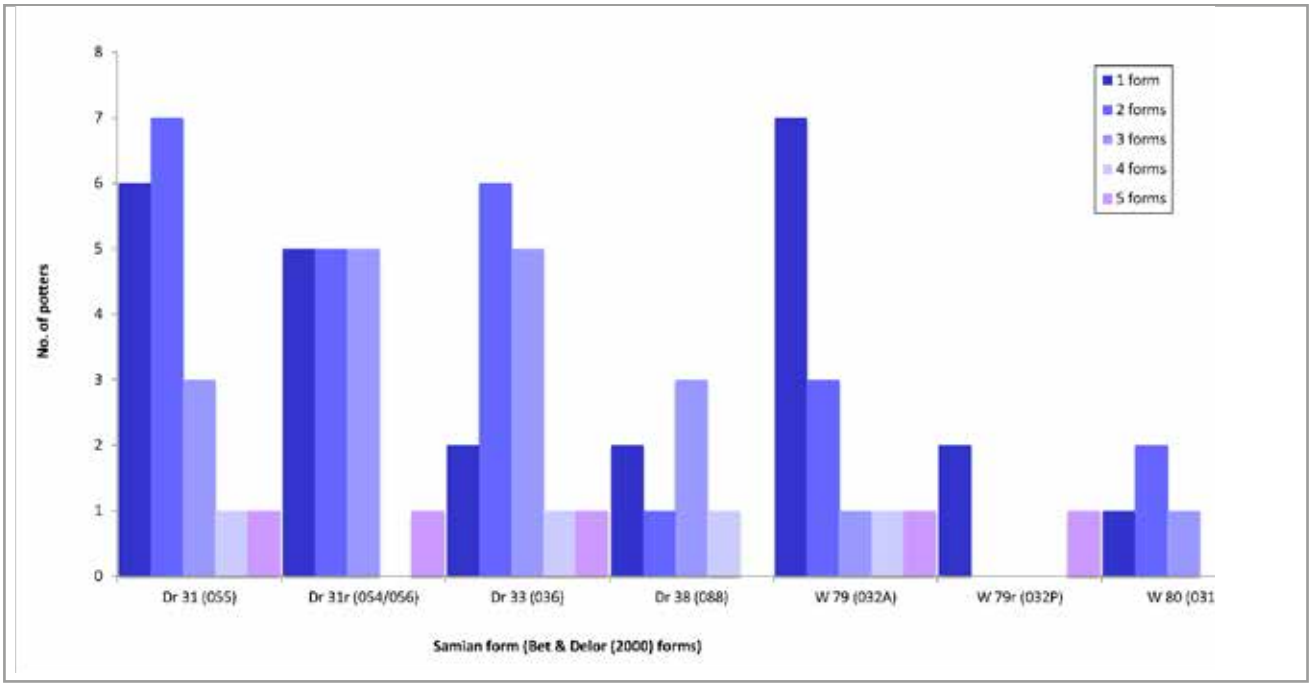


Figure 42 Combinations of vessels produced by potters/workshops

are found on two forms, five of whom produced a combination of Dragendorff forms 31 and 33, which seem to have formed a cup and dish set (Bet and Delor 2000: 467); and six names (13 per cent) are found on three forms, most of which were predominantly Dragendorff forms 31/31r and 33 with limited Dragendorff forms 38, 79 or 80.

The stamp of Atilianus (i 59) was found on four forms (31, 33, 38 and 79), while the stamp of Saturninus (ii 8a) was found on five forms (predominantly forms 31 and 31r, with a few forms 33, 79 and 79r), which are all primarily plate and cup combinations of varying size. It is perhaps not surprising that the stamps of Saturninus and Atilianus appear on the greatest variety of forms, as these are respectively the first and joint third most prolific stamps from Pudding Pan. Of the other most common stamps, those of Caletus (2a) and Decmus (iv 3b) appear on just two forms (31 and 33) and those of Maternianus (i 3a) appear on three forms (31, 31r and 33). This suggests that these potters specialized in the production of this presumably very popular set, that the other forms made by these potters remain buried at Pudding Pan, or that they were not included in the original consignment.

Figure 42 illustrates the combinations of forms produced by potters and workshops. It shows that the most common forms produced by potters making only one form were Dragendorff form 79 (seven potters) followed by Dragendorff form 31 (six potters). Dragendorff forms 31 and 33 were the most common combination of forms produced by potters producing two forms, which supports the notion that these two forms comprised a 'set' (Bet and Delor 2000: 467). Dragendorff forms 31r and 33 were the most common forms produced by potters producing three forms. The ubiquity of Dragendorff form 31 amongst these sets is not surprising given its abundance in the assemblage as a whole.

It would seem from this evidence that where individual potters made more than one form they were engaged in the manufacture of tableware 'sets' rather than the production of a random range of forms. It must be stressed that this may be a highly selective sample of a far larger consignment so any conclusions are somewhat circumspect. Smith (1907: 279; 1909: 400) also identified four different forms each represented in three sizes that he suggested were sold in sets; these were Dragendorff forms 79, 79r and 80, forms 35 and 36, 'Curle forms 15 and Dragendorff form 46', and Dragendorff forms 31 and 31r (Smith's PPR forms 1, 2 and 3; 4, 5 and 6; 7, - (unnumbered) and 8; 9, 10 and 11 respectively; **Fig. 43**).

As noted previously (see Chapter 3), there is a problem with the old Dragendorff form 46, which is now thought to include three distinctly different forms – types 042, 044 and 048 (Bet and Delor 2000). These three, with Curle forms 15 and 23, comprise at least two different sets. One set is made up of Curle form 23 with the Dragendorff form 46 with a downturned rim (types 042 and 043, service F; id). The other set, which is completely missing from Smith's (1909) 'Rock series', consists of Curle form 15 with a variation of Dragendorff form 46 and possibly the Ludowici Tf dish, all of which have an upturned rim (types 044 and 045, service C; id.). This is why the name Dragendorff form 46 should be 'totally proscribed' (ibid.: 469). Both sets are found at Pudding Pan, thus producing five identified sets in total.

As stated above, the Dragendorff form 46 and Curle form 15 are early forms but the Ludowici Tf dish is dated after AD 160 so could only have been a late addition to this set. A solitary Dragendorff form 32 bowl ascribed to Pudding Pan (**Fig. 44**) is also missing from Smith's series, perhaps because it was recovered after 1909. It has a stamp, which is illegible but is an east Gaulish form dated to the late 2nd century AD (Webster 1996). These forms are interesting as only the Ludowici Tf dish conforms to the bulk of the Pudding Pan assemblage. The implications of the anomalous forms will be addressed below in conjunction with some equally anomalous potters' stamps.

Although the number of potters represented has increased since Smith's (1909) study, the relative frequency of

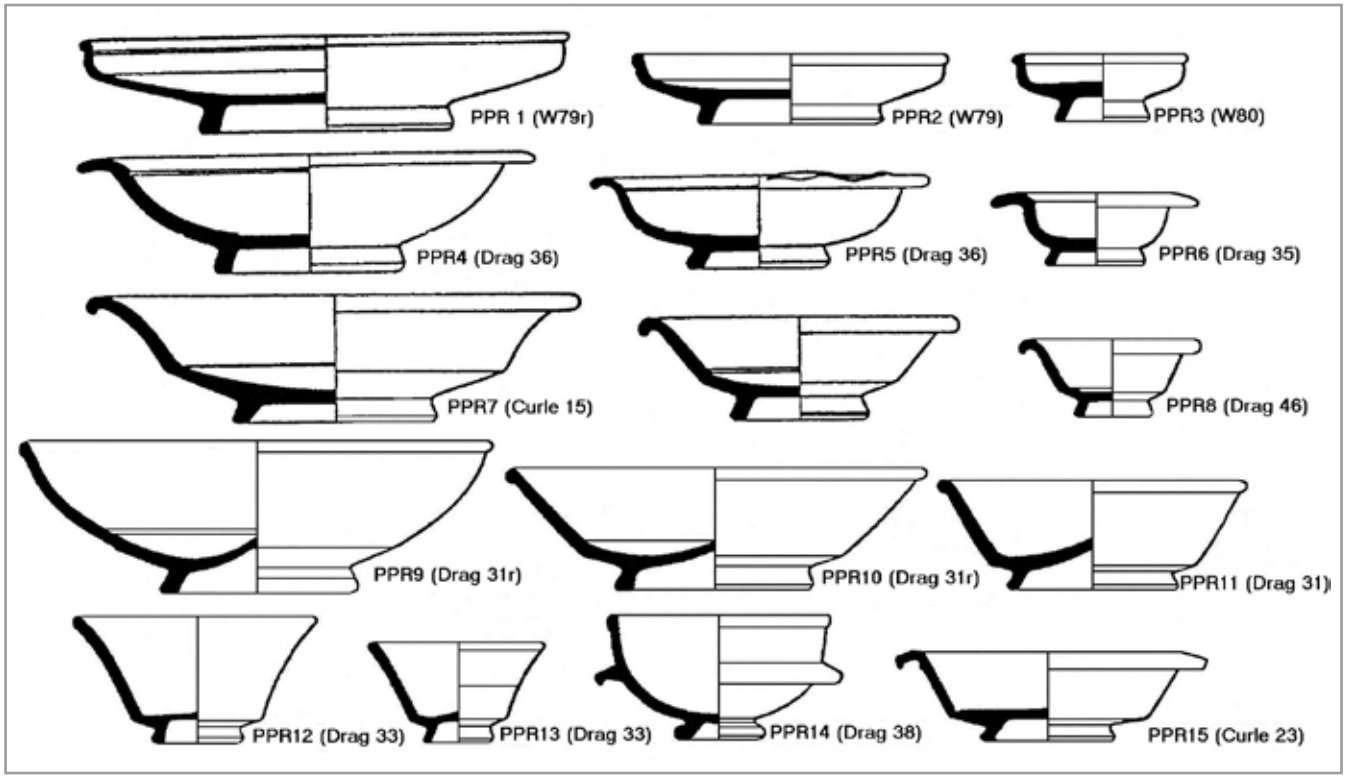


Figure 43 Smith's (1909) Pudding Pan Rock [*sic*] series

potters' stamps found on one and two forms remains almost identical (**Fig. 45**), which again highlights the uniformity of the results obtained by Smith and by the current study. The lower proportion of potters recorded by the current study as represented on four pot forms is difficult to explain but must relate to artefacts that remain in private collections. However, by far the largest proportion of potters is represented on only one form, which seems to confirm that there was some specialization. It also supports the notion that relatively few styles of cups, plates and bowls were current at any one time owing to the repetitive process of manufacture and that even fewer styles were particularly popular (Webster 1996: 4). For example, no more than about 20 really common plain forms and only 'half-a-dozen' common decorated forms are found in Britain (B.R. Hartley 1969: 238–40; Willis 2005: database).

The sets recovered from Pudding Pan to date may not represent the full extent of each potter's repertoire as the complete assemblage has not yet been recovered. However, these may be assessed through analysis of the range of vessels found on terrestrial sites throughout Britain that bear their stamps. This analysis will be conducted in Chapter 7 by comparing the Pudding Pan assemblages with similar assemblages from terrestrial sites.

Anomalous stamps and forms

This survey identified a number of potters' stamps never previously recorded from Pudding Pan, including Asiaticus ii 5a, Datius 2a, Firminus i-Arean- 2a, Mercator iv 5a, Saturio ii 1a and Vitalis i 1b (after *NOTS* 2008–12). It is possible that these vessels were overlooked by Smith (1909) or they may have been recovered since his study although each of these names appears only once, which increases the possibility that they may have been incorrectly ascribed to Pudding Pan. At present this is impossible to determine with any certainty. Future discoveries from the site may confirm the presence of these potters' work amongst the consignment but until then their inclusion must be viewed with suspicion and any conclusions drawn from anomalous deviations must be circumspect.

Apart from the Vitalis i 1b die stamp, which dates from the Claudian-Domitianic period (AD 70–100), the dates of the other five stamps are consistent with the bulk of the assemblage (*NOTS* 2008–12). There does, however, seem to be some temporal and spatial variation in the assemblage particularly associated with these stamps, albeit a handful of examples. The workshop of Vitalis was based at La Graufesenque while Saturio/Saturrus dates from the Hadrianic-Antonine period and worked at Rheinzabern, as did Datius. Another later 1st-century AD potter, Gaius i 1-a

Figure 44 Dragendorff form 32 bowl ascribed to Pudding Pan. Maidstone Museum, unnumbered (not to scale)

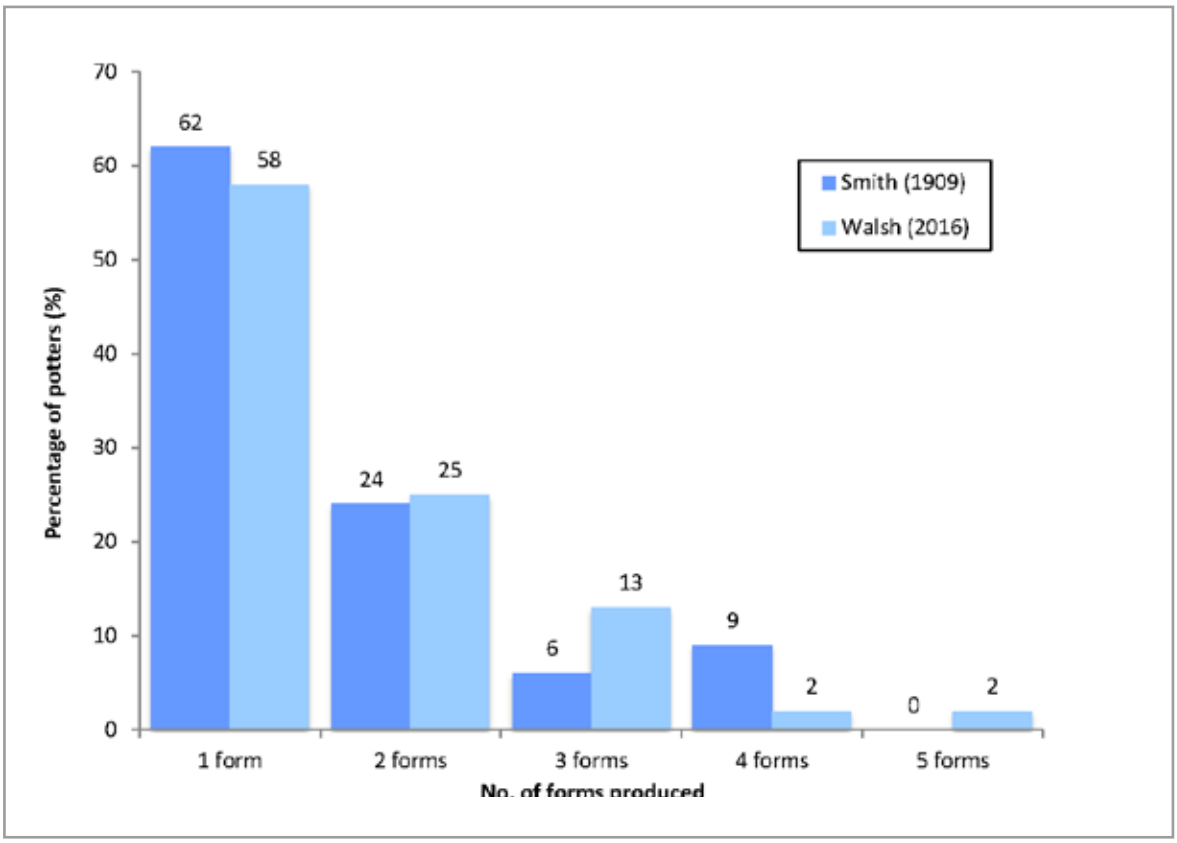


Figure 45 Relative frequency of range of forms produced by potters recorded by Smith (1909) and those recorded during the current study

(70–100; two OF.GAI stamps, originally recorded by Smith 1909), is believed to have operated from a south Gaulish workshop at Montans. The stamps of three further potters, Cassius ii 3a, Muxtullus 7-a and Gongius 2a, are dated to the mid 2nd century AD (130–60, 140–75 and 145–75 respectively).

If the attribution to Pudding Pan of these potters and the aforementioned anomalous forms is accurate then it provides mounting evidence for an alternative source of material that cannot be easily dismissed as misallocation or contamination. However, these explanations must remain a possibility as we are dealing with relatively few samples. The most likely explanation for these specimens, supported by a growing body of evidence, is that this material has come from an earlier source buried elsewhere on the Kentish Flats and dating from the late 1st–early 2nd centuries AD. Indeed, Smith's diver (1909: 398) recovered a fragment of a mid 1st-century AD bowl from La Graufesenque while dredging a mile away from the Pan Sands, which led him to propose a second wreck. The mid 2nd-century AD stamps do not fit comfortably with either the late 1st- or the late 2nd-century AD assemblages, but these samples might represent old stock or crew's possessions on a later trading vessel carrying predominantly late 2nd-century AD wares. Only one example of each of these three stamps has been recorded but, as stated above, none of these stamps were recorded by the present study. Similarly, only one specimen of the stamp of Gippus was recorded in the past (Smith 1909) but not by the current study.

The east Gaulish stamps (three specimens) and form (one specimen) are contemporary with the bulk of the central Gaulish wares, dating from the later 2nd century AD, so could feasibly comprise a component of the same assemblage. These east Gaulish intrusions in a predominantly central Gaulish assemblage imply the involvement of merchants who passed through east Gaul *en route* from central Gaul to Britain, or could raise questions over the route taken from central Gaul to the Thames estuary. However, it is a very small sample and it must be noted that similar deposits of unused samian usually derived from only one source (Rhodes 1989: 44). Not enough is known of the composition of the 1st-century AD assemblage to offer an informed comment regarding the inclusion of south Gaulish samian wares.

It is notable that many of these recent additions to the corpus of forms and stamps from Pudding Pan do not conform to the notion of a consignment of samian from Lezoux dating to AD 180–200, possibly because they have previously been dismissed on the grounds that they do not fit the Pudding Pan norm. However, any rigorous study of Pudding Pan must give due consideration to these alleged additions in the context of the complete corpus of finds. This will become apparent when the other artefacts from Pudding Pan are considered below – these highlight the dangers of dismissing alleged recoveries from Pudding Pan on the grounds that they do not conform to preconceived notions of the composition of the assemblage.

As previously stated, an anomalous Dragendorff form 37 decorated bowl ascribed to Pudding Pan superficially undermines the notion that the recovered assemblage represents a plain samian consignment, although it could have been incorrectly attributed. The provenance of this decorated bowl in the Liverpool Museum collection (acc. no. M7450) is given as 'Whitstable' (Watson 1987), which is

Figure 46 Dragendorff form 37 bowl recovered from Sandwich, now in the British Museum, 1931,0711.1 (not to scale)

somewhat ambiguous. Like many of the Pudding Pan samian vessels in the Liverpool Museum, the bowl was collected by Revd Bryan Faussett in the 18th century. Although the Antonine date and wear patterns are consistent with the other Pudding Pan samian vessels it is still possible that the bowl was attributed to Pudding Pan in error, as has been the case with several other plain examples. For example, another samian bowl in the Liverpool collection, a Dragendorff form 18/31 (acc. no. 6436) is attributed to Pudding Pan, presumably owing to its obvious maritime context, even though the museum's accession notes clearly state that it came from Sandwich.

A Dragendorff form 37 decorated bowl in the British Museum was recovered off the coast from Sandwich in Pegwell Bay, at the opposite end of the Wantsum Channel from Whitstable and Herne Bay (**Fig. 46**). It would therefore seem probable that the Dragendorff form 18/31 ascribed to Pudding Pan came from the same site in Pegwell Bay as the Dragendorff form 37 bowl. If so, this suggests that another source of samian ware, possibly dating from the first half of the 2nd century AD, lies buried in Pegwell Bay. If, on the other hand, the Dragendorff form 37 bowl in Liverpool Museum did come from the area of Pudding Pan it could represent post-deposition contamination. A similar vessel, currently on display in Southend Museum, was recovered from the northern side of the outer Thames estuary, which suggests that there are maritime deposits of decorated wares in the vicinity.

Obviously the presence of one decorated bowl does not refute the assertion that this is a plain ware assemblage but it does raise an interesting dilemma. Has the site yielded other samian forms, either decorated or plain, *mortaria* or indeed potters' stamps that have been assigned to other sites because they do not conform to our perceptions of the 'known assemblage', thus perpetuating a preconceived notion of the nature of the consignment? It is possible, but this study has found evidence to the contrary with a tendency to ascribe to the Pudding Pan site, by accident or deliberate intent to deceive, any plain samian wares that appear to have come from a maritime context. Impostors are often easy to identify as they may not conform with a known form or potter's stamp from the Pudding Pan 'series', or one or more of the tell-tale characteristics commonly found on vessels recovered from Pudding Pan (broken foot-ring, asymmetric wear on the base or marine growth) may be missing, although it must be stressed again that this ascribes a consistency that may be misplaced.

Could the perceived absence of decorated wares or samian *mortaria* from the recovered assemblage be the result of a collection or reporting bias (see Hodder 1974: 340)? For example, fishermen may have discarded any recovered decorated wares or samian *mortaria*, as reportedly happened to the black-slipped wares. It has been noted at New Fresh Wharf that the larger decorated bowls were more susceptible to breakage than the plain forms 31 and 33 (Bird 1986), which might explain why fishermen may have discarded them. However, no decorated or samian *mortaria* fragments have been identified even amongst the collections of fishermen who collected all fragments. Moreover, it is reported that Mr Holden, the Whitstable collector, never saw or heard of even a fragment of decorated ware (Smith 1907: 289). It therefore seems highly unlikely that they were recovered and discarded, as they would undoubtedly have been even more highly prized than the plain wares.

Alternatively, it is possible that decorated wares were not disclosed to antiquarians or archaeologists for fear of confiscation, although the finders of the aforementioned decorated wares from Pegwell Bay and Southend had no

Figure 47 Grit embedded in the surface of a vessel during the production process. This occurred when a newly formed vessel was placed on top of another vessel before they had been fired. Whitstable Museum, no. 66 (not to scale)

such qualms. It seems most unlikely that artefacts could have remained concealed for the last 300 years and it would be illogical for private collectors to disclose their plain ware collections while withholding decorated wares. Thus the absence of decorated wares and samian *mortaria*, rather than being a result of selective retrieval biasing the assemblage, must be a genuine anomaly for which there might be a number of explanations, which will be explored below.

Summary

This study has ascertained that a minimum of 526 samian vessels have now been recovered from the Kentish Flats. The similarities between the findings of this study and those of Smith just over a century ago are quite striking, emphasizing the homogeneity of the deposit. The bulk of the samian assemblage dates broadly from *c.* AD 170–200 and probably from AD 180–200. Some forms and stamps are notably earlier, dating from the pre-Antonine period, indicating an earlier source of material of the late 1st–early 2nd century AD.

Unfortunately the lack of detailed records identifying the location from which individual samian vessels have been recovered and the conflation of locations in subsequent publications renders it impossible to distinguish between sites of differing date from the samian wares alone. The majority of the potters are known to have worked at Lezoux but a few stamps on more recent discoveries represent potters who worked at Rheinzabern in east Gaul. The assemblage supports the notion of the production and transportation of tableware sets, five of which have been identified from the main consignment. The production of sets will be investigated further in the next chapter in the context of similar discoveries from terrestrial sites. The close dating and homogeneity of the main assemblage suggests that the main consignment represents a contemporaneous shipment of recently manufactured samian wares *en route* from the central Gaulish kilns to Britain. Analysis of the wear, growth and damage to the pots will now assess the evolution and disturbance of the site since its first deposition.

Wear, growth and damage to the samian vessels

The results of the current study of 526 samian vessels from Pudding Pan are broadly in line with those of Watson (1987). The majority of the vessels have sustained heavy external wear that has removed the burnished surface, in varying degrees, from the base of the pots. For example, of the 459 vessels for which this type of evidence was recorded, the external surface on 13 vessels (3 per cent) was completely unworn, 60 vessels (13 per cent) had minimal wear, 102 vessels (22 per cent) had medium wear and 284 vessels (62 per cent) had sustained heavy wear. In contrast, the internal surface on 53 vessels (11 per cent) of the 461 vessels for which evidence was recorded, was completely unworn, 318 vessels (69 per cent) had minimal internal wear, 72 vessels (16 per cent) had medium wear while only 18 vessels (4 per cent) were heavily worn.

The pattern of wear on many of the samian vessels has undoubtedly resulted from the exposure of the undersides of the vessels uppermost on the surface of the seabed. The burnished surface has therefore been worn from the underside of the inverted bowls (**Fig. 47**) through many years of exposure at the interface of the seabed and the salt water. The absence of this wear on 3 per cent of the sample might imply that these vessels have been incorrectly attributed to Pudding Pan but the forms and stamps are consistent with the remainder of the assemblage. Anecdotal evidence suggests that occasionally multiple vessels have been recovered in a single haul; perhaps the absence of external wear indicates that these vessels were either recovered in this manner or shortly after the top vessel, which had protected the stack, had been removed so that the lower vessels were never exposed to the abrasive seabed silts.

Of the 438 vessels for which this evidence was recorded, the foot-rings on 138 vessels (32 per cent) were undamaged or slightly worn, 23 vessels (5 per cent) had chipped or cracked foot-rings, 177 vessels (40 per cent) had broken foot-rings, while on 110 vessels (25 per cent) the foot-rings were

Figure 48 Post-firing wear from the foot-ring of one vessel on the internal surface of the next vessel in the stack. This has occurred after the vessels have been removed from the kiln, probably during transit. Note also the circular scour on the sides of the bowl that has occured around oyster anchorages after the vessel has become exposed on the seabed. Whitstable Museum, unnumbered (not to scale)

completely missing. Most of this damage must have occurred *in situ* on the seabed but it appears that some damaged foot-rings were completely removed after recovery so that the vessel would stand upright and level. This is difficult to prove but there is clear evidence that some marine growth has been mechanically removed post-recovery and in some cases attempts have been made to replace the missing slip with cellulose (Marsh 1979: 125). Thus the removal of damaged foot-rings would be consistent with the reports that the vessels had been used in domestic situations by the fishermen of Whitstable and by Gustavus Brander.

Some vessels display post-slipping/pre-firing damage in the form of a circle of grit embedded in the burnished surface around the centre of the internal surface (Watson 1987: 21; **Fig. 47**). This occurred when completed vessels that had dried to 'leather-hardness' were dipped in a slip of refined liquid clay and were then placed on a sanded surface intended to prevent vessels sticking together (Webster 1996: 4). Sand that adhered to the foot-rings was then impressed on the internal surfaces of fired vessels that had been stacked consecutively in the kiln (see **Fig. 47**).

There is also some post-firing wear in the form of circular wear patterns around the centre of the internal surfaces, which corresponds to the diameter of the foot-rings on similar vessels (**Fig. 48**). This is likely to have been caused by the manner in which the bowls were stacked, in an inverted fashion, during transportation rather than during manufacture, again supporting the notion of a coherent cargo. It indicates either that any packaging used to protect the vessels in transit was ineffective or that this damage occurred as a result of the incident that deposited the vessels on the seabed. A few samian vessels also display a rather curious circular wear pattern on their internal surfaces, which seems to have been caused by scour around oyster anchorages that have since become detached (**Fig. 48**).

A model is suggested elsewhere (Walsh 1998; 1999) for the recovery of the pots, which proposes that damage to the foot-rings on the majority of the pots is synonymous with the method of recovery and is entirely consistent with the vessels lying inverted on the seabed. This is confirmed by the existence of completely intact foot-rings on vessels that appear, from wear patterns, to have been lying on their sides thus protecting the foot-rings (see **Fig. 53**). It has been argued that this scenario is unlikely as any vessels struck by heavy fishing gear would be more likely to shatter than to sustain superficial damage. However, oysters lie on the seabed rather than being sunk into it, so that the dredge needs only to rake the surface lightly in order to fish successfully (Wilkins 2001: 56).

Several basal fragments of vessels have come to light in which the base, including the foot-ring, has been completely severed from the pot as if by a knife. Astonishingly, the walls of one Dragendorff form 33 cup (Appendix 1, cat. no. 1.261) have survived intact despite the near-complete absence of

Figure 49 Dragendorff form 33 cup from which the base has been completely removed, presumably by an oyster dredge. Whitstable Museum, no. 54 (not to scale)

Figure 50 Dragendorff form 33 cup displaying damage probably also caused by an oyster dredge. The fact that, despite this damage, the remainder of these cups has survived intact illustrates the resilience of these vessels. Maidstone Museum, unnumbered (not to scale)

the base, which appears to have been removed in this manner (**Fig. 49**). This surely testifies to the sturdiness of these tablewares and assuages any doubts about the cause of the damage to the underside of the pots. Evidence from structured deposits confirms the robustness of Dragendorff form 33 cups which, rather than being broken, were spoiled by sawing a V-shaped notch in their rims (Willis 2005: 9.6; **Fig. 50**).

If the oyster dredge rakes the surface of the seabed only lightly then some interesting questions regarding the nature of the deposit are raised. It would seem that rather than ploughing through and destroying the deposit the dredges so far have merely superficially sampled the extremities of the deposit. It seems highly improbable that dredges operating in this manner could have exhausted the deposit, but once the uppermost layers of the deposit have been raked out it is curious why further vessels are recovered. It would seem either that the dredges are slowly shaving the uppermost surface of the deposit thus creating a slight depression in the seabed or the wreck is gradually eroding from the side of a sandbank. Recent bathymetric surveys have revealed a depression in the seabed in the area from which fishermen believe most artefacts have been recovered (Grant *et al.* 2016), so it is tempting to suggest that the wreck is eroding from the sides of this depression. Another factor that needs to be considered is that of sediment transportation as there has been an assumption that the sandbanks in this area are highly mobile. It is feasible that sediment transportation may expose and re-bury the wreck at different times and in different areas, which could account for the variety of forms and stamps represented in the assemblage. However analysis of the most recently published chart (Hall 1973) and the

Figure 51 Westward migration of a large bedform in the centre of the main study area between the surveys of 2015 and 2016

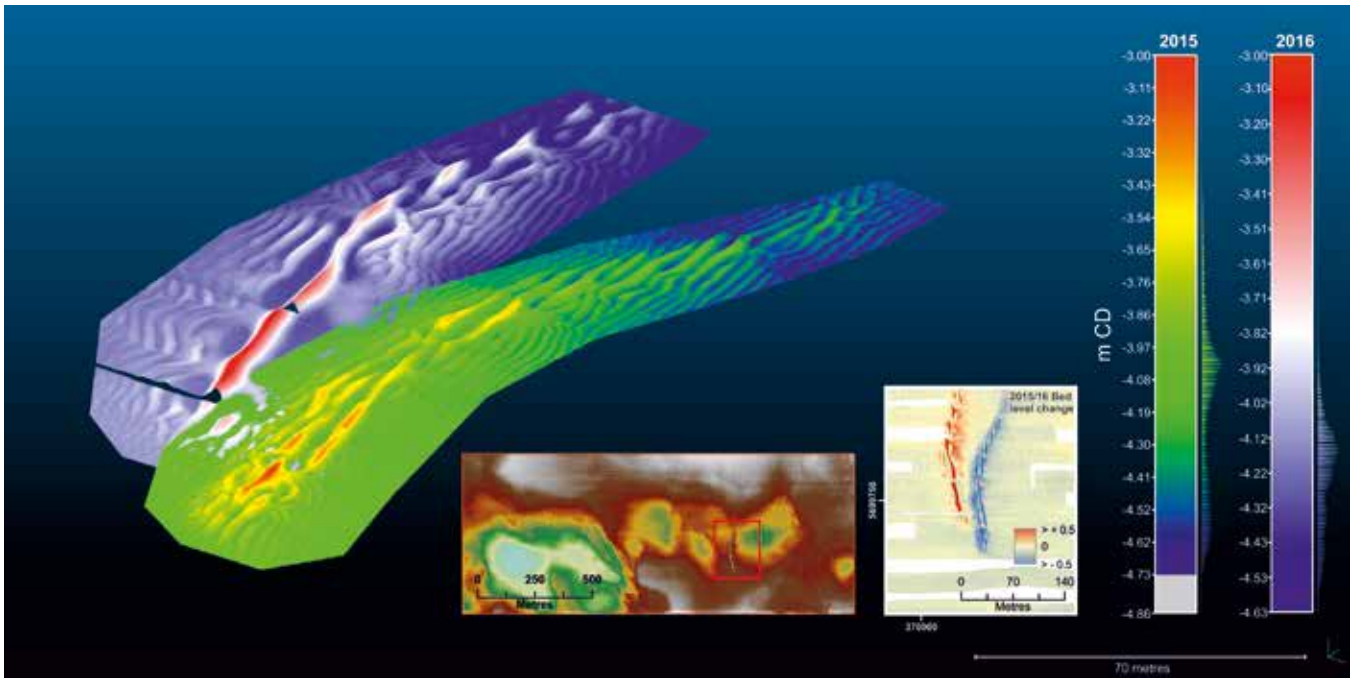


Figure 52 Two Dragendorff form 31 bowls displaying symptomatic angled wear on the lower external surface thus illustrating the area of the vessel that has been exposed to the seabed silts. Note the removal of the section of the foot-ring that appears to have been exposed above the protective seabed silts on the lower bowl. Note also that this break reflects the angle of wear on the slip. Whitstable Museum, unnumbered (not to scale)

subsequent corrections up to 2013 have shown that Pan Sand has remained relatively stable over the past 40 years (see **Fig. 22**). Admittedly, this is a very short timescale when considering Roman deposits but analysis of charts over 240 years has shown that although the orientation and shape of the sandbank has changed the general location has remained fairly constant (see **Fig. 24**; Chapter 3).

Recent geophysical surveys conducted in the vicinity of Pudding Pan as part of the ongoing research on the site reveal some interesting findings in this regard. A comparison of surveys conducted in 2015 and 2016 has revealed that although the general seabed topography is essentially stable, with similar features visible in both the 2015 and 2016 data, a prominent sandwave had moved some 30m to the west (**Fig. 51**) (Grant *et al.* 2016).

Aspect of vessels on the seabed

Of the 459 vessels for which this information was recorded the external surfaces of 171 vessels (37 per cent) and the internal surfaces of 21 vessels (5 per cent) displayed clear evidence of a tilted aspect on the seabed. Of the 171 vessels displaying clear external wear 55 vessels displayed angular wear that was sufficiently defined to enable measurement, if somewhat subjectively. **Figures 52–3** illustrate the difficulty of measuring the wear: the wear on the two Dragendorff form 31 bowls in **Figure 52** is clearly similar on both vessels whereas the wear on the two Dragendorff form 33 cups in **Figure 53** is very different on each cup, reflecting the varying aspect in which each vessel was lying on the seabed. In all cases, although the pattern of wear is obvious, the definition of the wear is ill defined so the measurement of that wear is somewhat subjective. Measurements in degrees were taken from the horizontal plane with the bowl lying in an inverted position, with the foot-ring uppermost.

The Dragendorff form 31 bowls exhibit the most uniform wear, all of which occurs on the lower portion of the external surface varying from 5° to 35° from the horizontal (**Fig. 52**). These 21 Dragendorff form 31 bowls bear the stamps of at least eight different potters, the most frequent being that of Patto 1a, which occurs on four examples. Three of these vessels (cat. nos 1.290, 1.293 and 1.294) display remarkable concordance in the angle of wear measured, which is identical at 20°. This indicates that these vessels have been lying on the seabed in an identical situation, supporting the notion that the products of individual potters were packed and transported together.

Six Dragendorff form 31r bowls stamped by four different potters also exhibit uniform angular wear, ranging from 15° to 30° (another example displays wear of 60°). Two of the three vessels stamped by Mainacnus 2a exhibit 15° and 20° of wear, which again displays some uniformity (cat. nos 1.221 and 1.226). Three of the four Dragendorff form 36 bowls (cat. nos 1.457, 1.471 and 1.479) exhibit wear at an angle of between 10° and 20°, while the solitary Dragendorff form 35 cup (cat. no. 1.418) displays wear at an angle of 90°, which seems

Figure 53 Comparison of two Dragendorff form 33 cups stamped by Caletus (left) and Decmus (right), illustrating the distinctive wear of each vessel. The vessel on the left has been recovered from a stack that is lying on its side while the vessel on the right has been recovered from an inverted stack. Note the intact foot-ring on the vessel lying on its side. In contrast the foot-ring is partially missing from the inverted vessel on the left as it was exposed above the seabed silts. Whitstable Museum

indicative of separate packaging for different forms. It is interesting to note that 16 of the 18 Dragendorff form 33 cups that display angled wear (of 131 Dragendorff form 33 cups stamped by 15 potters) are all stamped exclusively and equally by either Decmus ii 3b or Caletus 2a.

Moreover, the Dragendorff form 33 cups exhibit two very distinct and discrete wear patterns; the wear patterns on many of the cups, like those for the majority of the vessels in this assemblage, clearly indicate that they have been sitting in an inverted stack on the seabed as the lower portion of the vessels display angled wear varying from 10 degrees to 55 degrees. However, some of the Dragendorff form 33 cups display asymmetrical wear and damage to one side of the rim, which indicates that they have been buried lying on their sides with a portion of the rim exposed above the seabed silts (**Fig. 53**).

Without exception, the foot-rings of the vessels that are lying on their sides remain intact, which supports the supposition that the broken and missing foot-rings are a consequence of the foot-rings of the inverted vessels being clipped by the oyster dredges during the recovery process (see **Fig. 49**). One of the Dragendorff form 33 cups stamped by Caletus (cat. no. 1.105) is broken on one side as though it has been wrenched from a horizontal stack of pots. There is some evidence to suggest that each discrete wear pattern relates to a particular potter, the pots of Decmus being inverted and the pots of Caletus lying on their side, thereby suggesting separate packaging for each potter, but this phenomenon was not immediately apparent and so has not been recorded in every case. If true, these vessels provide the clearest indication yet that the products of each potter were packed and transported separately, a notion supported by the evidence from an earlier, pre-consumption deposit from Burghöfe in Germany where samian was grouped by form and by potter (Weber 2013: 207). Also supporting this notion is the variation in the size of similar forms, which means that vessels made by one potter cannot easily stack inside those of another (see below).

The wear patterns on the remainder of the vessels are less easy to ascertain but indicate that most of the pots have been lying on the seabed in an inverted position. Angular wear on the more shallow vessels is less pronounced and therefore more difficult to determine with any degree of objectivity. The varying angle of wear on some pots suggests that each transportation container was packed with only one form of samian and that these 'crates' have deposited their various contents at differing angles of incidence on the seabed (see Atkinson 1914). The pottery found in the cellar at Burghöfe had been burnt to different intensities in a fire, leading to the suggestion that it had been arranged in stacks by form (Ulbert 1959: 54–8; Rhodes 1989: 53). Perhaps the pottery was tied together in stacks separated by straw (Rhodes 1989: 46). Alternatively, the variety of wear patterns displayed on the Pudding Pan vessels may relate to the positions of different forms at different levels on the wreck, thus reflecting the gradual exposure and denudation of the site. This evidence, together with the large number of contemporaneous samian vessels recovered, is consistent with a coherent wreck site or a jettisoned cargo from a floundering vessel rather than with anchorage detritus.

Manufacture

The Pudding Pan assemblage is unusual for a number of reasons, not least because a high proportion of the assemblage (95 per cent) is made up of complete or near-complete vessels thus providing a unique opportunity to undertake a series of measurements that would otherwise be impossible. These measurements should highlight any variation between different potters producing the same forms as well as variations between vessels of the same form produced by individual potters. This close analysis of a considerable assemblage of vessels apparently manufactured shortly before their loss may enhance our understanding of the production processes.

Plain samian wares were made on a potter's wheel using shaped burnishing tools or perhaps templates, or devices for mechanically shaping and smoothing the clay into relatively uniform cups, bowls, plates and so on. The absence of finger-rilling on the smooth surfaces of open vessels provides evidence of these processes, as do the curved diagonal lines sometimes visible on the sides of vessels (Webster 1996: 4). After manufacture of the basic vessel, foot-rings were shaped or added and decorative details applied depending on form. Leaves were trailed *en barbotine* using a trailed slip technique, or simple designs were impressed using a roulette wheel. There was considerable variation in the size of kilns, with some capable of firing a very large number of vessels at one time. Some potters, possibly owing to the complex operations involved, appear to have contributed to communal firing rather than using kilns dedicated to one workshop (Webster 1996: 4, 9–12). A 1st-century AD graffito from La Graufesenque recording names and vessel forms indicates that between 27,000 and 30,000 pots could be fired at one time while one text lists 166,000 vessels of the same shape (Pucci 1983: 110). However, many of the names on the kiln tally do not correspond with names stamped on the vessels so the correlation between stamps and tallies remains obscure (Webster 1996 12).

Variability and standardization: vessel size

The Pudding Pan assemblage can be used specifically to investigate variations in the dimensions of individual forms manufactured by individual potters in order to assess production methods. Superficially, pots of a particular form look almost identical but there is considerable variation between pots made by different potters and even between the vessels made by one potter (Walsh 2002). When plotted these measurements, taken from a large proportion of vessels, graphically illustrate the extent of these variations. These data could show that a standard template was used for each form by many of the potters represented in the assemblage or that each potter used a unique template. Is there any evidence to suggest that groups of potters shared the same template, thus possibly identifying groups of potters within the assemblage who may have worked together? Individual potters may have used a variety of templates for the same form. The dimensions of the potters' stamps can be used not only to confirm how many stamps an individual potter may have used but also to aid the identification of some of the illegible stamps.

The series of measurements, taken from as many vessels as possible, included the rim diameter and height of the vessels (excluding the foot-rings, which made little difference to the results). Measurements were also taken of the length and width of the various potters' stamps. These data were then plotted to highlight variations between different potters and between the products of individual potters. A margin of error has to be allowed for variations in the manufacturing process, for variable shrinkage of wet clay in drying and firing and for minor errors in the recording process. Many of the vessels were found to be asymmetrical, with a variation in the rim diameter of *c.* 5–10mm so some variations reflect the position from which the measurement was taken on the vessel. Despite these factors the results show considerable and significant variations that might not otherwise have come to light. In the following analysis the term 'template' is used as shorthand to mean either a template or shaped burnishing tools.

The Dragendorff form 33 cups recovered have been in two distinct sizes: the smaller cups range in height from 38mm to 54mm without foot-rings with a rim measuring from 99mm to 112mm. The larger cups range in height from 46mm to 83mm with a rim measuring from 133mm to 149mm. Monteil (2013: 367) has suggested that Dragendorff form 33 vessels higher than 70mm (including foot-rings) are likely to date to after AD 160. Only two potters in the Pudding Pan assemblage, Namilianus and Quintus v, made cups of both sizes.

The larger Dragendorff form 33 cups from Pudding Pan have been stamped by five potters, four of whom seem to have used at least two templates (**Fig. 54**). For example, 9 of the 11 vessels stamped by Arncus 1a are clustered in a group with a variation in both dimensions of only 5mm, with another vessel only 4mm bigger. However, another vessel is 14mm shorter than the smallest of the other vessels, which implies the use of a smaller template. The vessels stamped by Atilianus i 5a also seem to confirm the use of two different templates even though only three examples have been recovered. The two other potters that appear to have used two templates display similar results, with a closely grouped cluster and a single outlier. There is insufficient evidence to confirm that different potters shared a template although this remains a possibility especially for the outliers.

The stamps of 11 potters are represented on the smaller Dragendorff form 33 cups (**Figs 55–6** illustrate the eight for which data were recorded). Most potters making the smaller cup appear also to have used at least two sizes of template although the results are less equivocal than for the larger cups. The three most prolific potters represented on small Dragendorff form 33 cups – Maternianus i 3a (18 vessels including one pair of identical dimensions), Decmus ii 3b (16 vessels including two pairs of identical dimensions) and Caletus 2a (12 vessels including one pair and two triples of identical dimensions) – all have fairly tight clusters of vessels with small variations in dimensions measured in a few millimetres. However, they all have at least one outlier that, in each case, seems to have been produced using a different template.

The greatest variation is displayed in the eight cups stamped by Cintusmus i 5a, although the variation is only 8mm in diameter and 13mm in height. It would appear from their distribution that Cintusmus used three different templates to make these cups. The three vessels each stamped by Namilianus and by Patto 1a seem clearly to indicate the use of two different templates. In contrast, the four vessels each stamped by Maternus iv 1a and by Saturninus ii appear to have been made using only one template.

The considerable variation between Dragendorff form 35 and Dragendorff form 36 vessels suggests that if one potter produced them a variety of templates were used (**Fig. 57**). Eight of the nine Dragendorff form 35 dishes are clustered, while the ninth is of similar diameter but significantly reduced in height, again indicating the use of at least two different templates. The two discrete groups of Dragendorff

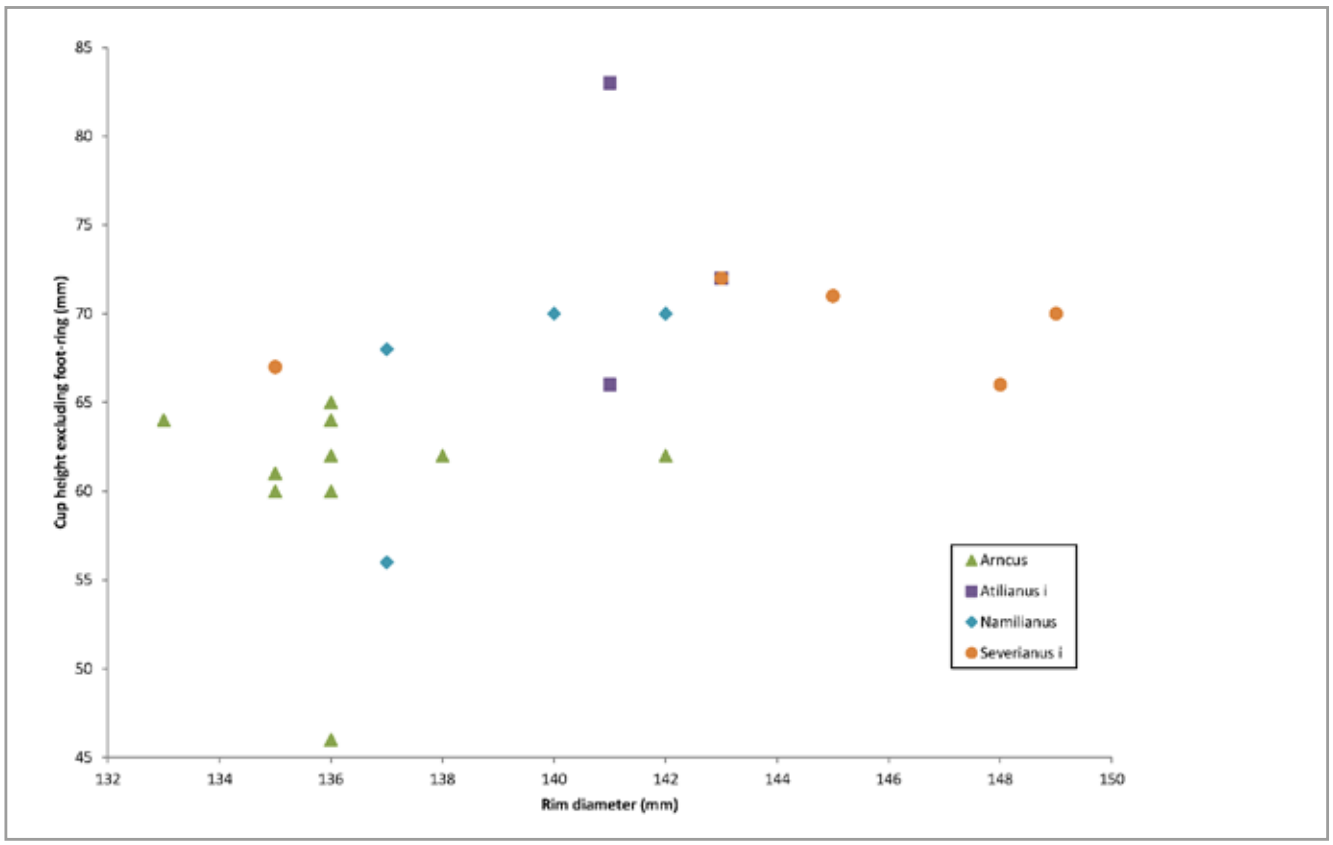


Figure 54 Variation in size of large Dragendorff form 33 cups stamped by Arncus, Atilianus i, Namilianus and Severianus i

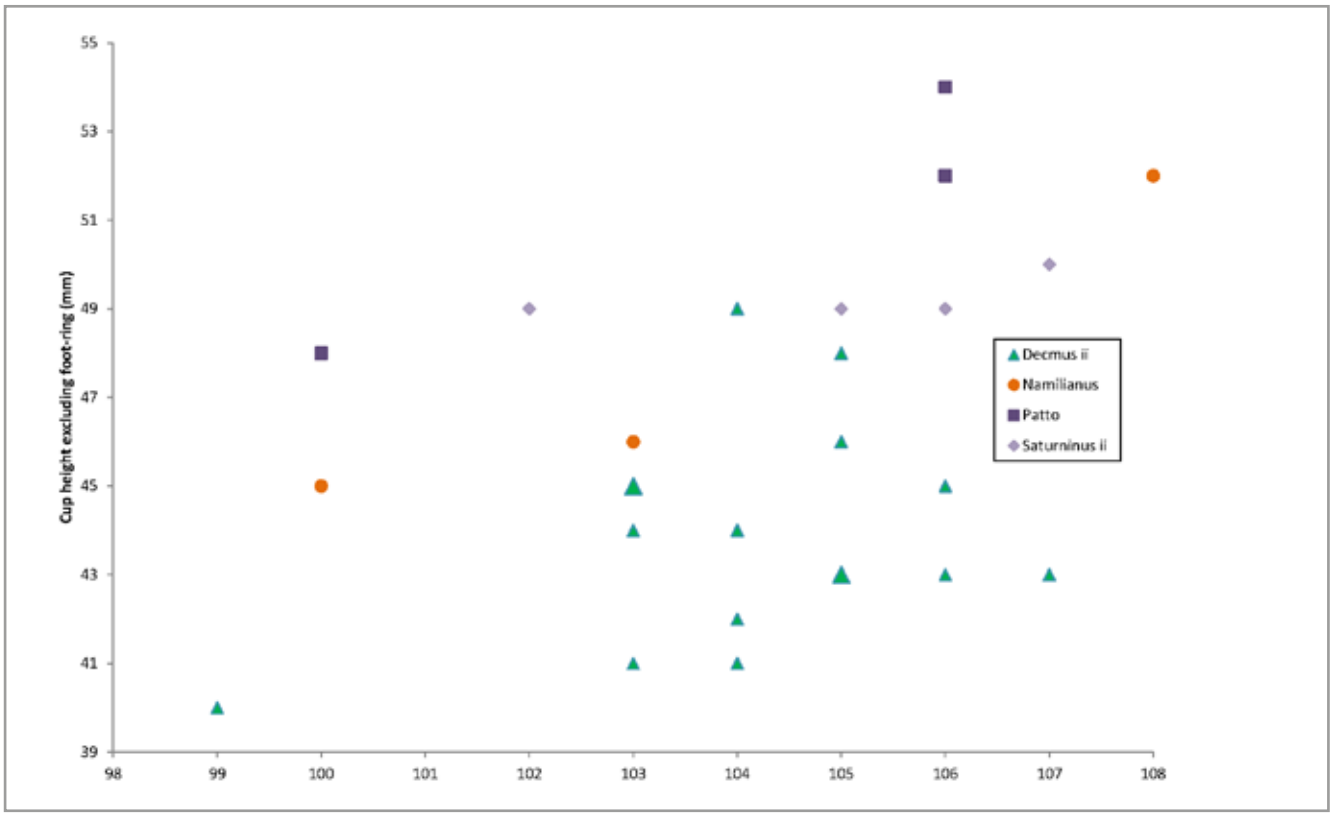


Figure 55 Variation in the size of small Dragendorff form 33 cups stamped by Decmus ii, Namilianus, Patto and Saturninus ii. The larger symbols denote multiple vessels stamped by the same potter of the same size

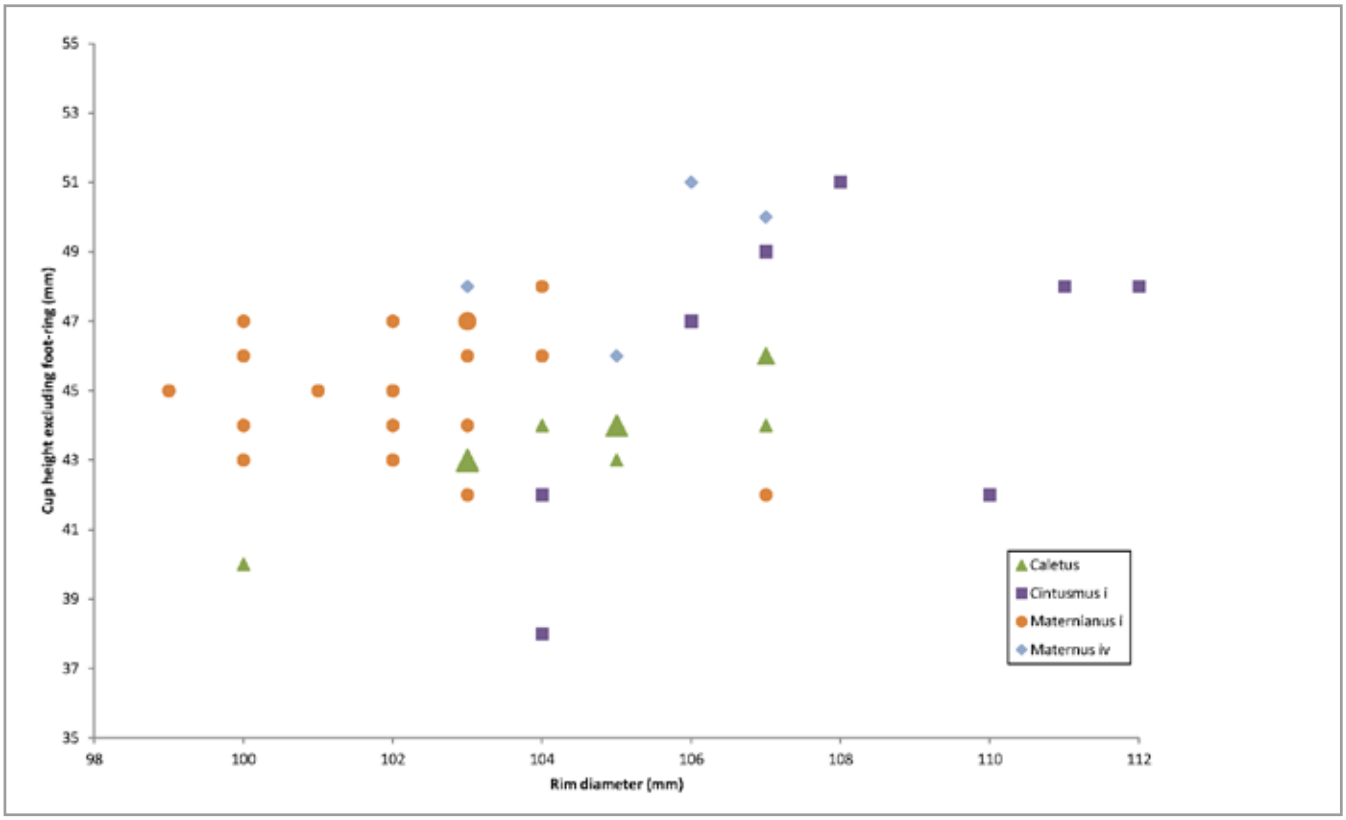


Figure 56 Variation in size of small Dragendorff form 33 cups stamped by Caletus, Cintusmus i, Maternianus i and Maternus iv

form 36 bowls indicate that they were produced in two distinct sizes. The variations in height (>20mm) and diameter (>14mm) of the eight larger vessels provide no obvious patterning to suggest how many templates may have been used. The dimensions of the 23 smaller bowls are more tightly clustered, with variations of less than 16mm in the diameter and less than 12mm in the height of most of the vessels. There are some notable outliers either side of this main cluster, suggesting the use of at least three templates.

The dimensions of the Dragendorff form 79 plates display far greater harmony, with 25 of the 30 vessels clustered with only 6mm variation in their rim diameters and 9mm variation in the vessel heights even though this sample has been stamped by six different potters (**Fig. 58**). These results are noticeably different from the other forms as it is possible that all the potters used a single template to manufacture the bulk of the vessels. However, it is interesting to note that the products of individual potters are still grouped together within the main cluster. For example, the vessels of Caratillus ii and most of those of Atilianus i are very closely clustered. In contrast, the two vessels each stamped by Campanus i and Sacrillus are markedly different, suggesting the use of more than one template. However, even these outliers display some clustering with other vessels made by the same potter in the main cluster. Whether these results illustrate the idiosyncrasies of individual potters using a communal template or the use by each potter of unique templates is difficult to determine.

The results from the Dragendorff form 31r vessels are somewhat mixed (**Fig. 59**). Two of the six potters represented in this sample, Primanus iii 6f and Cintusmus i 5a, each appear to have used one template although their work is represented by only two and three vessels respectively. In contrast, Iustus ii 2b is also represented by only two vessels but these are of very different dimensions and have clearly been made using two different templates. Mainacnus 2a is represented on nine vessels, six of which are closely clustered, but the spacing of the remaining three suggests the use of three different templates. The most frequent stamp, Saturninus ii 8a, appears on 16 vessels whose dimensions are widely dispersed. The eight smallest vessels are clearly grouped in two well-defined clusters, suggesting the use of two templates, whereas there is no obvious patterning to the eight larger vessels so that four different templates may have been used.

The largest group in this study is that of Dragendorff form 31 with 71 vessels, reflecting its ubiquity in the assemblage (**Figs 60–1**). The output of each potter is clearly definable in clustered groups by vessel dimension, which must point to the use of discrete templates by each potter. The Dragendorff form 31 bowls stamped by Albucianus 6a (16 vessels), by Aestivus 2a (12 vessels) and by Caletus 2a (12 vessels) are each clustered in one or two groups with a few outliers suggesting the use of two or three templates. The variations in the smaller samples, Patto 1a (six vessels), Arncus 1a (two vessels) and Quintus v (two vessels), each suggest the use of one or possibly two templates. The dimensions of the four bowls stamped by Decmus ii 3b are more widely spread, with an 11mm variation in height and 8mm variation in diameter (**Figs 60–1**).

Saturninus ii is once again the most prolific potter in this sample, producing both Dragendorff form 31 (17) and Dragendorff form 31r (16) vessels (**Fig. 62**). It is clear that

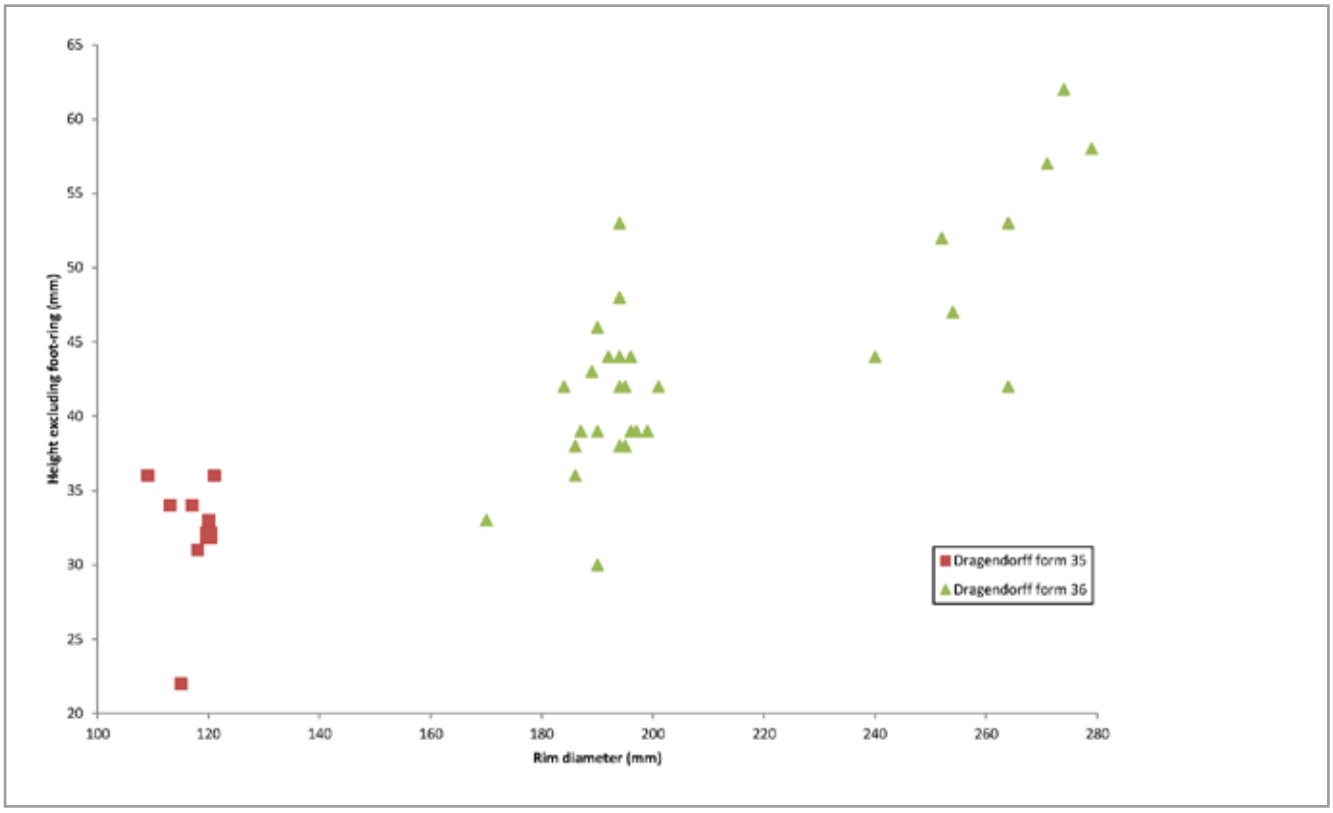


Figure 57 Variation in the size of Dragendorff form 35 dishes and Dragendorff form 36 bowls

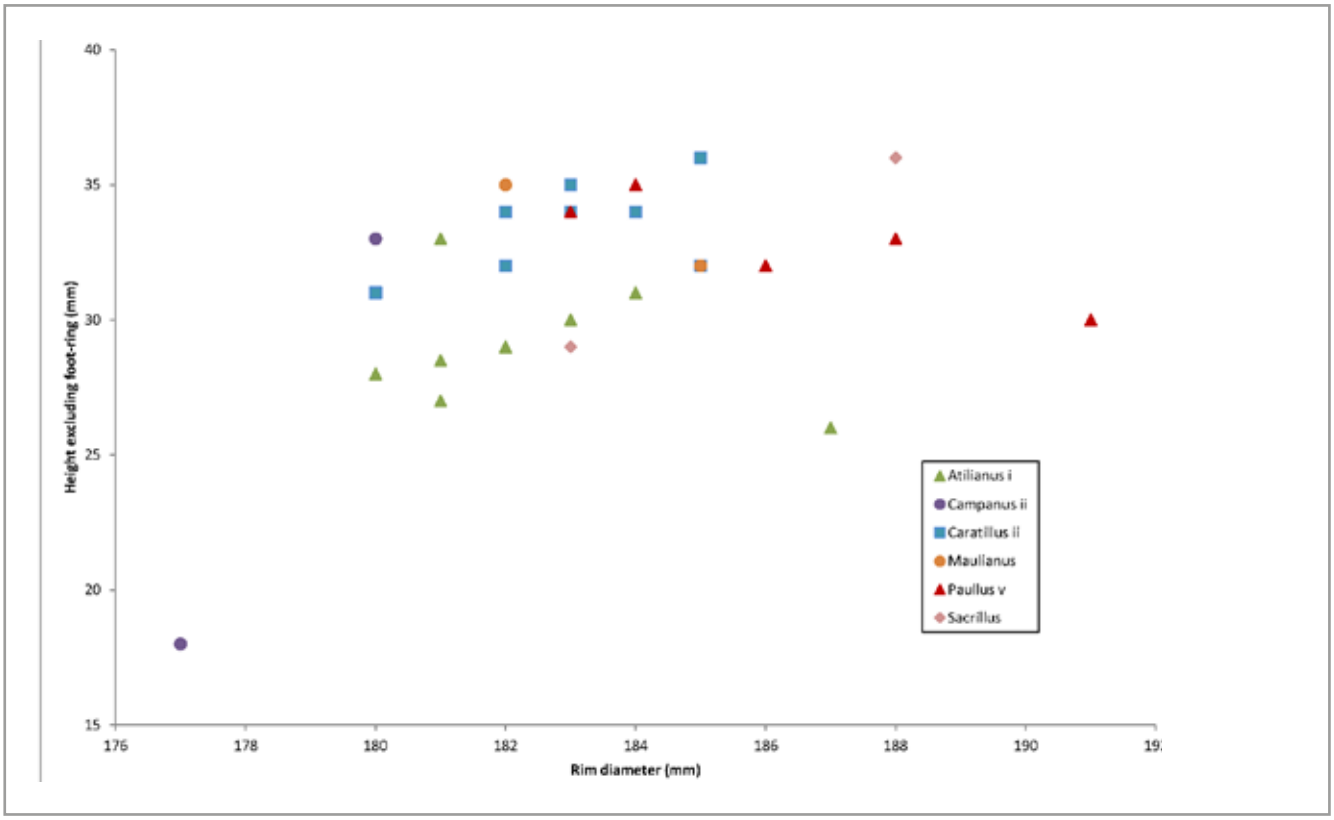


Figure 58 Variations in the dimensions of Dragendorff form 79 plates stamped by Atilianus i, Campanus ii, Caratillus ii, Maulianus, Paullus v and Sacrillus

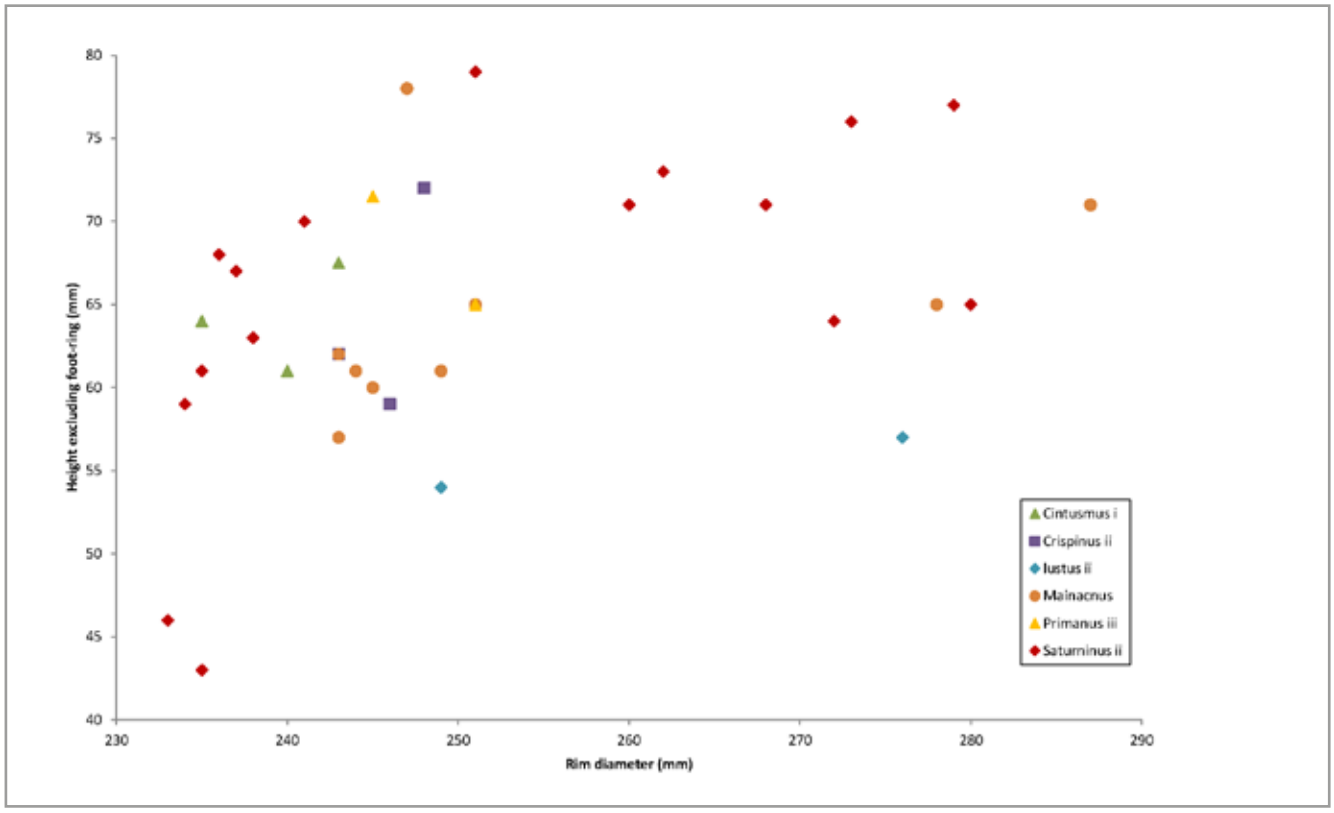


Figure 59 Variations in the dimensions of Dragendorff form 31r bowls stamped by Cintusmus i, Crispinus ii, Iustus ii, Mainacnus, Primanus iii and Saturninus ii

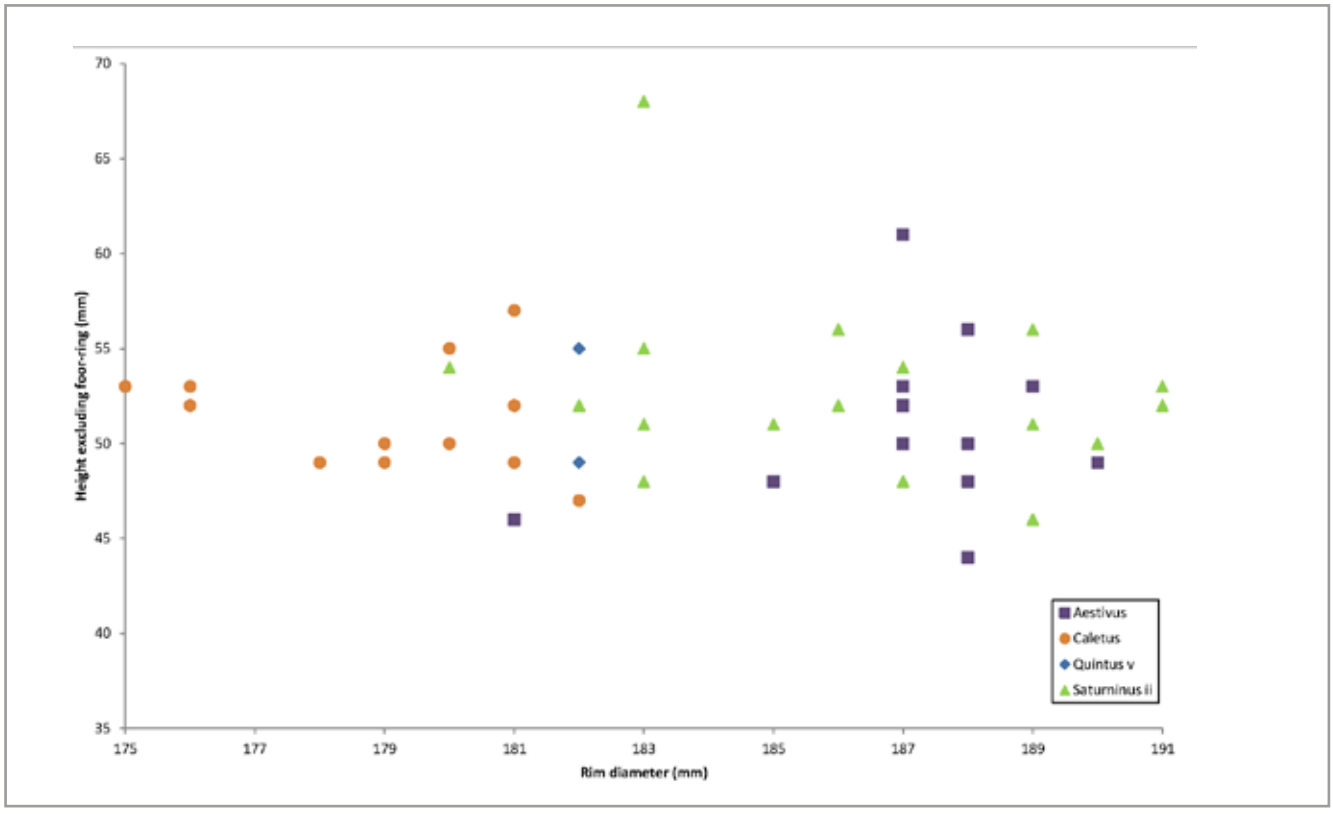


Figure 60 Variations in the dimensions of Dragendorff form 31 bowls stamped by Aestivus, Caletus, Quintus v and Saturninus ii

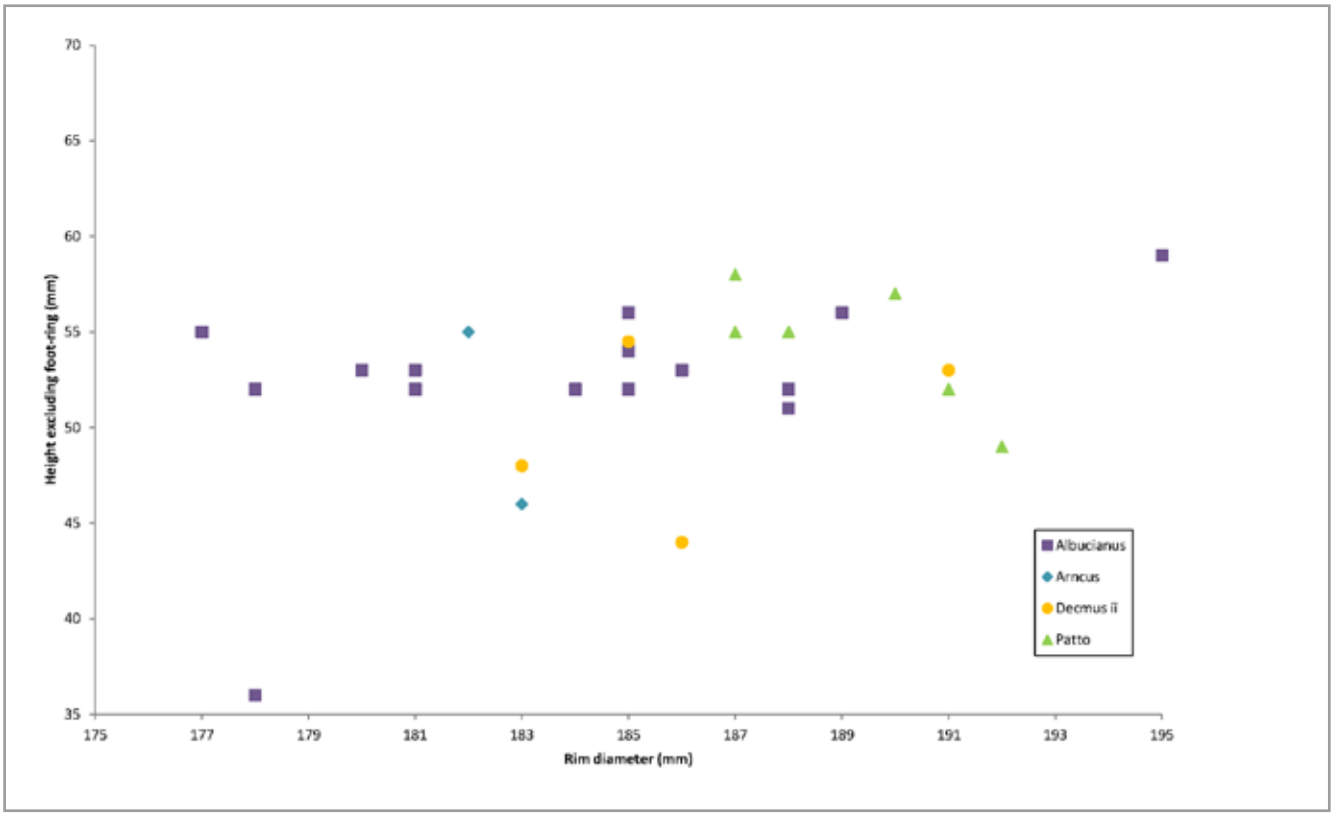


Figure 61 Variations in the dimensions of Dragendorff form 31 bowls stamped by Albucianus, Arncus, Decmus ii and Patto

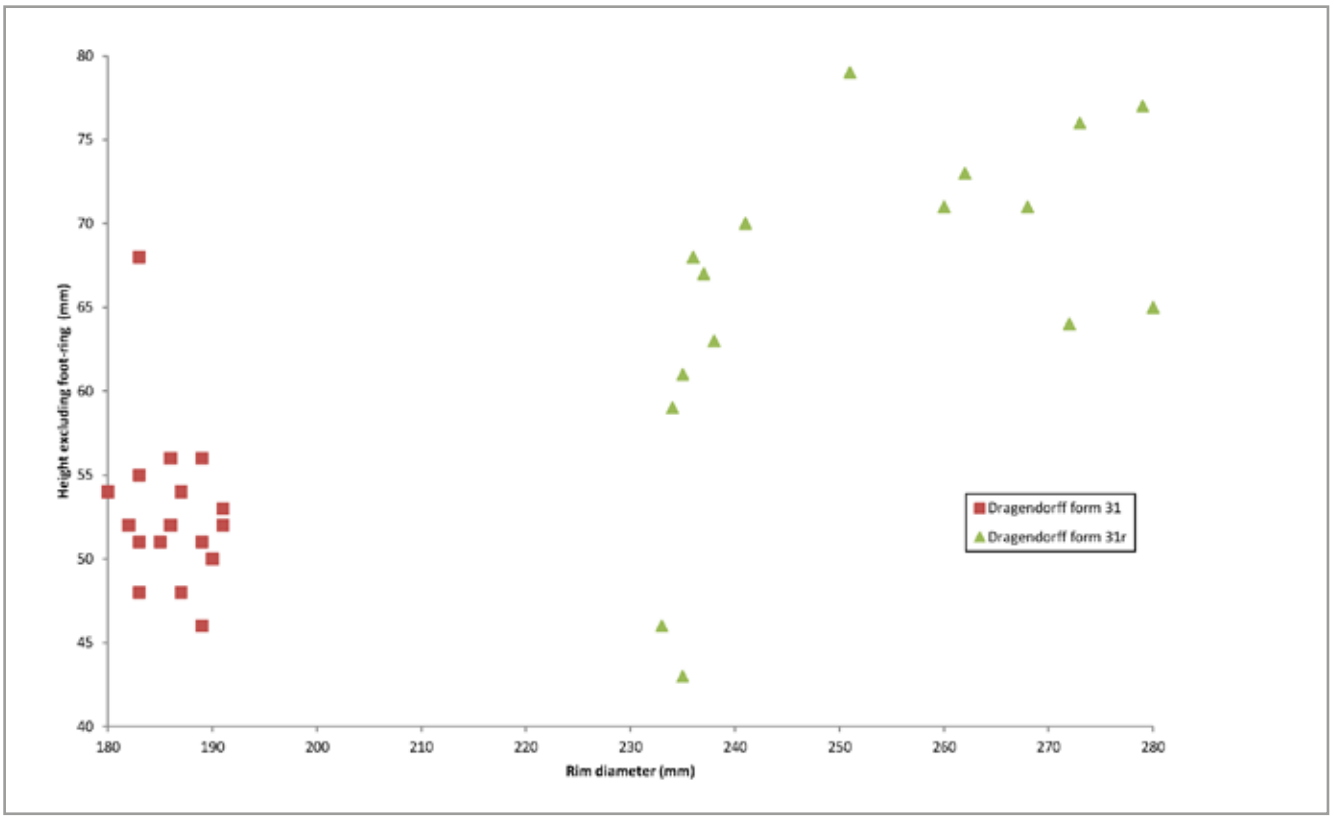


Figure 62 Comparison of dimensions of Dragendorff forms 31 and 31r stamped by Saturninus ii 8a

Figure 63 Given that this particularly misshapen vessel was on its way to market clearly illustrates that quality control on the output of the manufactories was not particularly rigorous. British Museum, 1920,1123.28 (not to scale)

there are three distinct clusters according to rim diameter, the smallest representing the Dragendorff form 31 bowls and the two larger forms representing two sizes of Dragendorff form 31r. It is striking how uniform the dimensions of each form are, particularly the Dragendorff form 31 and smaller Dragendorff form 31 vessels with a maximum variation in the dimensions of either rim or height of only 11mm, with a few outliers. The larger Dragendorff form 31r bowls are less clearly defined yet there is still only a maximum variation of 13mm in height and 20mm in diameter. It seems reasonable to suggest that the larger the vessel the greater the margin for variation. Thus a seemingly wide difference is shown to be more uniform than assumed and could be accounted for by the margin of error inherent in both the manufacturing and the recording processes.

It is clear, however, that there is noticeable variation between similar vessels made by individual potters. This variation in a seemingly standard form of pottery indicates that accuracy and uniformity were not particularly important as long as the pieces looked similar. This is consistent with the observation that many vessels were damaged by grit embedded on their internal surfaces during the manufacturing process and that fingerprints are present in the slip of some vessels. This suggests not only that the implementation of quality control on the output of the samian manufactories was somewhat variable, but also that fairly minor variations and imperfections in the finished product were acceptable to producers and consumers alike (Dannell 2002; Willis 2005: 9.6, 11.7; **Fig. 63**). It is not clear why individual potters seem to have used a number of templates to make the same form of vessel. Perhaps the templates or shaped burnishing tools broke or wore out. If so, this is likely to have been the result of considerable usage.

Thus the variation detected in the Pudding Pan assemblage presents a number of possibilities. These vessels may have formed part of a very large assemblage, which is consistent with the evidence from the La Graufesenque graffito, as one would expect less variation in a smaller consignment. Alternatively, they may have been manufactured over a considerable period of time rather than the much shorter period envisaged for a contemporary consignment, although the homogeneity of forms and potters' stamps in the assemblage implies that the vessels were manufactured shortly before their transportation.

On the other hand, the variation detected in individual forms might indicate that templates were communal in a workshop, used as and when required rather than unique to individual potters. The dimensions of the Dragendorff form 79 vessels manufactured by individual potters, however, indicate that each potter did use unique templates since the outliers from the main cluster are grouped adjacent to that potter's products within the main group. Whether different potters used the same template is difficult to ascertain. Many of the vessel dimensions of individual forms overlap while the dimensions of some vessels made by different potters are identical, suggesting that it is possible that there was communal use of templates. But the fact that there are clear groupings by dimension of vessels manufactured by individual potters again implies that templates were unique to each potter rather than communal. Nevertheless, it is clear that standardization in the production of samian ware was important. The results of similar assessments have implications for understanding the use of samian forms and dining customs (see Monteil 2013: 367).

In summary, analysis of wear and damage confirms that the majority of the vessels have been lying on the seabed in an inverted position with their foot-rings, many of which have been damaged, uppermost. Wear from stacking on some internal surfaces has been distinguished from damage in the same area sustained during the production process. The wear on some of the vessels illustrates that the vessels have been lying on the seabed in a tilted aspect; in some cases the angle of wear can be shown to be peculiar to a particular form or to the products of a particular potter. This indicates either that different products or forms have been packaged separately or that different levels of the consignment have been exposed.

The unusually large number of complete vessels recovered from the site has enabled analysis of variation in individual potters' products and between the work of different potters for a range of forms. This analysis has shown that the recovered assemblage contains similar vessels that have been manufactured by potters each of whom used a variety of templates or burnishing tools. The use of various templates within one assemblage suggests either that the consignment is considerably larger than that which has already been recovered or that it was assembled over a considerable period of time. The general homogeneity of forms and potters' stamps represented suggests, however, that the consignment was in fact manufactured and assembled over a relatively short period of time. Besides samian a variety of other Roman artefacts have been recovered by Whitstable fishermen. These are detailed below.

Figure 64 Left and centre: base of a central Gaulish black-slipped cup from Pudding Pan now in Whitstable Museum (Box 25) (not to scale). Right: complete central Gaulish black-slipped 'sugar-bason' [sic] after Smith (1907)

Central Gaulish black-slipped ware

The samian production centres made variations of the distinctive red-coloured vessels such as the so-called 'black samian', more accurately called 'central Gaulish black-slipped ware' (Tyers 1996, 137–8; Tomber and Dore 1998: 50; Willis 2005: 6.5.2). It is reported that some of these black vessels, which Pownall (1779: 287) claimed were 'Tuscan ware', have been recovered from Pudding Pan (**Fig. 64**). Smith (1907: 273, fig. 1;) presented a photograph of a black Dragendorff form 9 'sugar-bason' [*sic*] from the site, also referred to by Jacob (1782: 124), which was given to Dr J.W. Hayward, a Whitstable doctor, by a local collector, and which Smith (1907: 272) believed was the so-called Tuscan ware. If this is the case then it is difficult to comprehend the report that these attractive vessels were ignored in favour of the plain red samian wares, which are much less ornate but seemingly commanded a higher price from collectors (Spurrell 1885: 282). They may not have been recognized as Roman or, more probably, they may have been only rarely recovered intact as they are thinner walled and therefore more delicate than the samian vessels. As previously established the assemblage is more heavily biased towards the collection of complete vessels.

Consequently, black-slipped wares from Pudding Pan are quite rare. Only one basal fragment has been identified recently, from which the vertical walls are missing (cat. no. 2.17; **Fig. 64**). This adaption may have occurred in antiquity in order to reuse the vessel in an alternative function, as proposed on other sites (Willis 2005: 8.5.2), or may more likely have occurred post-recovery. Another vessel, reportedly from Pudding Pan (cat. no. 2.16; Cambridge University Museum of Archaeology and Anthropology, acc. no. 1922.896), has not been seen.

The geographical provenance and date of these black-slipped vessels (*c.* AD 150–200) conform to those of the main samian assemblage and they could therefore have been a component of the same consignment. The discoveries from the Kentish Flats and from New Fresh Wharf show that Lezoux black-slipped wares and Lezoux samian were imported to Britain together (Rhodes 1989: 44). It is clear that curiously few examples of black-slipped ware come from forts and other military sites (Willis 2005: 6.5.2), which might provide a clue to the likely destination of this consignment.

North African red-slipped ware

North African red-slipped (ARS) ware (Tomber and Dore 1998: 61–2) is a fine ware produced in North Africa that was widely distributed in the Mediterranean from the late 1st to the 7th centuries AD. It is also widespread around Britain but in small quantities, found in contexts from the late 1st to at least the end of the 4th century AD. ARS ware appears to have filled the marketing void around the Mediterranean that was left by the movement of the samian industry northwards. The earliest styles and forms were based on contemporary south Gaulish samian types but diverged sharply from those of Gaul and the northern provinces after the 2nd century AD. The term 'African' is used to cover a number of production centres but the main kiln sites were probably concentrated around modern Tunisia (Bird 1977: 269). Like samian, the great majority of ARS vessels belong to a comparatively small number of highly standardized types that changed fairly frequently (Hayes 1972: 14). Carandini (1983: 150) suggests that some forms disappeared because they were difficult to stack in the hulls of ships.

Two vessels identified as ARS ware have been ascribed to Pudding Pan: a form 3B bowl (**Pl. 17** in plate section, this volume; cat. no. 2.19; Bird 1977: 271, fig. 20.2; Hayes 1980: 522, n 10) dating from the first half of the 2nd century AD; and a form 39 bowl (**Fig. 65**) (cat. no. 2.20; Hayes 1972: 58–9) dating from the first half of the 3rd century. The form 3B bowl, equivalent to Dragendorff form 36 (Hayes 1972), was in the Museum of London collections (acc. no. 20565) but was transferred to the British Museum in 1997 (acc. no. 1997,0912.33). Bird (1977: 273) questions the Pudding Pan provenance for this vessel as the surface is near perfect apart from a small calcareous encrustation. She suggests that this contrasts with 'the distinctive abraded surfaces of Gaulish vessels from the Rock', which is not entirely accurate, as at least 3 per cent of the samian vessels do not share this 'characteristic' abrasion. This vessel was not inspected by the author but the British Museum database describes its surface as very pitted, the barbotine decoration abraded and the foot-ring chipped, which does conform quite closely to the wear and damage sustained by other Pudding Pan examples.

There is some doubt regarding the identity of the form 39 bowl as although the shape is similar it has two concentric grooves rather than the appliqué decoration around the floor of the vessel reportedly found on other specimens (Hayes 1972: 58–9). This variation might be explained away, however, as form 39 is very rare with only one other complete example, currently in the Louvre. The bowl, ascribed a 'Pudding Pan' provenance, is intact with a dull

Figure 65 North African red-slipped ware form 39 bowl. Jewry Wall Museum, Leicester, unnumbered (not to scale)

pinkish-red burnished surface of very poor quality especially when compared to the highly lustrous, deeply coloured burnished surface of the samian wares. Beyond the marine encrustation, it bears none of the wear marks so characteristic of other vessels from Pudding Pan although the foot-ring on this form is not very pronounced and is therefore far less susceptible to the damage sustained by its Gaulish counterparts.

By its very nature, ARS ware differs from other artefacts in form, fabric and potter's stamp, so association with Pudding Pan cannot be categorically confirmed by wear, growth or damage analysis. The separation of more than a century in the dating of the two vessels is interesting as it supports the notion of more than one source of material in the area. It is possible that the form 3B is associated with the other late 1st- to early 2nd-century AD material, possibly as shipboard equipment, although an ARS bowl of this early date is unusual in Britain.

The form 39 bowl dated more conventionally to the first half of the 3rd century AD is considerably later than the bulk of the samian. It might represent a casual loss or a later source of material although both vessels might represent post-deposition contamination. Greater numbers of these relatively rare imports (Bird 1977: 269; Carandini 1983: 146) would lend credence to a Pudding Pan provenance. In any event, ARS wares are unlikely to have been direct objects of trade as the Gaulish samian industry monopolized the British market until it was succeeded by local imitations (Bird 1977: 272). Therefore, if these two vessels are associated with the sources of the other material they are more likely to represent crew's possessions or ship's equipment than cargo.

Terra rubra

Maidstone Museum has one piece of Gallo-Belgic ceramic that allegedly came from Pudding Pan (box RB21C; cat. no 2.18; **Fig. 66**). The delicate nature and near-pristine condition of this vessel coupled with very slight marine growth raise some doubts regarding its provenance although other near-pristine vessels have been recovered from Pudding Pan. If it did come from the Kentish Flats this form 56C *terra rubra* cup dating to AD 20–60 (Tyers 1996: 162–5, fig. 198; Tomber and Dore 1998: 12; Deru and Rollet 2000: 346; Bédoyère 2000: 26, fig. 14b) must have come from the 1st-century AD source north of Pan Sand rather than from Pudding Pan. Only one vessel of this type has been recorded

Figure 66 *Terra rubra* cup form 56c from Pudding Pan. Maidstone Museum, box RB21C (not to scale)

a b

Figure 67 Samian lamps from Pudding Pan currently in Whitstable Museum (not numbered) (not to scale); a Bailey type K misc. group (left) and a Bailey type O group I (right)

but its north Gaulish origin is consistent with the other 1st-century AD finds from Pan Sand.

Lamps

Two samian lamps in Whitstable Museum (unnumbered) are alleged to have been recovered from Pudding Pan. The oval lamp (**Fig. 67a**) is a mould-made Bailey type K, misc. group, with a Loeschcke shoulder form VIIb variant (Bailey 1980: 250; Q1116; cat. no. 2.14). It originates from southern Italy but this example could be a copy, and dates from the last quarter of the 1st century AD and into the 2nd century, so is probably associated with the later 1st century source. The circular lamp (**Fig. 67b**) is a Bailey type O, group I, with a Loeschcke shoulder form VIIa with closely spaced rays surrounding a decorated picture discus (Bailey 1988: 164; Q1569; cat. no. 2.15). It is possibly south Gaulish or Italian in origin and dates broadly to the first half of the 2nd century AD (D. Griffiths pers. comm.) and therefore is more likely associated with the later 2nd century source. In contrast to much of the samian these lamps are both in very poor condition with much of the slip and decoration worn away, suggestive of considerable post-depositional movement. Samian lamps are extremely rare in Britain and elsewhere in the north-west provinces and their use declines sharply after AD 100 (Eckardt 2011), so these finds are potentially very significant. The six other samian lamps found in Britain like those from Pudding Pan are central Gaulish and of 2nd-century AD date. They come from at least three sites: New Fresh Wharf (St Magnus House) in London, Latimer Villa in Buckinghamshire and an unknown site in London. A group of central Gaulish black-slipped lamps were also recovered from the New Fresh Wharf site (Willis 2005: 8.5.1). With the possible exception of the lamp of unknown provenance, the samian and black-slipped lamps from London came from the river frontage, which suggests either that they were lost at the point of import or, perhaps, that they were votive offerings. None have come from deposits within the city (Willis 2005: 8.5.3).

Amphorae

An array of *amphora* forms of diverse provenance, encompassing a broad range of dates, has been recovered from the Kentish Flats (**Table 14**; see also **Figs 28, 68–9**; Appendix 2). Some of the *amphorae* have been recovered intact while others are represented by rim, neck and handle fragments. Interestingly only one basal spike, of a Class 25 Dressel 20 Spanish oil *amphora*, and one body fragment, from a medieval Spanish olive jar, have been recorded, which seems to reflect a heavy bias towards the collection of only the most interesting or most visible fragments, which are also the most diagnostic. The locations from which *amphora* sherds have been recovered have generally been far more accurately recorded than those of many other classes of artefact.

Five Class 25 Baetican Dressel 20 *amphora* fragments (Appendix 2, cat. nos 2.02–06), used to transport oil or olives, make up the largest group. Most are in the possession of private collectors. This form is broadly dated from the mid 1st to the mid 3rd century AD but, more specifically, the type 28 and 29 rims date from the mid 2nd century AD, consistent with the bulk of the Pudding Pan assemblage. However, the type 29 rim was recovered from the Copperas channel approximately 1.75km north of Reculver (see Dean 1984: 78), which is about 6km south-east of Pudding Pan. Its proximity to the ancient shoreline suggests that this find is as likely to have come from a terrestrial deposit as it is to have

Table 14 *Amphorae* recovered from the Kentish Flats

Type	Date	Provenance	Content	Location	Fig. no. in this volume
Class 59 London 555	*c.* 55–130	France	olives	National Maritime Museum	Fig. 28
Class 27 Gauloise 4	*c.* 50–250	Languedoc, France	wine	Private collector	Fig. 68a
Class 27 Gauloise 4	*c.* 50–250	Loire, N. France	wine	Private collector	Fig. 68b
Class 25 Dressel 20: Rim 28	*c.* 130–70	Baetica, Spain	oil	Private collector	Fig. 68c
Class 25 Dressel 20: Rim 29	*c.* 120–80	Baetica, Spain	oil	Private collector	Fig. 68d
Class 25 Dressel 20: Rim 41	*c.* 200–60	Baetica, Spain	oil	Private collector	Fig. 68e
Class 25 Dressel 20 handle	*c.* 50–250	Baetica, Spain	oil	Private collector	Fig. 68f
Class 25 Dressel 20 spike	*c.* 80–250	Baetica, Spain	oil	Private collector	Fig. 68g
Class 6 Dressel 1-Pascual 1	*c.* 1–80	Barcelona, Spain	wine	Folkestone Museum	Fig. 68h
Gauloise 12	*c.* 1–299	N. France	wine	Private collector	Fig. 69

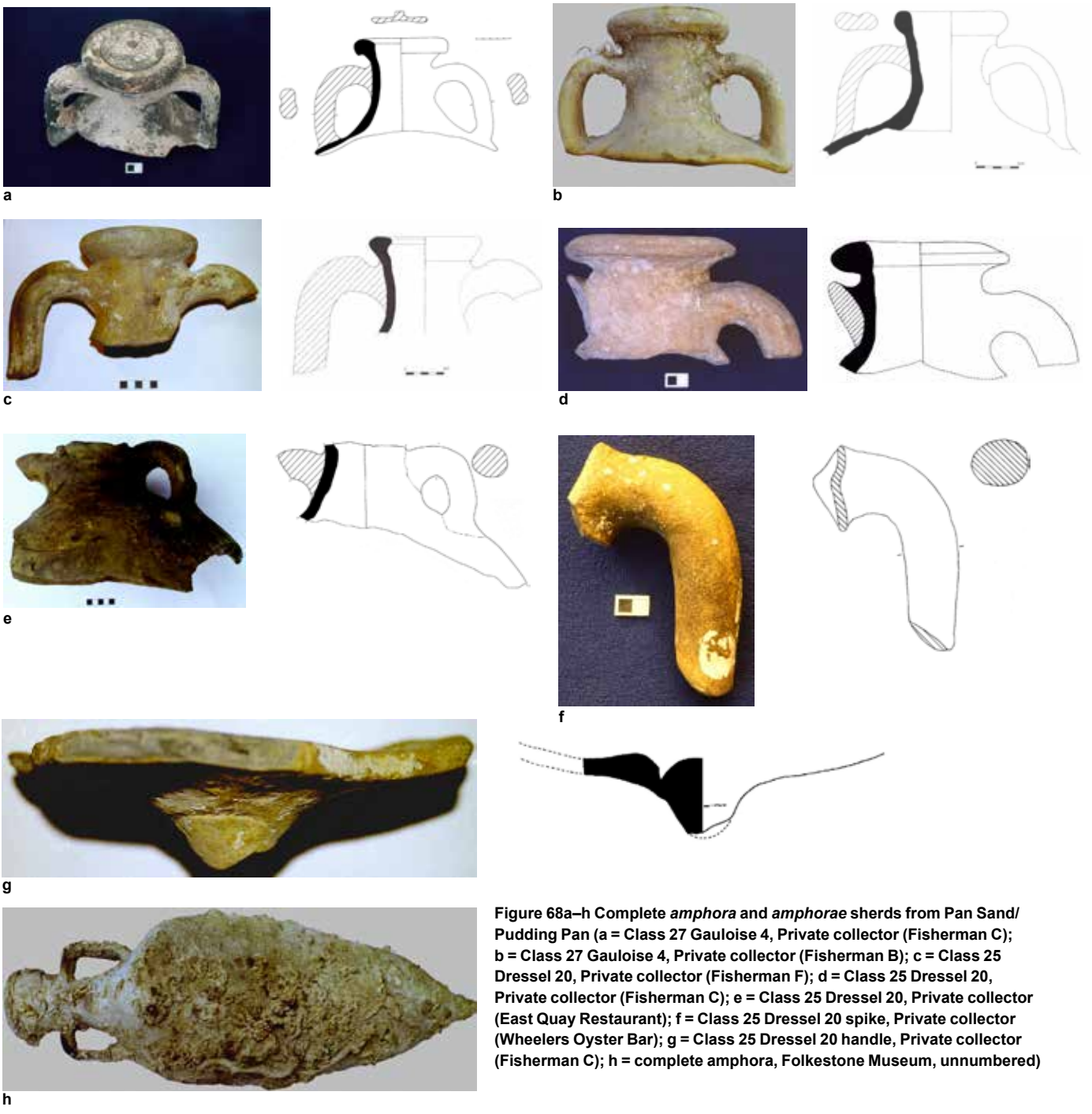


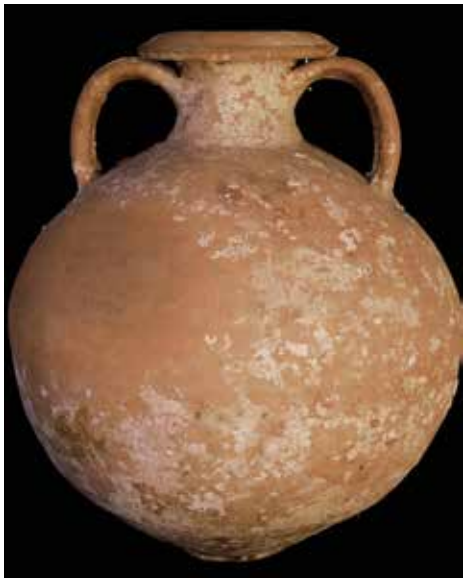
Figure 68a–h Complete *amphora* and *amphorae* sherds from Pan Sand/ Pudding Pan (a = Class 27 Gauloise 4, Private collector (Fisherman C); b = Class 27 Gauloise 4, Private collector (Fisherman B); c = Class 25 Dressel 20, Private collector (Fisherman F); d = Class 25 Dressel 20, Private collector (Fisherman C); e = Class 25 Dressel 20, Private collector (East Quay Restaurant); f = Class 25 Dressel 20 spike, Private collector (Wheelers Oyster Bar); g = Class 25 Dressel 20 handle, Private collector (Fisherman C); h = complete amphora, Folkestone Museum, unnumbered)

come from a shipwreck. The type 41 rim dates from the first half of the 3rd century AD, lending credence to the notion of a third source of material. The broad date range of the remaining Dressel 20 fragments makes it difficult to assign these finds to a specific source. The wide variation in dates from this small sample suggests that it is unlikely that these Dressel 20 *amphorae* comprised a single consignment from Baetica so it is more likely that they represented ships' provisions or isolated finds from various sources.

One of the Class 27 Gauloise 4 fragments (cat. no. 2.01), which included the original stopper, dates to the mid 1st–mid 3rd century AD and came from the Languedoc region of southern France carrying wine. The other Gauloise 4 came from northern France and also carried wine (cat. no. 2.07). It was recovered from north of Pan Sand and could therefore be part of the 1st-century AD source.

Notwithstanding variation in similar *amphora* types (Paterson 1982: 156), like the Dressel 20 *amphorae*, these two *amphorae* are quite different from each other and have different provenances, so are unlikely to have made up part of a bulk cargo.

The London 555 *amphora* (cat. no. 2.09), recovered complete with 6,206 olive pits, emerged as a form in the early AD 50s and it is suggested that production of it ceased *c.* AD 125/50 (Sealey and Tyers 1989: 67). This find is thus clearly placed beyond the range of the bulk of the Pudding Pan assemblage and supports the notion of an earlier source of material. Interestingly, unlike many of the *amphora* find locations which are given generally as Pudding Pan or Pan Sand, the location of this find was reported very specifically and places it north of Pan Sand (see Sealey and Tyers 1989: 53). Therefore we not only have temporal separation from



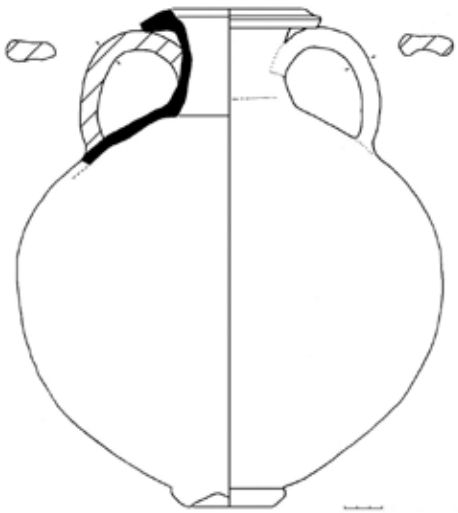


Figure 69 Globular Gauloise 12 *amphora* from southern France. Private collection (not to scale)

the main assemblage but also geographical separation by the not inconsiderable obstacle of the Pan Sand sandbank. The provenance of the London 555 *amphora* was originally tentatively reported as Spanish (Sealey and Tyers 1989: 65), but more recent research suggests that it was made in and around Lyons in the Rhône valley although a Baetican origin still cannot be discounted (Davies *et al.* 1994: 14–16).

One of the other complete *amphorae* recorded in this survey is uncommon in Britain. It has recently been tentatively identified as a Gauloise 12 from southern France, dating broadly to the 1st–3rd century AD and probably originally containing wine (cat. no. 2.10; R Tomber pers. comm.). It is a small globular vessel, approximately 400mm high with a maximum diameter of 340mm and a small flat base-ring and a flattish rim (**Fig. 69**; University of Southampton 2014: doi:10.5284/1028192). It was recovered *c.* 1980 from the edge of the Oaze Deep channel that runs roughly north-east to south-west, approximately 6.5km west-north-west of Pan Sand. It is also approximately 9km north-west of Pudding Pan so, given the broad dating, it could possibly relate to a late 1st-century AD deposit somewhere to the north of Pan Sand.

The other complete *amphora* (cat. no. 2.08) was so heavily encrusted with marine growth that it has proved difficult to identify with any certainty, although it has the overall shape of a Class 6 Dressel 1-Pascual 1 from the Catalan coastal zone of north-east Spain. It probably contained wine and may date from the late Republican period to AD 79, although the majority of finds in north-west Europe tend to date from the Augustan period (Peacock and Williams 1986 93–5; R Tomber, pers. comm.). If this early date is confirmed it again supports the notion of a 1st-century AD source somewhere in the vicinity.

Mortaria

Like some of the *amphorae*, the locations from which *mortaria* have been recovered have been well recorded and seem to corroborate other dating and locational evidence. There are reports of considerable numbers of Roman *mortaria* recovered off the north Kent coast although few were located during the current study. One of the *mortaria* that was

Figure 70 *Mortarium* from Pan Sand with Q.VAL stamp. Whitstable Museum, unnumbered

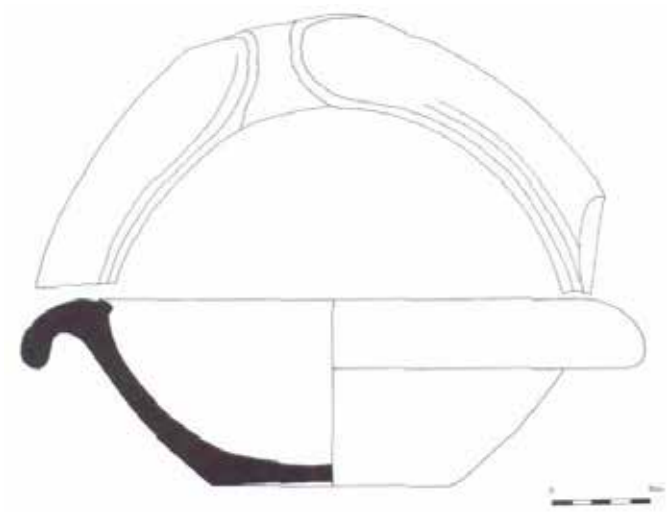


Figure 71 *Mortarium* fragment stamped by CAVARIVS. Private collection

inspected in Whitstable Museum (cat. no. 2.11) was stamped Q.VAL (Q. VALERIVS SE--), as cited by K.F. Hartley (1977: 6; 1998: 206), dating to AD 55–85 (**Fig. 70**). Parker (1992a: 211 n. 502) claims that 'several *mortaria* (at least four)' bearing this stamp were recovered from Herne Bay although the number and location have not been verified. It is unclear from where the finds location of 'Herne Bay' is derived, as the cited source (K.F. Hartley 1977) does not mention it. It may have come from Parker's informant, Mark Redknap, who conducted investigations in the area in the 1980s. This appellation is problematic as it is ill defined and seems to be used in the absence of more precise geographical location.

Accounts regarding the number of identical Roman *mortaria* stamped CAVARIVS that have been recovered from the Oaze Deep channel by fishermen in the 1970s are also conflicting, varying from three vessels (Rhodes 1989: 50) to six vessels (Dean 1984: 78, n 7). None of these have been located although anecdotal evidence suggests that they were stored at Whitstable Museum (M. Dean, pers. comm.). They have been dated to AD 65–100+ as *mortaria* stamped CAVARIVS have been found in pre-Flavian deposits at Usk and Wroxeter (K.F. Hartley 1977: 11). The failure to locate these documented finds is rather unsatisfactory but corroborates the belief that considerable quantities of material have been recovered but not recorded. It is interesting to note that another *mortarium* fragment impressed with the stamp CAVARIVS was recorded for the current study at the East Quay Restaurant in Whitstable (cat. no. 2.13; **Fig. 71**).

These two potters belong to the two main 1st-century AD groups identified by K.F. Hartley (1977), each of which is typified by the use of a particular type of rim. Both groups of potters stamped their *mortaria* once only and neither group stamped all their *mortaria* (ibid.: 5–6). One large complete unstamped *mortarium* recovered from Herne Bay and currently in Whitstable Museum (cat. no. 2.12; **Fig. 72**) is similar typologically to the one stamped Q.VAL, so it seems safe to assume that it stems from the same group. Both vessels appear to have rim-type 3, which is quite rare for Q. Valerius Se- (ibid.: 8).

These *mortaria* were either made in Kent or imported in bulk from Gaul to Richborough, from where they were distributed around Britain, presumably by sea as they are heavily represented in coastal and adjacent areas (Dickinson and Hartley 1971: 133; K.F. Hartley 1977: 13; Rush 1997: 56). This is entirely consistent with their recovery from Herne Bay, which is situated north of the Wantsum Channel whence any ship calling at Richborough would have emerged. Examples of both potters' work have been found at Richborough but seemingly in contexts indicating normal use rather than in stores, pottery shops or wharves (K.F. Hartley 1977: 12).

Tegulae and imbrices

A number of apparently unused *tegulae* and *imbrices* have been recovered from Pudding Pan (**Fig. 73a–b**; **Pls 18–19** in plate section, this volume) but the fabrics are undiagnostic (Rhodes

Figure 72 Unstamped *mortarium* with rim similar to the *mortarium* stamped Q. VAL but smaller in size. Whitstable Museum, unnumbered

1989: 50). Five *tegulae* (cat. nos 2.23–7) and one *imbrex* (cat. no. 2.28) were located during the current study and another possible *imbrex* was recovered during controlled dredging operations (cat. no. 2.29). It is claimed that the tiles may have been carried as cargo (Rhodes 1989: 50) rather than representing part of the ship structure such as a galley roof as has been postulated on numerous other wrecks like the St Peter Port wreck (Rule and Monaghan 1993), presumably owing to the fact that the tiles were unused.

Other finds

A one-hole stone anchor recovered south-west of Pudding Pan (cat. no. 2.30; **Fig. 74**) is one of only a handful found on the east coast of Britain; the majority (27 to date) have been found around Poole Harbour in Dorset. The Herne Bay anchor is approximately 510mm high, 460mm wide and 265mm thick. It is made from quartz arenite, which does not occur naturally in the area and indicates that it had been imported (K Knowles, pers. comm.). Other than the Porth Felen lead anchor stock (Boon 1977a; 1977b) none of these anchors can be definitely attributed to the Roman period (Dean 1984; Markey 1991; 1997). This stone anchor is one of only four found in association with Roman material on the seabed, which enhances its significance. The others are presumed to be prehistoric or Roman in date but no detailed analysis has been undertaken (Dean 1984).

Conclusion

It is clear from this assessment that there are at least three distinctly dated groups of material lying on the seabed on the Kentish Flats (**Fig. 75**). It would appear that at least two of these distinguishable groups have been retrieved from discrete areas, which indicates that they have been recovered from different sources. Thus to continue to use the catch-all term 'Pudding Pan' seems not only erroneous but conveys an impression of homogeneity for the complete assemblage that

Figure 73a–b *Tegulae* (flat Roman roof tiles) recovered from the Kentish Flats. Left (a): Maidstone Museum (unnumbered). Note the square nail hole in the top right corner; Right (b): Ashmolean Museum, University of Oxford, AN1910.3

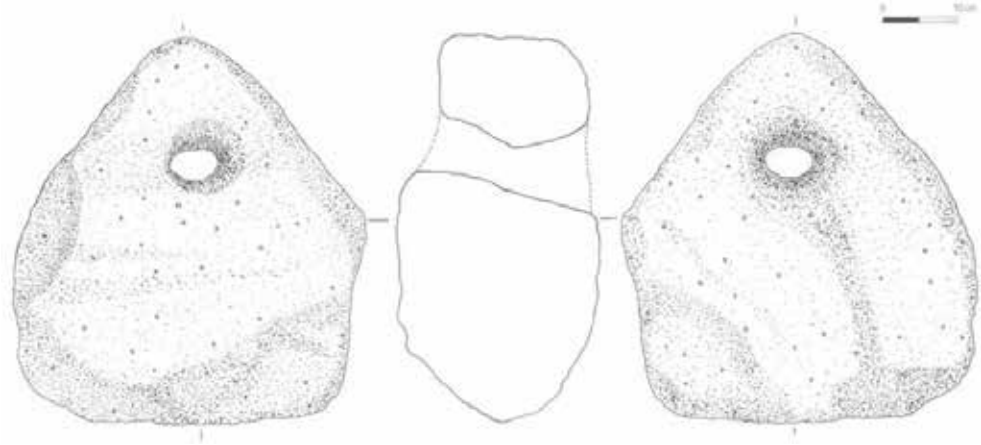


Figure 74 A single-hole stone anchor recovered from the Kentish Flats possibly unassociated with the Roman finds. Private collection

is no longer justified. Indeed, this careless shorthand has resulted in considerable confusion over the provenance of many artefacts between 'Pudding Pan Rock', 'Pan Sand' and various other amalgamations of the two names.

This has led to the assumption that artefacts from a single source have been widely dispersed by post-depositional transformation processes with the conclusion that no significant deposit remains to be discovered. This assumption will be challenged in Chapter 6, which investigates the nature and location of the sources. This shorthand has also caused considerable confusion for investigators searching for what remains of any consignment and must have resulted in significant efforts to find the source being conducted in the wrong locations. The wide range of dates represented and the perceptible geographical separation implies more than one source, but the issue of residuality must be investigated.

By far the largest consignment, for which 'the' site is most renowned, consists of the mid–late 2nd-century AD plain samian and the more elusive black-slipped wares from Lezoux in central Gaul, which appear to have come from one consignment. The Spanish Class 25 Dressel 20 *amphorae* from Baetica, the form 39 North African red-slipped (ARS) ware bowl and the Bailey type O, group I lamp seem to have made up part of this ship's equipment rather than its cargo. Had the *amphorae* conveyed cargo one would expect greater homogeneity of form than the varied types represented here. The ARS bowl may have been the private possession of a crew member and might imply a connection with North Africa although it could equally have been bought or collected from elsewhere in Europe. The uniformity of the wear patterns on most of this samian is consistent with a shipwreck dating from *c.* AD 180–200 rather than a jettisoned cargo. It seems probable, based on anecdotal evidence, that these artefacts have been recovered from a wreck buried in the vicinity of Pudding Pan. The presence of oysters on 17 per cent of the assemblage is crucial in this regard and will be considered in conjunction with the evidence for post-depositional disturbance in Chapter 6.

The most notable components of the earlier material are the not inconsiderable quantities of *mortaria* stamped either Q.VAL or CAVARIVS, recovered from 'Herne Bay' and from the edge of the Oaze Deep respectively. It is significant that the Class 30 Gauloise 5 *amphora* also recovered from Oaze Deep is almost identically dated to *c.* AD 60–100. The Class 59 London 555 *amphora* and one of the two Class 27 Gauloise 4 *amphorae* were also recovered from north of Pan Sand and date from a similar period. This latter *amphora* comes from northern Gaul, as does the *terra rubra* cup, which is also early in date, dating to *c.* AD 20–65. Although the find locations of some of the plain samian wares, the other similarly dated *amphorae* and the Bailey type K, misc. group

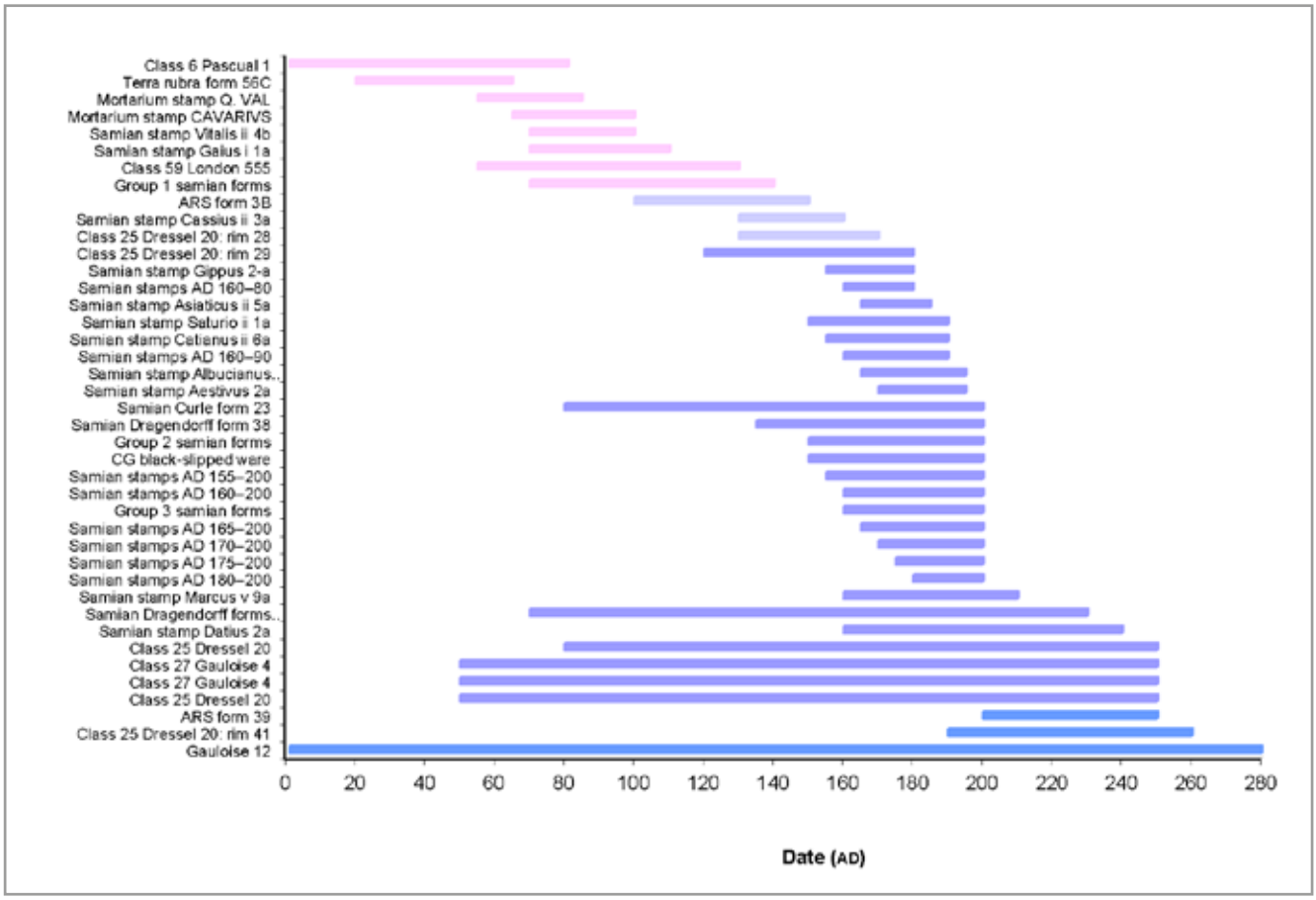


Figure 75 Dates of all classes of Roman artefact recovered from the Kentish Flats

lamp are not clearly recorded it would be logical to assign them to the same consignment. These artefacts date broadly from the mid 1st to the early 2nd century AD, although if we assume that the dating of the artefacts is accurate and that they all derived from the same source then this can be narrowed to *c.* AD 65–85.

All the finds known to have been recovered from the north and north-west of Pan Sands, coloured red in **Figure 75**, graphically illustrate the contemporaneity of these artefacts and seem to indicate the likely location of an earlier source of material. Although it is probable that the roof tiles and the stone anchor came from one of these sources the absence of dates or accurate recovery locations makes it impossible to assign them specifically to either. Finally, there are a few artefacts that are significantly later in date than the rest of the assemblage, dating from the early 3rd century AD, which lends credence to the notion that artefacts have been recovered from multiple sources. These artefacts include one of the Class 25 Dressel 20 *amphorae* from Baetica and an ARS bowl, although the date ranges of some of the other artefacts extend to this period.

As yet there is no information on where these artefacts were recovered and it is possible that they represent casual losses. The possibility of an association between this material and the main late 2nd-century AD assemblage again seems unlikely as the bulk of a cargo on an early 3rd-century AD vessel is unlikely to date from the mid to late 2nd century AD. Any association, other than contamination, between the 3rd- and 1st-century AD material seems wholly implausible.

Chapter 6
Interpretation and Investigation of the Herne Bay Sites

> [T]he mode of fishing improves, as other arts do, in a commercial and polished nation. If any particular object had carried the Whitstable fishermen to this place three hundred years sooner, there might not be a pan now left to exercise our opinions on: by the same rule it might have been reserved for a discussable point at a future distance of time equally remote (Keate 1782: 127).

This chapter will consider the nature and locations of the sources through interpretation of the recovered assemblage as the artefact find-spots may bear no direct relation to the source locations owing to the effects of site evolution processes that have impacted upon a site since its original formation; what Schiffer (1987) has characterized as c- and n- transforms. Cultural (c) transforms include the direct and indirect impacts of fishing and dredging on the site while natural (n) transforms include the impacts of tide, currents, sediment mobility and so on. There is mounting evidence that this material has been recovered from multiple sources but due consideration must be given to the prevailing belief that it has come from a single source that has been widely dispersed. The assessment of the known assemblage recovered to date established three discretely dated groups of material, two of which could be clearly spatially separated. The later 1st-century AD assemblage, possibly dating to *c.* AD 65–85, includes a number of *mortaria* bearing either Q.VAL or CAVARIVS stamps, and a range of *amphorae*, many of which were recovered from a broad area to the north and north-west of Pan Sand. Other artefacts dating from the same period, including samian and a solitary *terra rubra* cup, probably came from the same area.

The main assemblage, for which the area is most famous, dates from *c.* AD 180–200 and comprises the central Gaulish samian and black-slipped wares from Lezoux, a range of *amphorae* primarily from Baetica in Spain and a solitary North African red-slipped (ARS) ware bowl. It is highly likely that these latter items represent shipboard equipment or crew's provisions rather than cargo. The early 3rd-century AD material includes a Dressel 20 Baetican *amphora* and a further ARS bowl, although the date ranges of some of the other artefacts do extend to this period. It seems increasingly unlikely that a single source could account for this broadly dated and widely dispersed material, but the issues of residuality and post-depositional transportation or contamination must be addressed.

Once the likely number of sources has been established their possible location, nature and condition will be considered as continued artefact recovery points to at least one significant deposit. The homogeneity of the material suggests that at least one of the two main deposits represents a shipwreck rather than a jettisoned cargo while the other could be either. The following types of question arise. How representative of the original consignments are the recovered artefacts? What remains buried and where? Can we determine the size of the original consignments through comparison with similar assemblages from terrestrial and maritime contexts? Can we pinpoint the location of the sources sufficiently for current technologies realistically to detect the sources, thus warranting further survey? Analysis of the recovered assemblage continues to shed ever more light not only on the nature and location of the sources but

Figure 76 These two Dragendorff form 31 bowls illustrate the extremes of conditions in which the vessels are recovered. The internal surface of the bowl on the right is in almost pristine condition while the bowl on the left clearly has been exposed on the seabed for some time prior to recovery attracting a wide variety of marine organisms. Whitstable Museum, unnumbered

on a variety of related topics. We now have a much clearer idea of what we are looking for and this chapter will attempt to refine the parameters further.

Multiple sources, contamination or residuality?

Three possible scenarios might explain the broad dispersal of artefacts spanning some 200 years over a large area of the Kentish Flats. The first, and to date seemingly most favoured, explanation is that a single consignment has become widely dispersed either as a result of the sinking process or as a result of post-depositional transportation processes, Schiffer's (1987) c- and n- transforms. The existence of broadly dated artefacts in contexts in which one would not ordinarily expect to encounter them, suggesting use beyond their 'normal' lifespan, is not unknown from other sites and is termed 'residuality'.

However, the legitimate presence of 1st-century AD artefacts in a 3rd-century AD context would be highly unusual, even though samian, especially decorated wares, seems to have been curated over longer periods than other contemporary pottery and the appearance of apparently earlier samian in later deposits is sometimes striking. For example, residuality of later 1st-century AD south Gaulish samian in 2nd-century AD contexts, particularly during the Hadrianic to early Antonine period, is not an uncommon occurence. Curation of Lezoux samian into the 3rd century AD is also attested (Willis 2005: 5.7.3–4, 5.8.1–4).

A second and more plausible explanation, as originally contemplated by Smith (1909: 398), is that the artefacts might represent a number of separate incidents that resulted in depositions at different and as yet ill-defined locations on the Kentish Flats. This appears to be borne out by the spatial separation between the finds locations of some of the 1st- and 2nd-century AD material.

The third possibility is that the existence of broadly dated material in the same area might represent contamination, either from passing ships or from transportation along the seabed from other areas (**Fig. 76**).

These uncertainties have discouraged serious academic interest with the result that succeeding generations of scholars are largely ignorant of these sites, their important assemblages and their tremendous potential. It must be remembered that this was, in all likelihood, a very busy shipping lane in the Roman period so numerous ships must have come to grief in the 400 years or so of Roman occupation. Indeed, it would be more remarkable if there were not more than one source of Roman material in this locality. Finds from the sandbanks of the North Sea and the English Channel highlight their great potential for preserving shipwrecks. The Goodwin Sands, known as 'the ship swallower', was notorious for its constantly changing shape (Redknap and Fleming 1985: 312) and has always posed a serious hazard to mariners in the area. A lion-headed spout from a Dragendorff form 45 samian *mortarium* recovered from that area (Dean 1984: 79) may bear testament to such an event.

An extensive range of medieval and later material has also been recovered from the Kentish Flats, which implies that, in addition to one or more Roman deposits, there is at least one medieval wreck in the vicinity (see Walsh 1998). A late 16th-century English wreck was found on the Girdler Sand just west of Pan Sand in 1847 (Marsden 1996: 34; 1997: 75) and two English East Indiamen, the *Albion* and the *Hindostan*, sank in the area in 1765 and 1803 respectively (Redknap 1990).

As discussed previously in the context of the Blackfriars I site (Marsden 1994), it seems highly unlikely that an early 3rd-century AD ship would have carried 200-year-old

pottery (see Frere 1987: 364). In this case, the distance between the known finds locations is considerable, given that Pudding Pan and Pan Sand are several kilometres apart. It is possible that post-depositional processes could account for the widespread artefactual distribution but this seems unlikely on topographical grounds as the Pan Sand sandbank that lies between the two locations presents a considerable barrier, though, of course, this may not always have been the case. Moreover, it is essential to distinguish between the widespread dispersal of material from seemingly different sites and the lack of cohesion of one particular site (see Jefferis and McDonald 1966: 171). The excavators of the Culip IV wreck found that the bulk of the 4,200 vessels covered an area of only *c.* 5m × 3m, showing that little disturbance occurred during deposition or later (Millett 1993: 415).

In reality, the recovered assemblage is now known to encompass such a considerable date range that it is difficult to interpret without the assumption of multiple sites. Moreover, analysis of the biographies of individual pots has shown that significant quantities of material continue to be recovered to the present day, not only indicating that a significant mass remains *in situ*, but also providing up-to-date locational information. Anecdotal evidence recounts how several samian bowls were recovered in one haul, which suggests that they were dredged directly from the point of deposition, potentially a very good indicator of the site location.

On the other hand, the considerable date range coupled with the absence of decorated wares has led to suggestions that the consignment represents old stock (Haverfield 1911: 120). If the Pudding Pan assemblage does represent old, unfashionable stock, however, one would expect a broad representation of forms and potters' stamps encompassing a wider range of disparate dates (Weber 2013: 201). This is not borne out by the three distinctly dated groups identified above, particularly the main closely dated, homogeneous assemblage. How fashionable the assemblage was will be assessed below through comparison with similar assemblages of unused samian from terrestrial sites.

Thus it cannot be coincidental that a significant proportion of the later 1st-century AD material was recovered some considerable distance away from the later 2nd-century assemblage. None of the suggested alternative hypotheses explaining the existence of artefacts of such diverse date and provenance recovered from wide-ranging locations is convincing. It therefore seems safe to conclude that we are dealing with two or more discrete sources of material buried on the Kentish Flats, whose locations will be investigated below.

The location of the later 1st-century AD source(s)

It has been suggested that several *mortaria* stamped CAVARIVS were trawled up in the 'same general vicinity' as the London 555 *amphora* and so may have come from the 'same cargo' (Rhodes 1989: 50). Whilst this suggestion is perfectly plausible in terms of date, as both discoveries broadly date from the later 1st century AD, the reported finds locations are some considerable distance apart. The Oaze Deep channel, from which the *mortaria* and the similarly dated Gauloise 12 *amphora* were recovered, lies just beyond the Shivering Sand Towers some 6.5km west-north-west of Pan Sand. In contrast, the location from which the London 555 *amphora* was recovered is reported, unusually specifically, as 51° 28' 50" N, 1° 9' 12" E (Sealey and Tyers 1989: 53), which is approximately 1km north of Pan Sand. Thus the *mortaria* were recovered *c.* 5.5km west of this *amphora*. It is interesting to note that Smith (1909: 398) stated specifically that the samian stamps he identified as not of the Rock series came from Pan Sand rather than Pudding Pan, although there is some circularity in this assertion. However, it is tempting to suggest that these samian vessels also came from the later 1st-century AD source.

If these artefacts have come from the same source it would suggest either that the reported finds locations are not entirely accurate, or that there has been considerable post-depositional movement, either explanation being quite plausible. Rather than exhibiting heavy abrasion and well-worn, rounded edges most of the artefacts apart from the lamps are in good condition with relatively sharp edges, indicating that they have not travelled significantly from their point of deposition (**Fig. 77**). Similarly the London 555 *amphora* still bore traces of a painted inscription on its exterior surface, indicating that it is not abraded. Even samian fragments have sharp-edged breaks indicating they have not been 'rolled' (see Appendix 1: cat. nos 1.527–58). On the other hand, the margin of error inherent in the reported finds locations could easily explain the discrepancy. The precise location given for the recovery of the London 555 *amphora* is highly suspect as the fishermen realize that they have 'caught' an artefact only when they recover their fishing gear at the

Figure 77 A basal fragment of a Dragendorff form 33 cup which displays not only modern breaks but also relatively sharp edges on older breaks, which, coupled with the sharp potter's stamp and the intact glaze, suggests a lack of post-depositional movement on the seabed. Whitstable Museum, unnumbered (not to scale)

end of a dredge or trawl. As the fishing net or oyster dredge is deployed over a distance of approximately 5–8km it is impossible for the fishermen to pinpoint where on a particular dredge or trawl an artefact was ensnared.

Indeed, pinpointing the finds locations during the controlled dredging exercise proved difficult for this reason despite using GPS whilst deploying the dredge over far shorter distances than usual. Most fishermen interviewed for this study who had recovered artefacts were at best able to indicate the course on which they were heading when the artefact was discovered in the net or dredge. At worst they were able to identify only a broad area and this seems heavily biased by their own preconceptions of where a wreck might lie. However, even this level of detailed locational information provided by the commercial fishermen is gradually disappearing as the fishing industry is shrinking. Many fishermen are decommissioning their boats while others are moving to new areas and taking their knowledge with them (Redknap and Fleming 1985: 314). Thus a significant proportion of this 1st-century AD material recovered from north of Pan Sand in two locations could actually have come from one source. A further group of *mortaria* stamped Q.VAL may have come from the same source but the details are lacking (cf. Parker 1992a: 195 no. 763, 211 no. 502). An alternative 1st-century AD source elsewhere on the Kentish Flats cannot be discounted.

The location of the later 2nd-century AD source

The evidence that the bulk of the 1st-century AD material came from an area to the north and north-west of Pan Sand now seems incontrovertible, but the evidence placing the later 2nd-century AD source in the vicinity of Pudding Pan is as yet inconclusive. The most recent academic study of the site prior to the current study concluded that the main source was located in the vicinity of Pan Sand (Watson 1987: 56–7). Although it is generally acknowledged that these artefacts have been primarily recovered in the vicinity of the oyster beds their location has been the subject of considerable historical confusion.

This confusion can now finally be resolved through the presentation of credible evidence for the location of the 2nd-century AD source. It has long been recognized that Roman artefacts have been recovered from both locations so if it is accepted that the earlier material has been recovered from north of Pan Sand then it is logical to suggest that the later 2nd-century AD material has come from Pudding Pan. However, it is essential to establish more conclusive proof for the location of the source of the largest and most significant assemblage from the area so that further time, resources and energy are not expended in fruitless searches.

Watson (1987: 32–3) reached his conclusion by suggesting that the wear on the underside of the vessels resulted from exposure to fast, sediment-rich water, which conflicted with the evidence of marine encrustation that required relatively sediment-free water. He infers from this conflicting evidence (ibid.: 56–7) that post-depositional disturbance has transported the pottery between two different environments from which he concludes that tidal currents have moved loose material from Pan Sand to Pudding Pan – ergo the wreck lies in the vicinity of Pan Sand.

However, this not only ignores the absence of evidence on the artefacts for post-depositional movement, but also the dominant east–west currents. These currents are more likely to transport material from Pan Sand eastwards to a deeper area close by known as Pan Hole, than to transport material several kilometres south-west to Pudding Pan, counter to the dominant currents. Dominant currents may not always have flowed east–west since the Roman era but this seems highly probable in the estuarine waters of the River Thames. Watson's conflict is resolved if we accept the hypothesis of a stable deposit that has not undergone any appreciable post-depositional movement, but which has been exposed for considerable periods to the scarifying effects of the seabed silts and seawater.

In the absence of evidence for post-depositional movement, the presence of oysters on 84 (17 per cent) of the later 2nd-century AD samian vessels is a crucial indicator for the location of the main source (**Fig. 78**). It suggests that the shipwreck is buried in the vicinity of Pudding Pan rather than Pan Sand where, contrary to popular belief (Watson 1987: 57), oysters do not grow, as the seabed is too soft. These misconceptions have resulted in the commonly held belief that artefacts have been widely dispersed since initial deposition, which inevitably leads to the conclusion that the ship broke up during the wrecking process and therefore no longer survives (see Jefferis and McDonald 1966: 171; Rhodes 1989: 50). If we accept that there is more than one source of material buried on the Kentish Flats then the question of the broad distribution of material is rendered superfluous; it now seems clear that contemporaneous material is recovered in close proximity to the source with which it is associated. It would have been most beneficial to be able to distinguish between samian recovered from each location in order to determine any variation in form, stamp and dating. However, such a distinction is impossible owing to the confusion over Pan Sand and Pudding Pan and the liberal intermingling of the terms.

The evidence from Pudding Pan as it exists is somewhat contradictory. The large numbers of complete vessels that have been recovered suggest that we are dealing with a site of some coherence. Evidence from other maritime sites indicates that the coherence of a wreck is proportional to the extent to which the vessel has been buried in protective silts. It has been suggested that wrecks might settle in mobile sands to rest on the underlying chalk bedrock (Redknap and Fleming 1985: 325). If Pudding Pan is the site of the sinking, this does not bode well as the requisite characteristics for the growth of oysters are incompatible with those required for the preservation of a coherent wreck site. It is difficult to see how a wreck could have been buried to any great extent in these conditions, although local fishermen have suggested that the hard ground, required for the cultivation of oysters, is interspersed with soft spots. This was confirmed during recent controlled dredging operations over Pudding Pan; when the dredge encountered the hard areas the boat came to an almost complete standstill.

Smith's diver supported this notion, describing the variable condition of the seabed from 'soft to setting hard like stiff sand' (1909: 400). Recent research has suggested that these soft spots may be palaeochannels representing the

Figure 78 A selection of samian vessels in Whitstable Museum with tell-tale oyster shells still attached

ancient watercourses and tributaries of the nascent River Thames and its estuary. A sub-bottom profiling survey of the area to establish the bottom and sub-bottom topography should therefore pay dividends in narrowing the search area. Although silted sites are the hardest to find they have the greatest potential especially for the preservation of ships (Parker 1984: 105). This matter will be discussed in greater detail below. Further investigations of this type could then be used to create a picture of the type of site for which we are looking thus helping to narrow the field of examination. It should also indicate whether wear patterns are the result of shifting sands or a genuinely angled deposit.

The early 3rd-century AD material

The source of the early 3rd-century AD material is more difficult to determine because there are so few vessels. It is only recently that they have been recognized as discrete from the other material. The late date and North African provenance of the ARS ware clearly distinguish it from the earlier material as it is difficult to contemplate one consignment containing such an eclectic mix of products from such diverse geographical locations and of such broad temporal spacing. The late date and rarity of these imports in Britain also raises the exciting prospect of another source on the Kentish Flats thus enhancing its cachet and providing further impetus to continue remote prospection in the area. Three Roman deposits in the area of Herne Bay are not inconceivable and would reflect the undoubted extensive maritime activity in this treacherous area of coastline in close proximity to the northern end of the Wantsum Channel.

Many wreck sites throughout the Empire bear testament that shipping hazards claimed multiple victims. It is not stretching credibility to suggest that the outer approaches to one of the most important ports of the province of Britannia (if not, as is generally believed, the most important port) would have experienced a considerable number of losses in 400 years of Roman occupation, though the possibility that this material represents post-depositional contamination cannot be discounted. Nevertheless, unlike luxury goods, the existence of these common wares so distant from their place of manufacture is an extraordinary phenomenon (Carandini 1983: 147).

Bird (1977: 272) proposes that African wares entered with their owners, either traders or craftsmen, and therefore indicate travel and contact between Roman Britain and the

Mediterranean rather than trade. If these wares have come from a consignment buried on the seabed off the north Kent coast then this is highly significant as possibly indicating a connection with the Mediterranean. The ARS vessels recovered are more likely either to have belonged to a member of the crew or to have been items of ship's equipment than to represent a complete consignment of African wares. This might mean that at least one of the traders was of Mediterranean origin, or it might suggest that this is the first consignment found in northern European waters that originated in the Mediterranean, although the African wares may have been picked up in a northern European port.

The nature of the sources

Having established that the recovery of artefacts from a broad area of the Kentish Flats is indicative of several sources rather than a single, widely dispersed source it is necessary to investigate the nature of those sources. Any conjecture regarding the nature of the later 1st-century AD source would be highly speculative given the limited number of recorded finds. The recovered artefacts indicate that the consignment included *mortaria* and at least one *amphora*-borne product as well as some samian and other fine wares, although the composition of the primary cargo remains unknown. Moreover, whether this consignment represents a shipwreck or jettisoned cargo is impossible to determine from the current evidence. If we assume that this material all came from the same consignment then it seems to point to a northern Gaulish origin. The provenance of all the later 1st-century AD artefacts has been identified as Gaulish with some specifically northern Gaulish elements. There is insufficient early 3rd-century AD material to hypothesize on the nature of any source.

In contrast to the other groups of material differentiated by date, the famed later 2nd-century AD assemblage is sufficiently large and well recorded to facilitate an accurate interpretation. The recovered assemblage is indicative of a main cargo of central Gaulish plain samian and black-slipped wares from Lezoux dating to *c.* AD 180–200, with a range of *amphorae* that may have conveyed the crew's provisions. The relatively high proportion of vessels displaying similar, uniform wear patterns is more indicative of a shipwreck than a jettisoned cargo (Watson 1987: 32), as the latter would exhibit more random wear consistent with a jumbled deposit.

Given, therefore, that this source appears to represent a shipwreck, there are two key questions: how much of the original consignment remains buried, and what was the composition of the original consignment? If a considerable proportion of the deposit has already been recovered then the composition of the original consignment is largely known. However, unless the vessel was very small indeed, this seems highly improbable. If, on the other hand, a considerable proportion of the original consignment remains buried then hypotheses regarding its composition are more speculative. The examination of the wear on the vessels, the evidence for stacking, and the nature and rate of recovery, which should indicate the condition of the deposit, are of central importance.

As stated, the heavy external wear has, to varying degrees, removed the burnished surface from the undersides of the majority of the vessels as a result of exposure on the seabed for many years. Combined with the damaged foot-rings these wear patterns demonstrate unequivocally that the majority of the vessels are sitting on the seabed in an inverted position. Moreover, circular wear patterns on the internal surfaces of some pots indicate that the vessels have been stacked in inverted piles for transportation. Further, the varying angles of wear on the vessels of different potters or on different forms indicate that they have been packaged separately. This combined evidence clearly supports the notion of a coherent consignment of separately packaged vessels now predominantly lying on the seabed in inverted stacks.

The condition of the later 2nd-century AD source

The condition of the remaining deposit of later 2nd-century AD material can be gauged by investigating any variation in the relative quantities of different forms and potters' stamps recovered over the last 300 years. Minimal variation in this comparative data would imply a significant structured deposit that largely remained *in situ*, damaged only superficially by oyster dredges as the extremities of the deposit were exposed. Significant variation would imply a more superficial deposit perhaps supporting the notion of a jettisoned cargo or a consignment of unfashionable stock.

Evidence from terrestrial sites indicates that only a small range of forms were ever fashionable at any particular time so perhaps only a small range of forms would have been transported together in any one consignment (see Weber 2013: 205). The biographies of the Pudding Pan artefacts may not have produced precise dates for the recovery of vessels but they have provided sufficient *termini ante quos* and *termini post quos* to enable the assemblage to be divided by time into significant groups for this purpose.

For the purposes of this analysis the assemblage of 526 vessels was divided into similar-sized groups of forms and stamps that are known to have been collected at a particular point in time. The division conveniently fell within the period of the First World War, with a sample of 159 (30 per cent) vessels whose *termini ante quos* fell before the First World War and 168 (32 per cent) artefacts whose *termini post quos* fell after the First World War. This fact is interesting in itself as it supports the above claim that there has been little or no perceptible decline in the quantities of samian recovered in recent years. The vessels making up the remaining 38 per cent of the assemblage were excluded for the following three reasons: they could not be located; no *termini ante* or *post quem* could be determined; the stamp or form was not identified. Comparison of the relative frequency of potters' stamps recovered before and after the First World War with the assemblage in general is surprisingly uniform with a general concordance of peaks and troughs (**Figs 79–80**).

There are, however, some distinct variations that warrant further investigation. For example, more stamps of Albucianus (5 per cent>1.2 per cent), Atilianus i (10.1 per cent>3.6 per cent), Maternus iv (5 per cent>0.6 per cent) and Saturninus ii (11.3 per cent>5.4 per cent) were recovered

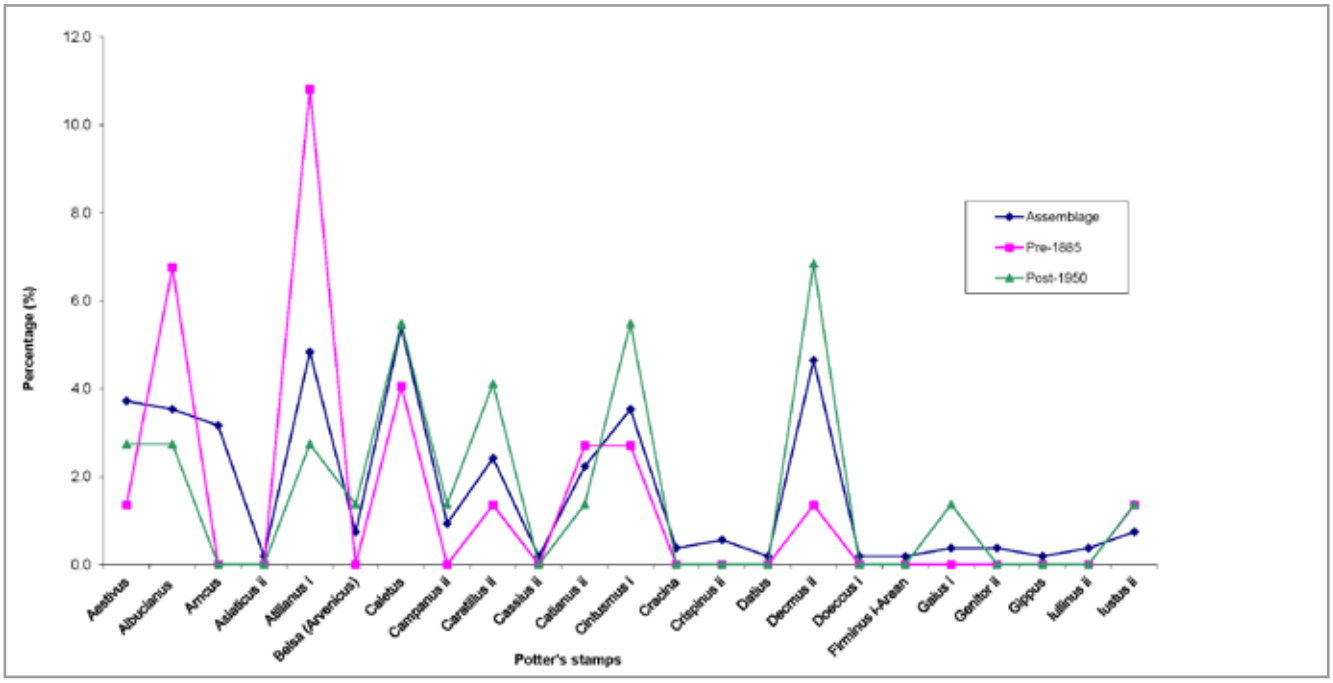


Figure 79 Comparison of relative frequency of potters' stamps (A–I) known to have been recovered from Pudding Pan before and after the First World War

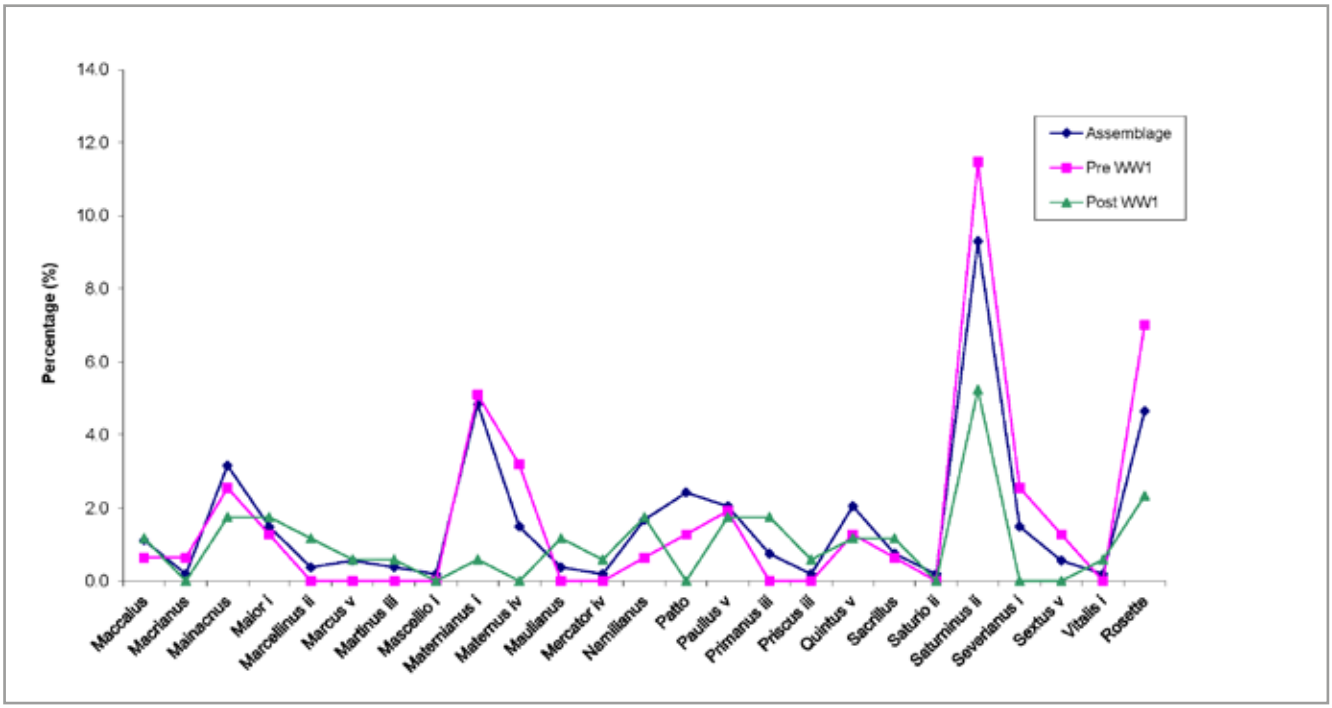


Figure 80 Comparison of relative frequency of potters' stamps (M–V) known to have been recovered from Pudding Pan before and after the First World War

before the First World War than afterwards. Conversely, more stamps of Caletus (2.5 per cent<5.4 per cent), Caratillis ii (1.3 per cent<4.2 per cent) and Namilianus (0.6 per cent<1.8 per cent) were recovered after the First World War than before. Each percentage represents the relative frequency of each stamp in that particular sample so we can see that we are not dealing with particularly high values, which makes it difficult to draw firm conclusions.

Closer analysis of these individual stamps reveals that there is little or no variation in the forms recovered per se before and after the First World War although the numbers represented per potter vary (**Fig. 81**). For example, eight Dragendorff form 31 bowls stamped Albucianus were recovered before the First World War and two of the same form afterwards. Eight Dragendorff form 33 cups stamped Maternus were recovered before and one after the First World War. The stamps of Atilianus i and Saturninus ii are both represented in a wider range of forms but again there is no significant variation between the two periods. Similarly, seven Walters form 79 plates stamped Caratillus ii were recovered after the First World War and two of the same form before. Again, twice as many Caletus stamps were recovered after the First World War than before but again of the same forms (31 and 33). Of this group only

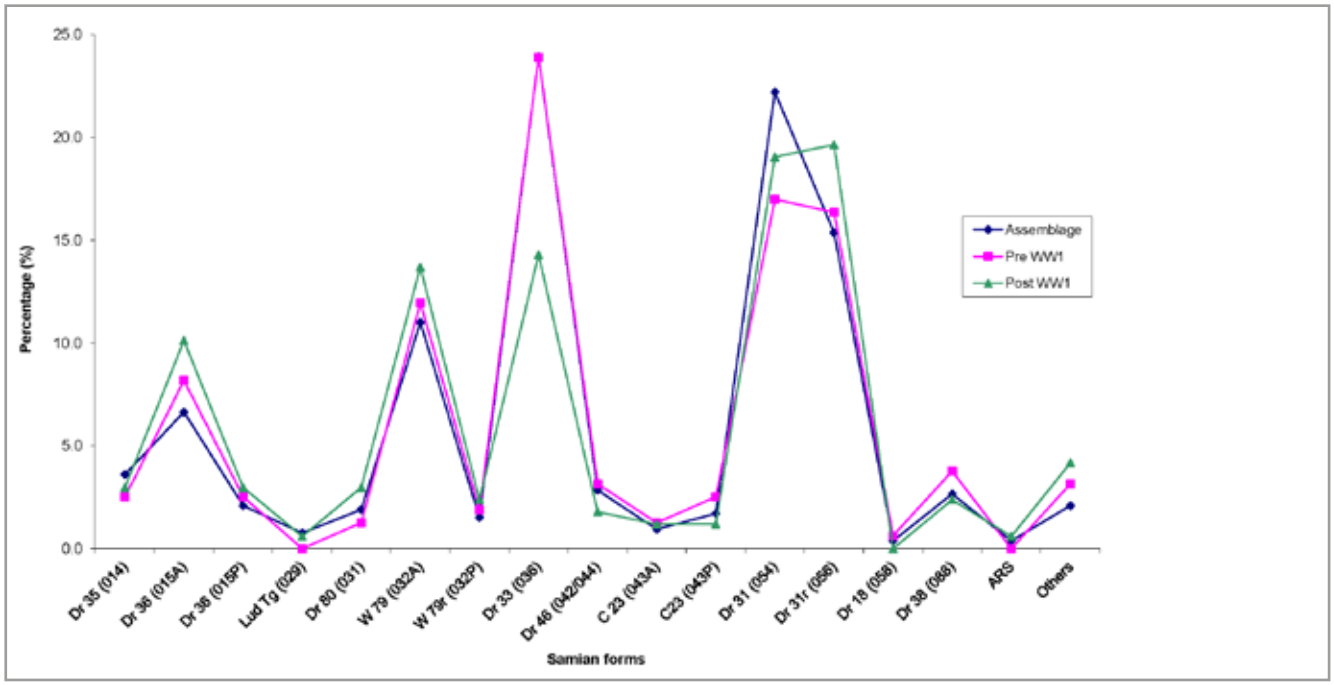


Figure 81 Comparison of relative frequency of samian forms known to have been recovered from Pudding Pan before and after the First World War

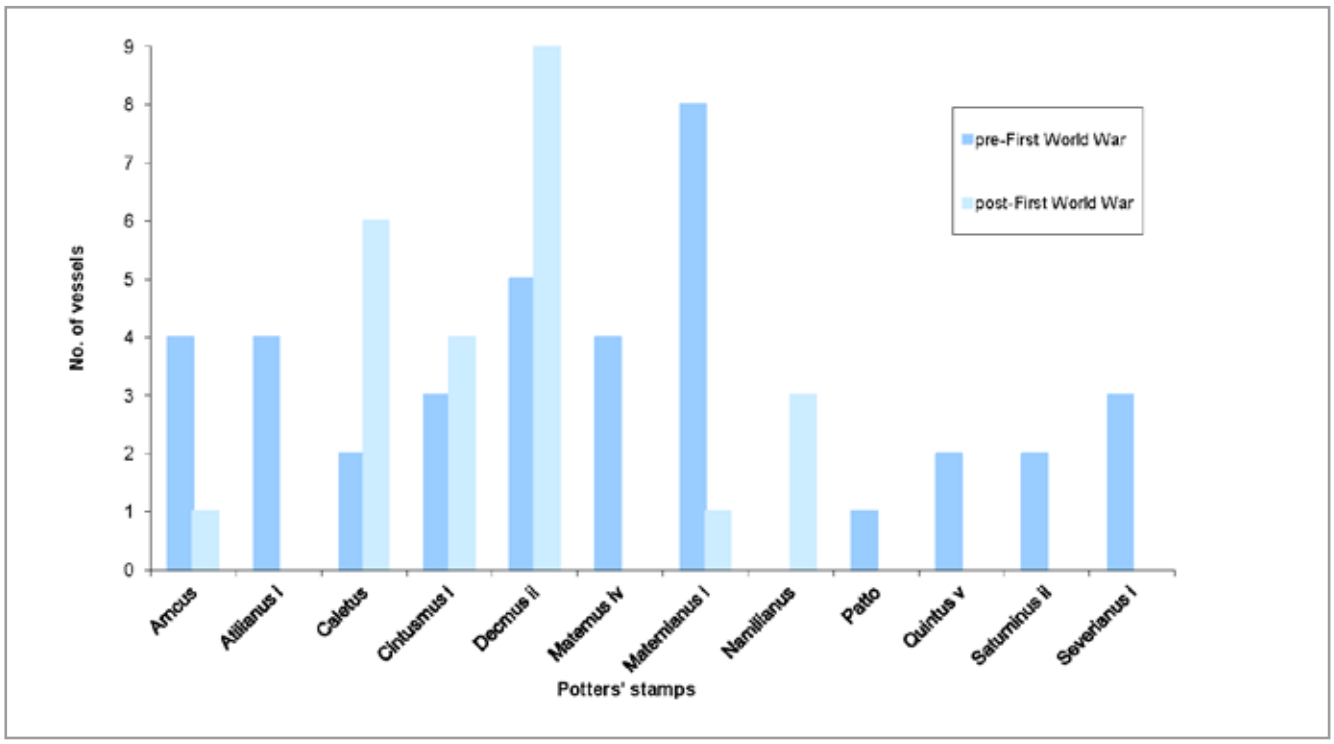


Figure 82 Comparison of Dragendorff form 33 cups known to have been recovered before and after the First World War

Namilianus had different forms recovered before and after the First World War but the sample is so small as to be insignificant.

Comparison of forms recovered before and after the First World War also shows close correspondence between each period. Again there are a few, albeit minor, variations, the greatest of which is found in the Dragendorff form 33 cup, which was collected in greater numbers before the First World War (23.9 per cent) than afterwards (14.3 per cent) (**Fig. 82**). However, although a greater variety of stamps were represented on pre-First World War form 33 cups, equal numbers of stamps (six) were recovered both before and after the First World War.

These datasets thus display significant uniformity in the range both of forms and of potters' stamps recovered before and after the First World War. To cross-check this uniformity the assemblage was further divided, using vessels recovered with *termini ante quos* before 1885 and *termini post quos* after 1950, i.e. broadly 30 years either side of the First World War. The vessels recovered before 1885 largely derive from the considerable collections of Townley and Faussett. Each sample comprised 75 and 74 vessels respectively with

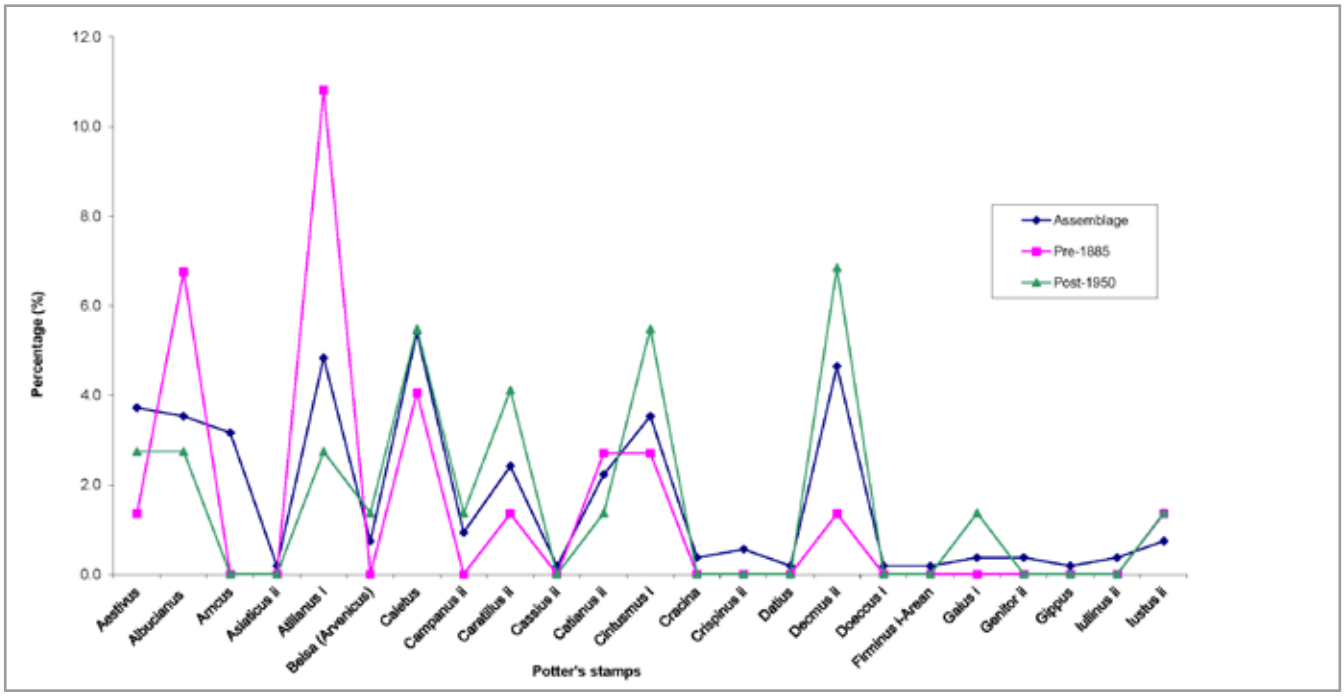


Figure 83 Comparison of relative frequency of stamps (A–I) known to have been recovered from Pudding Pan pre-1885 and post-1950

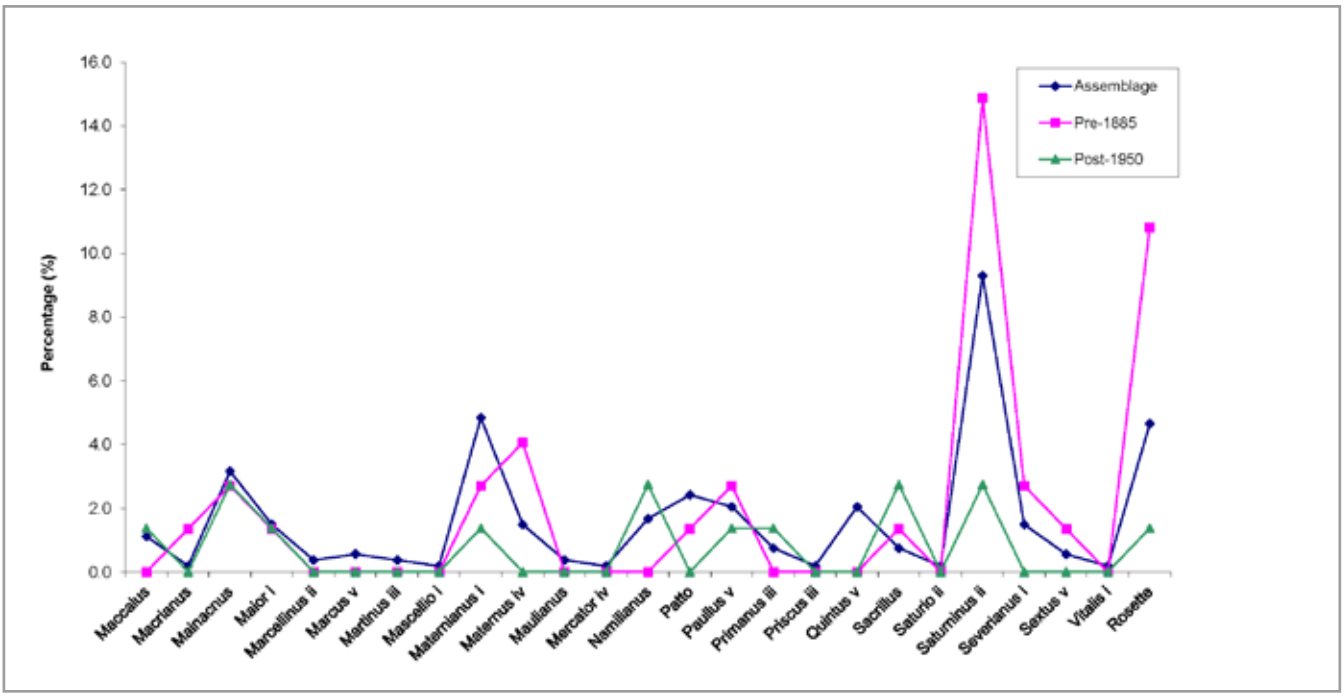


Figure 84 Comparison of relative frequency of stamps (M–V) known to have been recovered from Pudding Pan pre-1885 and post-1950

each representing just over 14 per cent of the total assemblage. Admittedly this is a relatively small sample but the division of 65 years should more clearly highlight any variation that may have been masked by the close proximity of the previous comparisons. **Figures 83–4** compare the relative frequency of potters' stamps recovered pre-1885 with those recovered post-1950.

These graphs substantiate the previous findings, with more stamps of Albucianus (6.7 per cent>2.7 per cent), Atilianus i (10.7 per cent>2.7 per cent), Maternus iv (2.7 per cent>1.4 per cent) and Saturninus ii (14.7 per cent>2.7 per cent) recovered before 1885 than after 1950. Moreover, analysis of the forms bearing these stamps corroborates the findings, with an almost identical breakdown of samian forms (**Fig. 85**). There is a slight variation in the range of stamps better represented post-1950 with more of the stamps of Caratillus ii (1.3 per cent<4.1 per cent), Cintusmus i (2.7 per cent<5.4 per cent) and Decmus ii (1.3 per cent<6.8 per cent) recovered after 1950 than before 1884. However, the recovered samian forms representing these potters' work is identical both before 1884 and after 1950.

The graph comparing the relative frequency of samian forms (**Fig. 85**) recovered pre-1885 and post-1950 shows no appreciable difference between the two periods. Marginally greater numbers of Dragendorff forms 31, 31r, 33 and 36 were recovered after 1950 than before 1885, but the

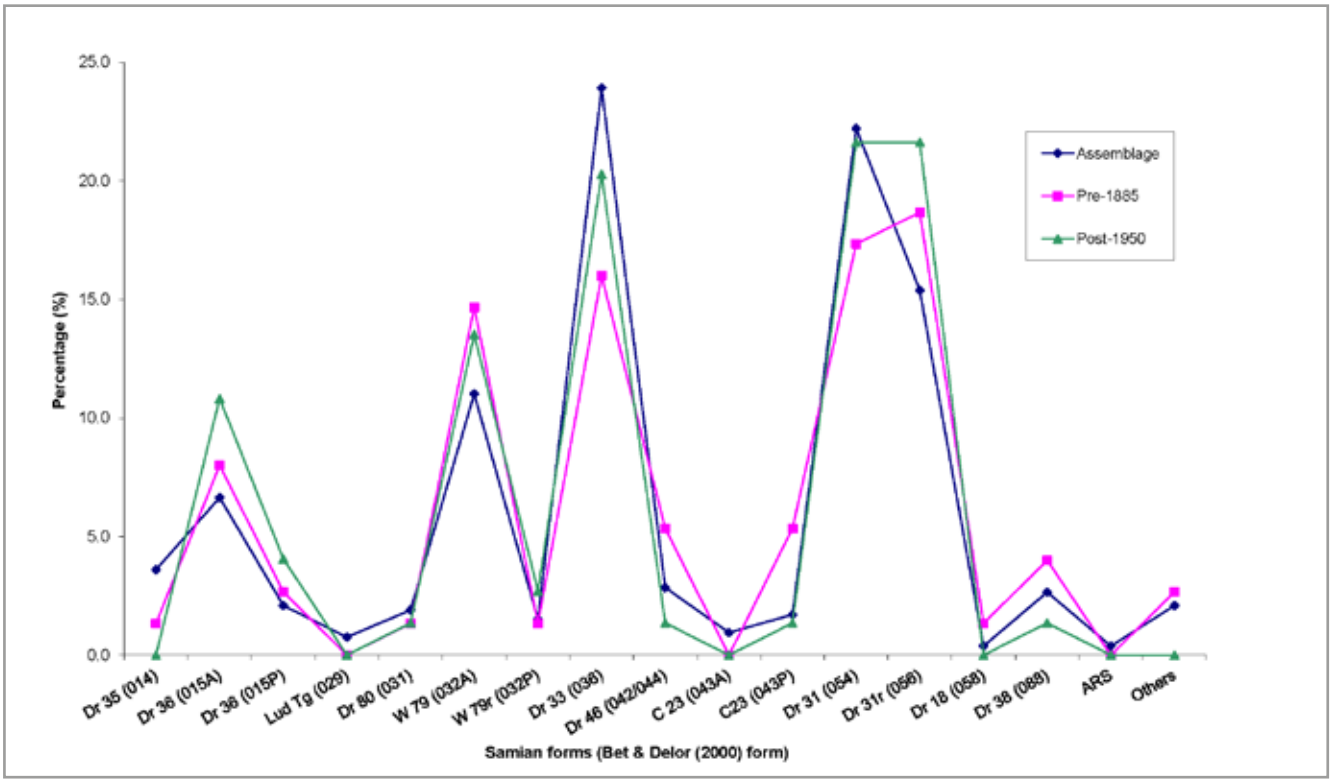


Figure 85 Comparison of relative frequency of samian forms known to have been recovered from Pudding Pan pre-1885 and post-1950

differences are so marginal as to be insignificant. This reaffirms the results from the larger pre- and post-First World War samples and confirms the veracity of the results. Thus we can conclude that the recovery of samian forms and potters' stamps has been remarkably consistent over the last 300 years with very little significant detectable variation.

This is the first time that the uniformity of recovery has been explicitly demonstrated and it is the greatest indication yet that we are dealing with a coherent deposit of some considerable depth. As the oyster dredges comb just the surface of the seabed they appear to be sampling only the extremities of a considerable, deeply buried deposit (**Fig. 86**). Moreover, the assemblage of 526 vessels including 47 potters' stamps produces a ratio of over 11 vessels per potter, which is a very high ratio when compared with occupation debris from terrestrial sites, and endorses the notion of a cohesive cargo that has not been widely dispersed (Weber 2013: 204). Terrestrial assemblages produce far lower ratios as a result of the dispersal and mixing of multiple consignments of samian (Rhodes 1989).

The absence of decorated wares

As it seems probable that a considerable deposit remains buried on the seabed, the nature of the original consignment and how it might relate to the recovered assemblage should be explored. One of the most striking features of the recovered samian assemblage is the seeming absence of decorated wares, which suggests that we may be dealing with a bulk consignment of plain samian wares. This would challenge not only the notion that samian was rarely, if ever, conveyed as a bulk cargo, but also the evidence from terrestrial sites where exclusively plain ware deposits are extremely rare. If this absence is real, it would considerably alter our perception of the trade in plain samian wares.

However, other than the obvious explanation that Pudding Pan genuinely represents a plain ware consignment there are a number of possible reasons for the lack of decorated wares. The source may have been intentionally deposited, rather than being the result of an accident, with the deliberate exclusion of decorated wares. For example, the Romans may have been actively farming oysters off the north Kent coast. There is ample evidence to show that oyster-gathering was an important occupation on the north Kent coast in the Roman period, an operation with a long history that became more ordered under the Normans (Goodsall 1965: 118–20). Oyster beds are known at Richborough, in the Thames estuary and along the Essex coast; oyster shells from the east coast, possibly Essex, were recovered from the Roman levels at Causeway Lane in Leicester (Monckton 1999: 340). Moreover, British oysters were popular in Rome, at least in the 1st century AD (Pliny, *Natural History* IX.169, XXXII.62; Juvenal, *Satires* IV.141). Seen in this light the samian deposits could represent a 'cultch': a hard substrate deliberately laid down in the Roman period on which oyster spat could settle. If the recovered material had been more fragmentary then this theory would be difficult to challenge, but the deposition for this purpose of a high proportion of complete pots of marketable value in almost pristine condition, displaying signs of stacking, seems most implausible. Incidentally, the oyster shells from Causeway Lane appeared to indicate a natural unmanaged population (Monckton 1999: 341).

The source could represent a votive deposit from which decorated wares had been deliberately excluded, precedents for which have been observed elsewhere. This seems unlikely, though, at such a considerable distance from the ancient coastline. Willis (2005: 12.4) states:

Figure 86 Recovery of an oyster dredge. Note the 'teeth' that comb the top *c.* 100mm of the seabed to 'tease' out the oysters

> [W]e might define unusual groups of material which do not appear like the artefact debris encountered in by far the majority of settlement contexts as 'structured' if intentional selection has seemingly determined the composition of a group. In the case of samian this might be through the presence of whole or near-complete vessels, unusual proportions of certain types, associations between samian vessels, and through the occurrence of samian with other finds indicative of selection.

The Pudding Pan assemblage seems to display many of these attributes. Samian was a key component of many structured deposits in Britain and Gaul, especially those associated with water. The Felmongers site near Harlow in Essex contained a great number of samian and other vessels, largely intact and functional, discarded within a single large pit during the mid Antonine period. As at Pudding Pan, decorated forms were absent from the deposit as they had been intentionally excluded (S Willis, pers. comm.). However, a votive deposit is more likely on a site that was closer to land and occasionally dry and Pudding Pan is, and probably was, never dry at any time.

Rhodes (1989: 46) has suggested that deposits of unused samian adjacent to quays may represent damaged imports that were discarded prior to landing in order to avoid paying the *portorium* or customs dues, although no quayside dumps have been positively related to this activity. This could possibly account for the Herne Bay assemblages but, beyond the obvious objection that Herne Bay is clearly some distance from any quay, it seems unlikely for two reasons. First, decorated wares would have been as likely to break in transit as their plain counterparts and should therefore make up an element of an assemblage discarded for this purpose.

Second, some of the recovered samian vessels are in pristine condition and therefore would not have been deliberately discarded for such a purpose, although they might have been had the ship been in jeopardy. If the site did represent a jettisoned cargo (Tacitus, *Annals* II.23), then given the relative value of decorated wares, *c.* 20 asses compared with 12 asses (Willis 2005: 1.3), the plain wares may have been sacrificed in order to refloat the ship, which could then continue on its journey with the remaining cargo of decorated wares. Decorated wares were more expensive than plain wares in terms of resources both to produce and to transport and had a higher cultural evaluation (ibid.: 7.3.1). However, as stated, the uniformity of the deposit challenges the notion of a randomly deposited, jettisoned cargo.

Another possibility, albeit slim, is that the decorated wares were salvaged in antiquity by *urinatores*. Evidence of ancient salvage attempts, in the form of large ballast stones, has been recorded on numerous wreck sites in the Mediterranean, such as at the Madrague de Giens site (see **Fig. 2**). This seems unlikely at Pudding Pan not only because of the relatively low value of the commodity but also because of the poor diving conditions, which are challenging for even the best-equipped modern diver.

Finally if, as now seems clear, the Pudding Pan site does represent a cohesive shipwreck it might be that the level of the ship in which the decorated wares were stored has not yet been exposed and remains inaccessible to the dredges. The study of the varied wear patterns seems to support the view that we are dealing with differing levels of deposit or even different packing cases, similar to the one found at Pompeii (Atkinson 1914), each packed with a particular form type. Thus the decorated wares could well be in packing cases that have not yet been disturbed.

In summary, the absence of decorated wares presents two viable possibilities: first, a shipwreck in which the decorated wares remain buried, which obviously cannot be discounted until the putative wreck is discovered and fully investigated; second, an accurate reflection of a shipment from which decorated wares had been deliberately excluded. Such an

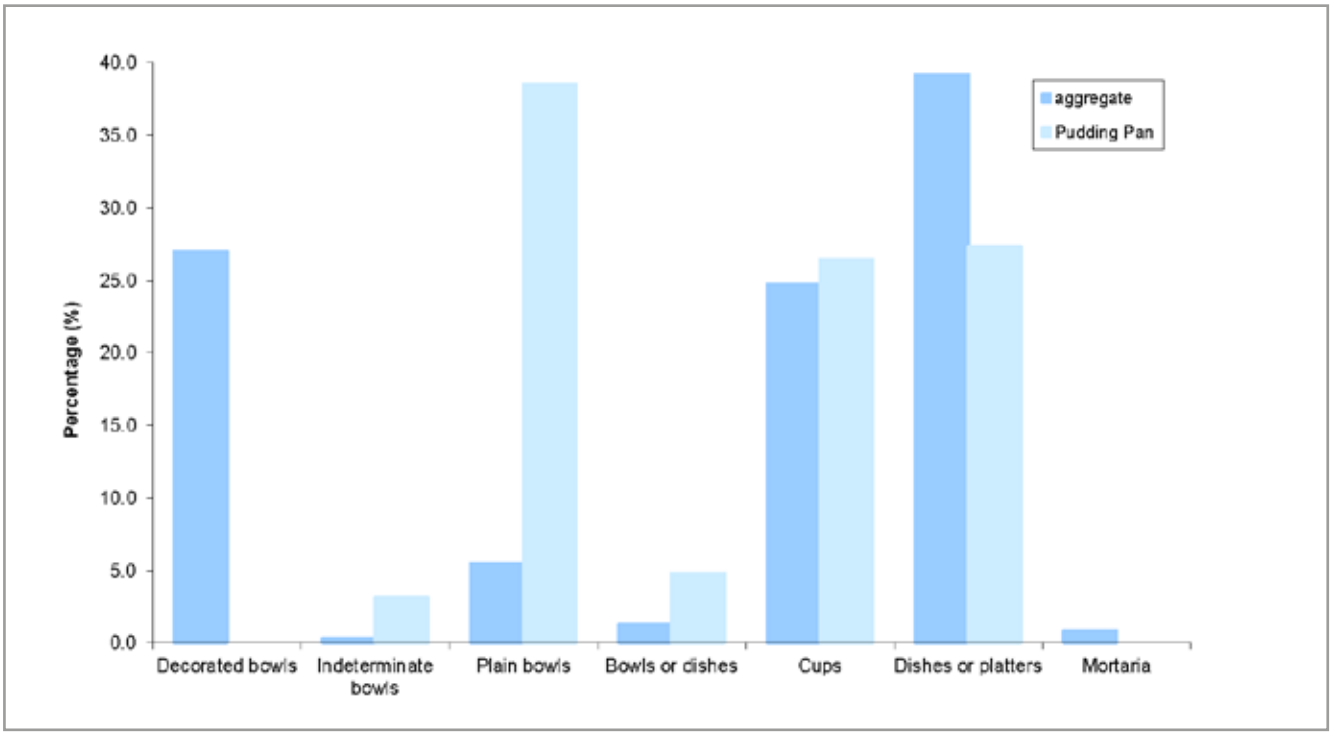


Figure 87 Comparison of characteristics of samian groups from different site types with similar groups from Pudding Pan. Note the complete absence of decorated wares and the significantly larger proportion of plain bowls recovered from Pudding Pan compared to other site assemblages

exclusion might be accounted for in three ways. Consignments of plain wares might have been the norm rather than the exception, contrary to popular belief – selective supply or demand for decorated bowls cannot be discounted (Willis 1997b: 41).

This shipment might have comprised old, unfashionable stock (cf. Haverfield 1911: 120). Assemblages from the Boudican destruction layers in London have been shown to be significantly more modern than those of Verulamium or Colchester, which seems to demonstrate that significant minor variations within apparently homogeneous assemblages can be identified (Millett 1987: 96). However, as shown, the high ratio of stamps to potters suggests that the Pudding Pan assemblage was homogeneous and therefore contemporary stock. In addition, one would expect a greater variety of forms in a consignment of redundant stock than the rather limited number of forms represented at Pudding Pan. Last, the consignment might be explained as a specific cargo intended for some as yet unspecified purpose which should become apparent through further analysis (see **Fig. 87**).

When the characteristics of the samian assemblage from Pudding Pan are compared with those from terrestrial sites there is a conspicuous discrepancy. Far greater proportions of large plain samian bowls have been recovered from Pudding Pan than from all other site types, which generally have similar proportions of large decorated bowls (**Fig. 87**). The substitution of large plain bowls for large decorated bowls is too marked to be coincidental; it has been argued that demand for decorated bowls may have been more utilitarian than aesthetic as they were generally larger than plain wares (Willis 1997b: 41). Thus the large plain samian bowls in the Pudding Pan assemblage may have been intended for a site at which they would have fulfilled the function ordinarily fulfilled by large decorated samian bowls at other sites.

This appears to confirm that the absence of decorated bowls is a genuine anomaly rather than the result of a selection or recovery bias, which again supports the notion of a shipwreck as opposed to a jettisoned cargo. It also seems to confirm that the recovered assemblage is a representative sample reflecting the characteristics of the original consignment rather than a heavily biased selection, which supports the notion that the Pudding Pan assemblage genuinely represents a bulk consignment of plain samian wares. The possibility that the assemblage was destined for an entrepôt will be explored in Chapter 7.

Moreover the prevalence, besides complete *amphorae*, of rim, neck and handle fragments is very significant since *amphora* rims are comparatively rare even in large collections (Peacock and Williams 1986: 19). While this could be the result of biased collection, although other sherds have been recorded, it could indicate that the *amphorae* are still there, standing in an upright position on the seabed until the oyster dredges shear off the exposed tops, thus supporting the notion of a coherent wreck site. The conclusion must be that we are dealing with a deeply buried deposit of considerable cohesion.

Alternative primary cargoes?

Any assessment of the composition of the Pudding Pan cargo would be incomplete without consideration of what else, besides a consignment of plain samian wares, a later 2nd-century AD merchant might have been importing to Britain. This is fraught with difficulties, as the full extent of the consignment remains unclear. Advocates of a parasitic piggy-back trade might suggest grain, although it is unclear over what period and in what quantities staples were imported. Evidence for the importation of grain is rare but includes a late 1st- or early 2nd-century AD deposit of grain at

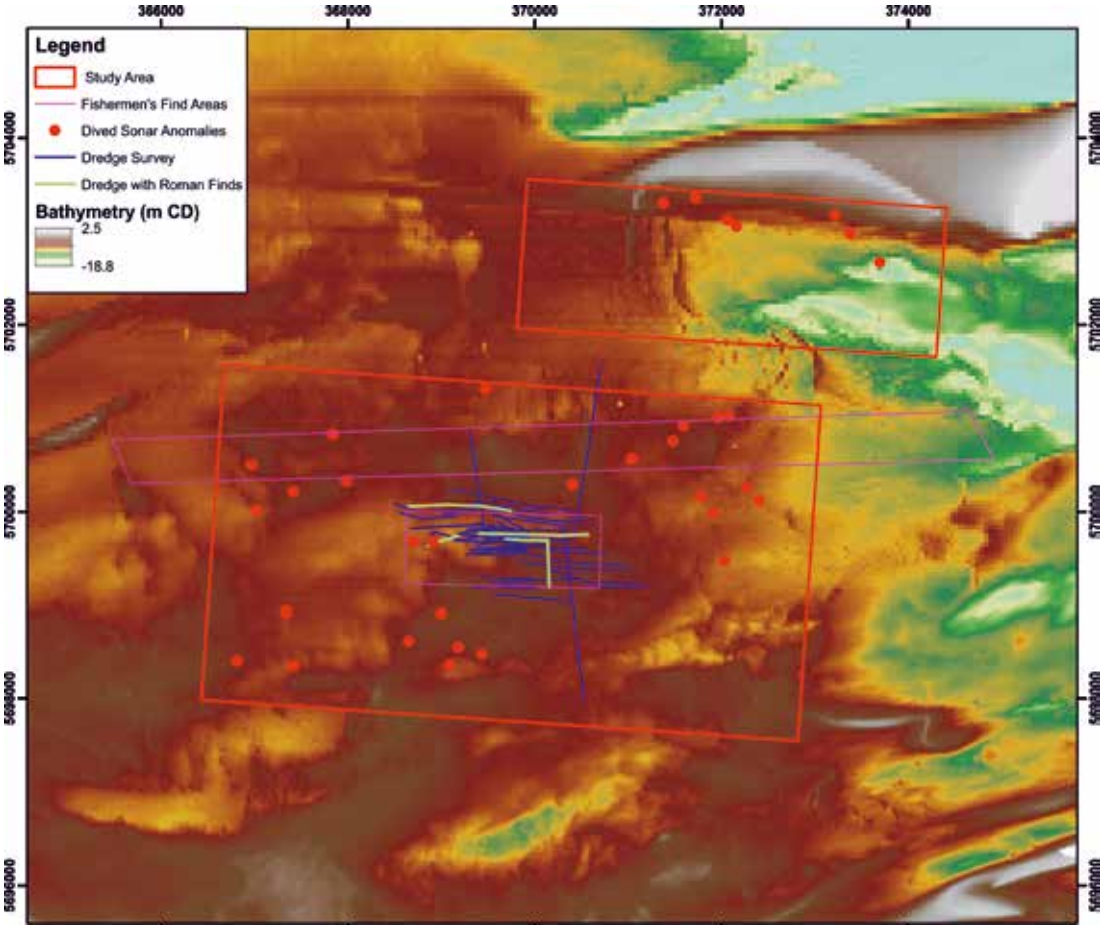


Figure 88 Areas investigated in detail by the current project. The area to the north (small red box just south of Pan Sand – the grey crescent shape) was the area first investigated in 1997/8 by geophysical and diver survey. Since then the focus has moved further south, to the area of Pudding Pan. This image shows the tracks taken during drift dives and controlled dredging operations; the green lines denote tracks on which Roman artefacts were recovered (see Fig. 26). The mauve boxes indicate areas where Whitstable fishermen believe they have recovered pots

Caerleon, and grain pests found at York and at Droitwich that could not overwinter in unheated buildings so may have been introduced in an imported cargo (Helbaek 1964). It seems, however, that manufactured goods, which dominate the archaeological record, also made up the bulk of importations to Britain (Fulford 1984: 132).

The final destination of the Pudding Pan consignment is significant in this regard as it is likely that any staples being imported would have been intended for the army, which at this time was largely garrisoned on the northern frontier. If the final destination was London then a cargo of wine, olive oil, fish sauce, dried fruit and other exotica conveyed in *amphora*e, or of wine, salt, salted fish and meat in barrels, remains a possibility. However, as Fulford (1984: 132) suggests, 'whether the contents of these vessels in their entirety contributed more than a dash of luxury to the staple diet is debatable'.

Without detailed knowledge of the complete cargo the problem must be addressed from the perspective of what Britain might have required in the later 2nd century AD. The importation of samian has been seen as representative of Britain's economic relations with the rest of the Empire. The period of greatest importation was undoubtedly from the time of the invasion to the end of the 1st century AD, with a considerable reduction in the 2nd century and even less importation in the early to mid 3rd century (Fulford 1984: 132; Marsh 1981, fig. 11.7). Fulford (1984: 138) acknowledges the perversity in suggesting that the greatest importation of basic materials occurred at a time when Strabo (*Geography* IV.5, 2) specifically cited them as exports, but thinks it inconceivable that Britain's surplus production could both satisfy Imperial demands after the invasion, *and* provide the means to pay for the recorded level of importation (cf. Millett 1990).

However, this appears to contradict Fulford's suggestion (1984: 136–7) that variations in samian importation loosely correlate with garrison changes and the development of towns. If we accept the possibility that pottery was imported in its own right then it overcomes this conundrum and explains what might have been imported to Britain to counterbalance the exports cited by Strabo (*Geography* IV.5, 2), filling ships that would otherwise have returned empty. The need to import staples in the later 2nd century AD is even less feasible, although there may have been a considerable demand for the *amphora*-based products of the Empire, particularly by a Romanized population. Thus it seems perfectly plausible that the Pudding Pan consignment might consist of a bulk shipment of samian, although the presence of an additional *amphora*-based consignment cannot yet be discounted.

It is now clear that rather than one widely dispersed deposit the recovered material represents a number of sources. Analysis suggests that there is considerable evidence

to show that a ship laden primarily with a consignment of plain samian wares from Lezoux sank *c.* 180–200 AD. Examination of the wear and damage sustained by many of the pots has shown that the vessels are stacked in inverted piles on the seabed, probably in separate packing containers. The absence of evidence for post-depositional movement coupled with the presence of oyster growth on almost one fifth of the sample suggests that these remains are buried in the vicinity of Pudding Pan. The assessment of the rate at which artefacts have been recovered from the area clearly shows that, despite claims to the contrary, variations in the rate and nature of the finds over the last 300 years are almost imperceptible. This, supported by the *amphorae* evidence, confirms that we are dealing with a deeply buried deposit of some cohesion of which we so far have only a sample and which is far from exhausted.

The evidence also suggests that at least one consignment of *mortaria* and other wares lies buried to the north of Pan Sand, probably on the edge of the Oaze Deep channel and probably dating to *c.* 65–85 AD. Whether this represents a shipwreck or a jettisoned cargo and whether all the later 1st-century AD artefacts came from one source remains unclear. At present there are too few artefacts from the early 3rd century AD to determine what they represent and where any deposit might be located. It is possible that it represents post-depositional contamination but further discoveries may prove otherwise.

Summary

It is now clear that at least one later 1st-century AD source dating from *c.* 65–85 AD is situated to the north of Pan Sand while the later 2nd-century AD source dating from *c.* 180–200 AD is located in the vicinity of Pudding Pan. The recovery of similar-looking but widely dated samian from both areas, which are several kilometres apart, would account for the earlier confusion in the literature. As yet, it is impossible to determine whether the 1st-century AD material represents a shipwreck or jettisoned cargo. Similarly, there is insufficient evidence regarding the nature and whereabouts of the 3rd-century AD source.

In contrast, the uniform wear and evidence for inverted stacking in separate packaging of the later 2nd-century AD samian is strongly indicative of a shipwreck. The uniform rate and nature of recovery over the last 300 years indicates that a considerable cohesive cargo was deposited, much of which remains buried on the seabed. Moreover, the comparison of the recovered assemblage with similar terrestrial assemblages has highlighted the substitution of large plain bowls for large decorated bowls in this consignment. This suggests that decorated bowls, rather than remaining buried, were deliberately excluded from the original consignment. Thus, in the absence of other cargo, the site appears to represent a bulk consignment of plain samian wares, which is unique in the maritime archaeological record. If so, this considerably undermines our current understanding of the samian trade and emphasizes the need to identify the area in which the wreck lies, which has been narrowed considerably by the current, ongoing study conducted by the author in collaboration with the University of Southampton, and generously funded by Historic England and STV Productions (**Fig. 88**). The following chapter will explore the significance of these findings through comparison of the recovered assemblage with similar assemblages that, unlike this consignment, successfully reached Britain, thereby placing Pudding Pan in its context as one link in the samian supply chain.

Chapter 7
Pudding Pan in the Context of Samian Trade and Distribution

> Avarice led men to sail the seas, for a desire for riches forced them to set sail and to suffer hardships. Ships were first of all used in order to raid and plunder. But also seafaring itself is dangerous, and all dangerous things must be avoided. Because seafaring is so dangerous, the sea is full of danger, but the land and agriculture are safe. (Libanius, *Progymnasmata: Comparationes*).

Samian has long been a cornerstone of Roman archaeology for its utility in dating sites and deposits, but until recently little was known about a number of aspects of this pottery, particularly, in the context of Pudding Pan, its transportation and distribution networks, and its social and economic context (B.R. Hartley 1969: 235; Willis 1997b: 38). With few exceptions the distribution of samian appears to be both geographically and socially widespread across all site types, albeit in modest proportions of total assemblages in early Roman Britain (ibid.: 42). The English Heritage Samian Project attempted to reflect this distribution with even geographical, chronological and site-type coverage (Willis 2005: 5.2.3). The glaring omission of any maritime sites is telling, reflecting the absence of data and stressing the significance of the assemblages from the Kentish Flats.

The importance of the considerable size of the main Pudding Pan assemblage of more than 526 known/recorded samian vessels is accentuated by the fact that the Castleford assemblage of *c.* 529 vessels is considered notable (ibid.: 5.2.4). Moreover, the unusually high proportion of complete or near-complete vessels recovered from Pudding Pan is emphasized by the fact that on average stamped items occur less than twice per 100 samian sherds, representing on average one stamp per 26 vessels (ibid.: 5.3.1). At Pudding Pan the current study has recorded 392 identifiable stamps, as well as 37 worn or otherwise illegible stamps, 24 rosette or concentric circle stamps, 73 unstamped vessels and 29 sherds where the stamp was missing. This represents one stamp for every 1.22 sherds, a ratio all the more striking given that unstamped forms 35 and 36 make up *c.* 14 per cent of the assemblage. When these unstamped forms are excluded almost every other sherd (vessel) is stamped, which highlights the unique nature of this assemblage.

Current consensus suggests that samian was distributed on the back of other higher-valued commodities, the so-called piggy-back trade, as samian is perceived by some to have been of too low value to warrant transportation in its own right (Middleton 1979; 1980; King 1981: 69, 74, n 3). Documented abuses of the *cursus publicus*, used for example in the illicit transport of marble, are cited in support of this notion but may have been the exception rather than the rule. The fact that Pudding Pan seemingly comprises only plain wares, which are known to have been relatively cheaper than their decorated counterparts, increases its potential impact on the current orthodoxy.

However, the evidence to date from Mediterranean sites overwhelmingly supports the hypothesis of a piggy-back trade (see Millett 1993: 418). In order to challenge it we need to determine beyond reasonable doubt that the Pudding Pan assemblage genuinely represents a bulk consignment of plain samian wares (*contra* Dannell and Mees 2013: 178, n. 25). Further, if it does represent a bulk consignment, does it represent the norm in samian distribution or rather a one-off

anomalous cargo assembled either to fulfil a specific demand or as a result of an abnormal supply problem? In other words, is the Pudding Pan assemblage typical or atypical of samian consignments crossing the Channel in the later 2nd century AD? It is important not to over-emphasize the economic importance of samian because of the abundance of samian potteries or its ubiquity in the archaeological record – the trade in less enduring commodities such as wood, stock animals, transport animals and foodstuffs was far more important (Marsh 1981: 206).

By establishing the range of vessels that were produced and exported to Britain by the Pudding Pan potters we should better understand the nature, composition and intended destination of the original cargo. Deposits of unused samian are particularly useful in this regard as they are more closely associated with the trade in samian than items recovered from 'refuse deposits' excavated at sites. They might show, for example, that goods that were made and fired together were transported, sold and used together. The absence of decorated wares in the Pudding Pan assemblage might be explained by plain and decorated wares being normally transported separately, as possibly indicated by the Pudding Pan assemblage. The Samian Project has shown that, with very few exceptions, samian assemblages include both plain and decorated wares in varying proportions, the character of which is strongly related to site type, status, function, exchange connections and identity (Willis 2005; Monteil 2005: 22; Willis 2011). Although this evidence emphasizes the more common combination of plain and decorated wares, it in no way proves unequivocally that plain and decorated wares were generally shipped in combination, for obviously the mixing of separate consignments on the quayside would produce the same result at end-user sites.

We might better understand and evaluate the Pudding Pan assemblage by tracing the samian supply route from Britain back to the production kilns. The extent to which the contents of kilns were mixed *en route* to the end user can be gauged from evidence for the nature and composition of samian consignments at various points along the supply route from central Gaul to Britain. However, other than Pudding Pan, there is no direct evidence for the shipment of samian wares in northern European waters. The composition of consignments arriving in Britain can be assessed through analysis of unused samian deposits at shops, warehouses and dockside dumps, to ascertain whether plain and decorated wares were transported in isolation from each other (see Weber 2013: 192).

There is limited evidence for the transportation of samian along the waterways of Gaul from two sites, at Vichy and at the mouth of the Loire. Evidence for the output of samian kilns should indicate whether plain and decorated wares were fired together at the production sites. If this was the case, what reasons might there have been for separating the different vessels prior to transportation? Was demand or supply the driving force behind the composition of samian cargoes? Did traders fill their ships with available products or with the products that the end users required?

Such evidence should enable us to confirm or refute the notion that the original Pudding Pan shipment comprised a bulk consignment of plain samian wares. If confirmed, it may be possible to determine the likely destination of this consignment. Even though an unknown proportion of the original consignment remains buried we may be able to characterize the Pudding Pan assemblage sufficiently to compare it with particular types of site, which might then indicate the likely recipients of this particular cargo. Alternatively, evidence of samian deposits of solely plain wares may display consistent characteristics, which could then shed light on the likely destination. How frequently are deposits of unused samian encountered on terrestrial sites and how do they compare with the assemblage from Pudding Pan? This analysis may alter our understanding of the trade and distribution of samian wares. If bulk consignments were the norm rather than the exception it is curious that we have not found similar consignments of samian in the Mediterranean. Most ceramic deposits from wreck sites found throughout the Empire have either never been examined in detail or require reappraisal (Rhodes 1989: 44). Chapter 8 will investigate Mediterranean wreck evidence further.

Bulk consignments of samian?

If samian was conveyed as a sole cargo one would expect a route direct from the production centres to the end users; if it was being shipped as subsidiary cargo one would expect a detour via the production area of the main commodity. For example, south Gaulish samian was transported to the southern Gaulish coast by mule train for transportation by water to the western Mediterranean, Germany and Britain up to *c.* AD 110 (Webster 1996: 2). The transportation of heavy, bulky goods south for subsequent distribution further north seems counterintuitive as the shortest route would have been to the western coast of Gaul via the Garonne for transportation up the Atlantic coast. Nevertheless, the south coast route is verified by archaeological evidence, thus supporting the notion that other factors superseded distance, such as the piggy-back theory whereby the transportation of pottery was parasitic.

This evidence also raises doubts regarding the notion of a long-distance Atlantic trade route. For instance, it is assumed that central Gaulish wares reached Britain via the Loire and shipment around Brittany, whereas the cost of a 40-mile road trip between the Loire and the Yonne and then down the Seine must have been preferable to the risks of the Bay of Biscay and the rocky Breton coast. The Seine route seems to be indicated by the distribution of Dressel 20 *amphorae* in the 1st century AD (Marsh 1981: 202, 230 n. 6). Calculations of the relative costs of shipping Lezoux samian to Britain based on Diocletian's Price Edict (AD 301) support this hypothesis; by calculating the kilometres travelled, weighting by the various forms of land-sea-river transport used to convey samian from the kiln sites to Dover the following relative modified units are produced: via the Seine 8,000, the Loire 8,100, the Somme 10,000 and the Rhine 14,500. This analysis also suggests that Lezoux samian cost twice as much to transport to Britain as its east Gaulish counterparts (King 1981). However, if this was the case then it seems that these additional transport costs were not passed on to the consumer (Fulford 2007: 57). The composition of

the Pudding Pan cargo, which seems to have originated from Lezoux, should shed some light on this issue.

Mixed cargoes suggest the involvement of shipping agents rather than direct contact with individual suppliers. Pottery sherds would seem to be the surviving representatives of a much broader range of products. The distribution of distinctive wares to military sites in a province suggests the involvement of middlemen. In the period immediately after the conquest of Britain it is possible that the army supplemented local pottery supplies by encouraging *negotiatores* who had invested in the expansion of pottery production at Lyon. If so, these wares would presumably be shipped to Britain as part of mixed cargoes for sale to the military (Evans 1981: 528).

Whether samian arrived in Britain as piecemeal lots assembled by middlemen (Millett 1993), as 'bulk commercial consignments' (Dickinson 2000, 204; Symonds 2000) or a combination of the two (Willis 2005: 6.4.6) is still unclear, largely as a result of the paucity of direct evidence. Whether the seemingly bulk consignment from Pudding Pan (*contra* Willis 2005: 6.1) represents the norm or an abnormality is more difficult to determine. The general heterogeneity of samian stamps observed at a range of site types, with few potters and even fewer dies in common (see, for example B.R. Hartley 1972), is somewhat ambiguous. It might suggest that if bulk shipments were the norm there was an exceptionally large pool of stamps in use at the time (Millett 1987: 96, n 9) or it might relate to manufacturing processes at the production centres (Weber 2013: 204). Alternatively, it might be that vessels from specific samian workshops were widely diffused once they had left the workshop.

If the latter, this challenges the view that dealers were bound by trade organizations to deal exclusively with one kiln site (Rhodes 1989: 46). Even if consignments were transported direct from the production centres to the market the well-documented practice of transshipment presented ample opportunities for the dispersal of an individual workshop's output prior to its deposition in the archaeological record. In summary, the heterogeneity of an assemblage might reflect either the composition of the pottery kiln, which could have contained the produce of many potters, or the manner in which the pottery was unloaded or packaged (Willis 2005: 6.4.6).

Wear patterns on the Pudding Pan assemblage appear to indicate that vessels produced by individual potters were packaged and transported together, thus implying that the shipment had not been significantly adulterated. If individual potter's products were shipped as homogeneous groups, the mixing of different potters' work could have occurred at the entrepôt/dockside, warehouse or pottery shop, resulting in the cohesion of a consignment being dissipated each time the shipment was unpacked and resold. Cohesion can be gauged through analysis of the average number of stamps per potter in a particular group, which should provide some indication of the number of trading points through which a particular consignment has passed.

A study of samian stamps in deposits of pottery lost *en route* from kiln site to the consumer (e.g. from wrecks, warehouses, shops etc) has shown that the average numbers of stamps per potter are usually significantly higher than would be expected in assemblages from other sources. Moreover, the highest ratios derive from kiln sites while groups of unused samian from Continental sites consistently produce higher ratios than their British counterparts (Rhodes 1989).

In 1989, the Pudding Pan assemblage included 219 stamps from 37 potters producing an average of six stamps per potter (Rhodes 1989: 50, 47, fig. 2; after Smith 1909). This was remarkably similar to comparable deposits of Lezoux samian from the 'pottery shops' at Wroxeter (*c.* 6.65 stamps per potter based on 173 stamps) and at Castleford (7.05 stamps per potter based on 416 stamps). However, unless the Pudding Pan assemblage represents a ship engaged in cabotage, in piggy-back trade or carrying redundant stock this result is at odds with the proposition (see Millett 1993: 417) that sites more closely associated with the samian production sites will be less mixed and will therefore have a higher ratio of stamps per potter than sites more closely associated with consumers (Rhodes 1989).

As the detailed analysis of the recovered assemblage has shown that none of these interpretations apply, one would expect a greater number of stamps per potter from Pudding Pan, as the consignment had not yet reached its final destination, meaning that the assemblage was more closely connected to the source of samian supply than was the case with either Wroxeter or Castleford. It must therefore have passed through fewer exchange nodes and so have been less susceptible to contamination. This anomaly can be explained, however, on the grounds that the complete consignment has not yet been recovered and subsequent enhancement of the assemblage has altered this ratio. As detailed above, the Pudding Pan assemblage now comprises 452 stamps representing 47 potters, which produces an average of 9.6 stamps per potter – considerably higher than the figures for both Wroxeter and Castleford. This appears to confirm that the Pudding Pan assemblage is more directly linked to the production centres and that it had passed through fewer trading points, as one would expect of a shipwreck or jettisoned cargo of samian wares lost *en route* to Britain. This homogeneity also favours a bulk consignment over a piecemeal trade, which is more likely to display greater diversity.

The New Fresh Wharf assemblage does not conform to this pattern, with relatively lower numbers of stamps per potter than would be expected from a normal cargo, shop or warehouse assemblage. At New Fresh Wharf the average number of stamps per potter on the Lezoux samian from in and around the quay is 2.16 (based on 173 legible stamps), which implies that the bulk of this assemblage does not derive from damaged cargoes discarded at the quayside. This is not only considerably lower than the three deposits of Lezoux samian of comparable size cited above, but is even lower than the composite figure of 3.1 stamps per potter for London sites in general. The same holds true for the deposit of east Gaulish wares from the same site. As the figures do not reflect typical warehouse or shop deposits lost at one time, one interpretation that will be explored below suggests that, as there is little or no evidence for waterfront shops, the bulk of the material represents breakages from warehouses

accumulated over time before being dumped in the backfill of the quay (for discussion see Rhodes 1989: 49; *contra* Bird 1986: 142).

The revised figure for the number of stamps per potter from Pudding Pan is still lower than that derived from groups of unused pottery from Continental sites, such as Bregenz, whose consistently higher figures reflect relatively direct trading links between these sites and the Gaulish kilns (Rhodes 1989: 47–8, fig. 2). Rhodes' assertion that a 'complete absence of east Gaulish samian' from Pudding Pan and from the Corbridge shop (a store containing pottery, *mortaria* and samian ware (Haverfield 1911: 115; B.R. Hartley 1972: 46)) implies a more direct supply route from central Gaul that did not involve east Gaulish warehouses and traders is seemingly challenged by the recovery of, admittedly few, east Gaulish specimens from the Kentish Flats. However, the east Gaulish vessels could have come from the later source that included the North African red-slipped (ARS) ware vessel, or this tiny element could represent post-deposition contamination. Indeed, the ratio of stamps to potters supports the circumvention of east Gaulish warehouses and traders. It also seems to confirm that the consignment was contemporary rather than redundant stock, as a consignment of old, unfashionable products would undoubtedly display less homogeneity and would be more likely to contain products from a greater variety of sources, potters and dates.

Possible explanations for the absence of decorated wares

If Pudding Pan does represent a bulk consignment of samian wares how do we explain the absence of decorated wares? It seems clear from the analysis in the previous chapter that decorated wares were deliberately excluded and replaced by large plain samian bowls. While this could have been a common practice in samian supply, with separate bulk shipments of plain and decorated wares regularly crossing the Channel, it is difficult to corroborate as Pudding Pan is unique in northern European waters. Although it does contrast with Mediterranean wreck evidence, which suggests that pottery was always subsidiary to raw materials or perishable cargoes. Nevertheless, there is no evidence to suggest that northern European cargoes had similar composition or that vessels were as large as those found in the Mediterranean (Rhodes 1989: 46).

Alternatively, decorated wares may have been excluded from this particular shipment as a result of supply or demand factors. For example, the shipment may have been intended for a specific market that did not require decorated vessels; although plain samian deposits are rare they are not unknown (see below). However, evidence seems to suggest that the supply of samian to Britain was driven by and reflects the output of kilns rather than the particular demands of the consumer (see Monteil 2005: 93). For example, the supply of decorated wares from Lezoux reached a peak *c.* AD 150–65, corresponding with the period of maximum production of the huge Cinnamus factory from which at least a quarter of all Lezoux pieces came (Marsh 1981). This has implications for the nature of trade and suggests that merchants filled their ships with what was available rather than with what, or what they thought, the consumer wanted or needed.

Thus the Pudding Pan consignment may have left the production centre at a time when decorated vessels were unavailable, perhaps in a transitional phase as suggested by Smith (1907: 289), although as stated (see Chapter 3) this is not supported by terrestrial evidence (Haverfield 1911: 117; B.R. Hartley 1969: 239). Alternatively, samian output may have been so vast that shipments consisted of whatever vessels were available at any particular time whether plain or decorated wares. Other than changing fashions that may have been demand led, there is little evidence to suggest that producers manufactured, or that traders transported, vessels to specific orders, so it may be inappropriate to discuss the distribution of samian in terms of supply and demand (Hopkins 1978: 180).

However, the concept of credit sale, with delivery and payment in the future and bilateral contracts binding both parties, had developed in Roman law before the 1st century BC. Before 215 BC contracts to supply the army were sold by auction to the lowest bidder, who was then responsible for buying the goods and transporting them. These contractors were wealthy Roman capitalists of the equestrian class, rather than merchants, who formed companies to share the risk. *Negotiatores* were then subcontracted to supply the goods. Pottery is never mentioned in army supplies but perhaps this is because, like salt, it was not of sufficiently high value to warrant mentioning (Evans 1981: 528; *contra* Mills 2013).

Indeed it is surprising to note that despite the tremendous output of the Gaulish samian industry, which at its peak must be estimated in millions of vessels per annum (Rhodes 1989: 47), the supply of samian was far from constant. Fluctuations throughout the mid 1st century AD to the end of the 2nd century (Marsh 1981: 180) are reflected in the variations – common to both British and Continental sites – in quantities of samian at different periods. Samian, like coins, must be calibrated to compensate for these fluctuations before it can be used to indicate site occupation and status. However, whilst volumes may have varied considerably the proportions of vessel forms reaching Britain and their relative importance remained fairly stable (Willis 1997b: 40). Given the fluctuations in the supply of samian over time, valid comparisons can only be made between assemblages of the same date from the same production source (Marsh 1981: 188), and then only with caution (see Rhodes 1989: 46–8). Indeed Willis (2005: 5.2.5) suggests that the most appropriate comparisons are with assemblages from the same region rather than the province in general.

It is tempting to suggest that these detectable fluctuations in samian supply resulted from the Pudding Pan sinking and other similar events, especially if 10,000 or more vessels were lost each time. Likewise, a number of similar catastrophes could perhaps account for the as yet inexplicable demise of central Gaulish samian importation at the end of the 2nd century AD (see B.R. Hartley 1969: 238; cf. King 1981). Somewhat perversely, however, the dates of the Pan Sand and Pudding Pan depositions coincide with those of acknowledged peaks in the supply of samian to Britain (Tyers 1996). Then again, it seems logical that the period of greatest maritime traffic, concomitant with the periods of

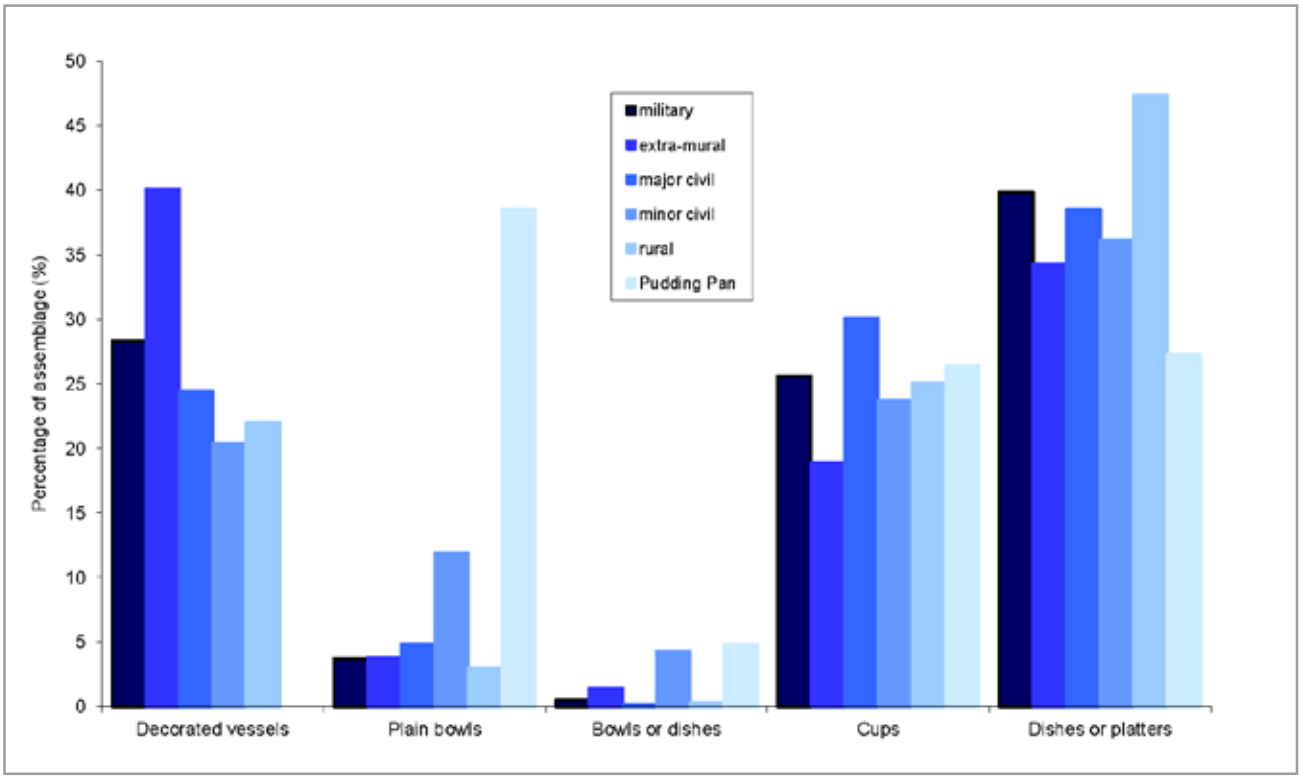


Figure 89 The characteristics of samian assemblages from various site types

greatest supply, would potentially increase the number of wrecking incidents. The concurrence of wreck dates with those of peak supply suggests that in reality such incidents had a marginal impact on the importation of samian to Britain, which must highlight the scale of this cross-Channel trade. Thus it seems that if supply and demand factors did influence the composition of the Pudding Pan assemblage then product availability rather than consumer choice may have played the more significant role.

Given the scale of production of samian it seems nonsensical to cling to the notion of a piecemeal piggy-back trade rather than a dedicated organized distribution network (Rhodes 1989: 47); it would be extraordinary if the distribution of this vast output were left to chance (see Middleton 1980: 187). In the absence of any significant evidence for the undoubtedly substantial maritime transportation of samian wares, the current seemingly biased evidence from Mediterranean wreck sites must represent opportunist trade by merchants eager to fill available spaces on their vessels. However, without corroboratory or contradictory evidence from northern Europe it is difficult to determine whether consignments like Pudding Pan were commonplace. The absence of decorated wares seems more likely a result of supply factors, possibly but not necessarily a shortage, rather than of specific demands of the consumer in Britain. The evidence presented here appears to indicate that the Pudding Pan assemblage is part of a bulk consignment of plain wares that may not have deviated a great deal from the normal cross-Channel trade in samian.

Comparison with end-user sites

Analysis of samian assemblages from end-user sites indicates that, with very few exceptions, plain and decorated wares are found in varying proportions across all site types. For example, the Samian Project found an overall ratio of one decorated to every four plain samian vessels, from a sample size of 7414 vessels from 110 sites. Moreover, it seems that there is a firm relationship between the type, function and status of a site and the proportion of decorated samian vessels, with the most visibly Roman sites utilizing the greatest quantities of samian and the greatest proportions of decorated wares. This must be related to the comparatively higher cost of decorated bowls, their use as symbols of cultural association and status and, to a lesser degree, supply and geographical access (Millett 1987: 93; Willis 2005: 7.3.1–10; 2011).

The proportion of decorated wares found within samian groups from different site types typically varies between at most *c.* 35 per cent and at least *c.* 17 per cent of the vessels, with the highest proportions representing military and associated sites (**Fig. 89**). At major civil sites the average figure is around 26 per cent, while on the majority of Romano-British sites including 'small towns', religious foci, roadside settlements and rural sites decorated wares represent *c.* 17–20 per cent (Willis 2005: 5.3.1 cf. table 42). In addition, there are significant and consistent contrasts in the proportions of particular form/functional categories from these different site types which must relate to economic and cultural differences between different consumers. For example, dishes/platters are the most frequent of all types among military sites (*c.* 40 per cent), decorated bowls are the second most frequent category (27 per cent) and cups are also strongly represented.

At extra-mural settlements decorated bowls are the most common functional category, accounting for *c.* 38 per cent of vessels, whereas dishes/platters form just over 34 per cent and cups *c.* 19 per cent. At major civil sites decorated bowls form a lower proportion of the sample than is the case with

both military sites and extra-mural sites, while cups and dishes/platters each account for more than 30 per cent of the sample. In contrast, decorated bowls form less than 20 per cent of samples from smaller civil centres, including 'small towns', roadside settlements etc, which is less than at any other type of site. Conversely, plain bowls form 12 per cent of the sample, a figure higher than at any other type of site while cups and dishes are the most common form types represented. Decorated bowls also form around 20 per cent of the sample from rural sites while dishes and platters account for almost half the sample, a much higher proportion than at any other class of site (Willis 2005: 8.2.1–6, table 45, charts 13–17) (see **Fig. 89**).

Assemblages from military sites, which consistently include higher proportions of samian, a much higher proportion of which is decorated compared with other site types, appear to confirm that the army regularly and consistently received selected bulk supplies of samian. The higher proportion of decorated bowls on sites at the top of the settlement hierarchy, including military sites, implies a particular association with wealth, social display and identity. These varied characteristics suggest that there were separate marketing and distribution networks for military sites and for civil sites, which is supported by evidence that samian continued to be supplied to areas long after the army had left. This, too, challenges the notion of a piggy-back trade based upon established supply mechanisms for the army facilitating the importation of samian. Moreover, the quantity of samian from across Britain is too large, and non-military demand too great, to support a purely supplementary trade (King 1981: 69; Willis 2005: 6.3, 7.3.1; cf. Middleton 1979: 92).

The recognizably varied characteristics of samian assemblages at different site types suggest that, in contrast to samian supply to the province in general, the requirements of specific consumers were taken into consideration at some point along the supply chain. If decorated and plain wares were imported separately, as the evidence from Pudding Pan may suggest, then they must have been mixed to the requirements of the end-user upon arrival at the destination quaysides, warehouses and shops. As stated, only decorated samian was found on the Plavac A site although the plain samian wares could have been removed without record (Chapter 2; Parker 1992a: 318 no. 831; Gunjača 1976/7). As the character of samian assemblages seems related to site type, it is feasible that there were certain circumstances where there was no demand for decorated wares for whatever reason, be it economic, social or functional. Thus the absence of decorated wares from Pudding Pan may not be particularly unusual although the occurrence of plain-only samian deposits is rare.

Decorated wares are absent from only two samian assemblages, one from a cellar in a *vicus* adjacent to an early auxiliary fort at Burghöfe in Germany and the other from the pottery shop at Corbridge. Both sites had been destroyed by fire, the former *c.* 69 AD and the latter *c.* 180 AD. The burned-out cellar at Burghöfe contained the fragments of *c.* 300 plain south Gaulish samian vessels dating from the Claudian-Domitianic period. The pottery shop at Corbridge included approximately 30 plain samian wares from Lezoux (Haverfield 1911: 115; B.R. Hartley 1972: 46). Given the relative rarity of unused samian deposits the existence of two plain ware assemblages with close military connections seems significant. Two other German 'pre-consumption' assemblages, a late 2nd-century AD deposit from Kempten and an early 3rd-century AD deposit from Ober-Florstadt, consisted almost exclusively of plain samian forms with very few decorated sherds (Weber 2013: 199). If these unusual deposits, more closely associated with the trade in samian wares than deposits from end user sites, contained no decorated wares, this might suggest that the Pudding Pan assemblage is not so anomalous and that plain samian wares may have been shipped more frequently than is commonly believed.

Haverfield (1911: 116) suggests, 'the occurrence of two such deposits [at Corbridge and Pudding Pan] of plain samian ware seems to demand explanation. I am inclined to suggest that perhaps plain and decorated samian were sometimes kept distinct in trade and use.' However, as stated, military sites consistently produce the highest proportions of decorated to plain samian wares, and decorated wares were found elsewhere on both sites. Their absence in these particular deposits could be explained by the obvious hierarchical nature of the army, as it is not inconceivable that the distribution and use of decorated wares was restricted within military sites, reflecting that hierarchy. Thus, the question of whether the Pudding Pan plain ware assemblage was destined for a military market on the northern frontier or the entrepôt of London remains open.

The fact that the characteristics of the Pudding Pan consignment fail to match those of the main site types is not particularly surprising but highlights not only the scale of importation but also the degree to which bulk consignments were mixed upon arrival. If the absence of decorated wares in the Pudding Pan assemblage was intentional rather than the result of a supply shortage it implies either that the consignment was destined for an entrepôt such as London at which it would have been split up and redistributed, or that it was an unusual specialist consignment. It is now clear from the particularly high proportions of samian, compared with other pottery types and with other non-London sites, that London was a major entrepôt and large-scale redistribution centre for samian ware to the non-military hinterland sites in southern Britain through the 1st to 3rd centuries AD (Marsh 1981; Bird 1986; Symonds 2000). These deposits could also reflect the relative prosperity of the city or the ready availability of inexpensive samian to pottery merchants and traders.

The mechanisms through which samian was distributed throughout the province remain obscure as do other ports of entry but the distribution of coarse wares like *mortaria* may throw light on the distribution of samian. For example, *mortaria* from the region of Verulamium are rarely found in areas such as the south and east coasts, which probably benefited from direct supply primarily for the fleet rather than from London. The eastern supply route that persisted through the 2nd century AD may have been responsible for the samian and the *mortaria* from Colchester found at the Castleford pottery shop. Evidence from Corbridge (Stanfield and Simpson 1958: xlix) and from York (Dickinson and

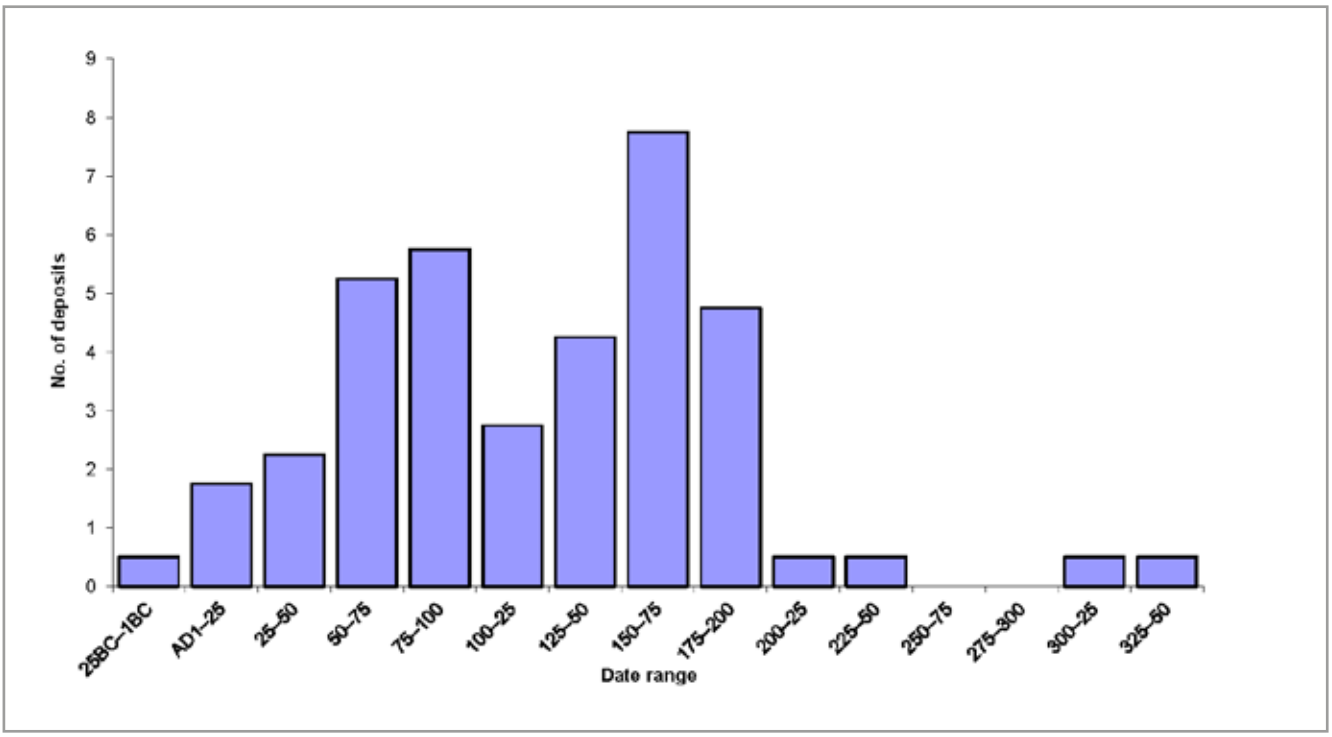


Figure 90 General date ranges of unused samian deposits

Hartley 1971: 130) suggests that the northern military zone was supplied direct from the Continent, while inscriptions confirm a trade link between the Rhineland and York (Frere 1987: 301). The distribution of 'Severn valley' ware suggests that the northern frontier may also have been supplied along the west coast from the end of the 1st century AD. From the early 2nd century, new *mortaria* kilns at Mancetter and Hartshill (K.F. Hartley 1973: 42) began to supply the northern market at a time when there was a sharp decline in the amount of samian entering the province (Marsh 1981: figs 11.6, 11.7).

If the samian supply to the province was prescribed by what was available rather than what was required, the varied proportions of plain and decorated wares usually found at consumer sites imply that there were separate marketing and distribution networks for military sites and for civil sites, which challenges the concept of a piggy-back trade. It suggests that the varying requirements of the end-user were fulfilled by mixing consignments after arrival at a few entrepôts and subsequent redistribution throughout the province, although some areas undoubtedly received direct supplies. The incidence of plain-only samian deposits is very rare and to date has been confined to military-related sites that ordinarily produce the highest proportions of decorated wares, as explained above.

Quayside, warehouse and shop deposits

Although the commonplace combination of plain and decorated wares on end-user sites emphasizes the unusual nature of the Pudding Pan assemblage, it is not illustrative of the wholesale trade in pottery unlike deposits from so called 'pre-consumption' sites (Weber 2013): quaysides, warehouses and shops. These sites, yielding large quantities of unused samian ware that had not been dispersed through markets to end-users, are a far more appropriate and relevant measure of the typicality of the Pudding Pan assemblage. Interestingly, apart from Corbridge, all of these deposits include a proportion of decorated wares. Many of these terrestrial deposits, in which samian forms the bulk of material, derive from the likely destinations of ships laden with similar consignments to that of Pudding Pan (for a summary of similar Continental sites see Rhodes 1989: 50ff).

Approximately 37 deposits of unused samian have been discovered on 34 sites in northern Europe marking various distribution points from the principal centres of manufacture, primarily in Gaul (see **Table 15**, after Rhodes 1989: 44). These deposits range in date from the early 1st to the mid 4th century AD, with the bulk of the deposits dating equally from the second half of the 1st and the second half of the 2nd centuries (**Fig. 90**). These coincide with the peak periods of samian supply and with the dates of the Pan Sand and Pudding Pan assemblages respectively. The paucity of plain-only samian deposits probably reflects the fact that the majority of these deposits have been interpreted as shop and warehouse stock or discarded products, so separate consignments may have already been mixed. However, it is interesting to note that one of the two sites that seemingly represent the transportation of samian consignments along the internal waterways of Gaul, at Vichy, also includes both plain and decorated wares. The other site is poorly reported and does not record this detail.

Given the aforementioned fluctuations in samian supply, the most relevant sites for comparison with Pudding Pan are the 'shops' (Wroxeter and Corbridge) and quayside dumps (New Fresh Wharf/St Magnus House) that contain sizeable deposits of Lezoux samian ware of similar date. The 'shops' at Colchester, at Northgate House, and at Castleford and the warehouse at Regis House will also be briefly discussed although they are earlier in date. At the very least these comparisons indicate the range of products that were sold

No.	Site	Date (AD)	Type	Contents
1	Loire mouth, France	mid 2nd century	wreck	Lezoux TS
2	Vichy (Allier), France	100–200	wreck	Lezoux TS
3	Arles, France	late 1st century	quayside	La Graufesenque TS
4	Bitterne, England	late 1st century	quayside	south Gaulish samian
5	La Nautique, France	41–69	quayside	La Graufesenque TS
6	New Fresh Wharf I, England	170–80	quayside	Lezoux samian
7	New Fresh Wharf II, England	200–50	quayside	east Gaulish samian
8	Gauting I, Germany	pre-139	warehouse	south Gaulish TS
9	Gauting II, Germany	150–63	warehouse	central Gaulish TS
10	Regis House, England	80–125	warehouse	south Gaulish and central Gaulish samian
11	Untersechenz I, Switzerland	mid to late 1st century	warehouse	east Gaulish TS
12	Untersechenz II, Switzerland	1st century	warehouse	east Gaulish TS
13	Ansedonia, Italy	40–5	shop/booth	Arretine
14	Bellheim, Germany	pre-mid 4th century	shop/booth	coarse wares
15	Bregenz, Austria	140–55	shop/booth	Lezoux TS
16	Budapest, Hungary	pre-178	shop/booth	Lezoux and Rheinzabern TS
17	Burghöfe, Germany	41–69	shop/booth	south Gaulish TS
18	Castleford, England	140–50	shop/booth	Lezoux
19	Colchester I, England	50–5	shop/booth	south Gaulish TS
20	Colchester II, England	pre-61	shop/booth	*mortaria*, flagons
21	Corbridge, England	150–80	shop/booth	Lezoux
22	Kempten, Germany	late 160s	shop/booth	Rheinzabern TS
23	Magdalensberg, Austria	early 1st century	shop/booth	Arretine
24	Mainz, Germany	11 BC–AD 20	shop/booth	Arretine
25	St Albans, England	*c.* 80	shop/booth	south Gaulish samian
26	Szombathely, Hungary	?	shop/booth	TS
27	Winchester, England	late 2nd century	shop/booth	Lezoux
28	Wroxeter, England	165–75	shop/booth	Lezoux and Rheinzabern samian
29	Northgate House, 20-28 Moorgate, England	*c.* 130	shop/booth	Lezoux, Les Martres-de-Veyre, and La Graufesenque samian, Verulamium region white ware, London oxidized ware
30	Alchester, England	150–65	shop breakage	Lezoux samian
31	Autun, France	120–40	shop breakage	Lezoux TS and central Gaulish black-slipped ware
32	Zugmantel, Germany	late 2nd century	shop breakage	Rheinzabern TS
33	Cirencester, England	60-5	fort discard	La Graufesenque samian
34	Inchtuthil, Scotland	83–7	fort discard	samian
35	Le Langon, France	late 1st century	other	Montans TS, coarse wares
36	St Katherine Coleman, England	early 2nd century	other	Montans samian
37	Nijmegen, Netherlands	65–80	other	Arretine and south Gaulish TS

Table 15 Unused samian deposits found outside the Mediterranean (after Rhodes 1989) arranged by site type

alongside samian so could illustrate the goods that accompanied samian imports. In addition, there are some details that are reminiscent of those posited for the Pudding Pan assemblage. Close analysis of this sort has not been previously conducted owing to the lack of a detailed publication of the Pudding Pan assemblage (see Bird 1986: 146, n 3).

Two deposits of south Gaulish samian at Colchester were interpreted as the contents of two pottery shops dating *c.* AD 50–5 (Insula 19: 127 and Insula 28: 171). In one deposit (Insula 19: 127) the samian was stacked in inverted groups and was covered in melted glass, indicating that glass objects were also being sold (Hull 1958: 153–5, 198–202). A whole variety of seeds found on the floor indicate that foodstuffs were sold alongside the pottery. Only a tiny fraction of the deposit was recovered but the repetition of certain names in the stock of the two shops suggests cases of goods may have arrived largely bearing the stamp of one potter (Rhodes 1989: 53), which corroborates the evidence from Pudding Pan.

The building at Regis House stood behind Roman London's quayside and has been interpreted as a warehouse or storeroom attached to a shop containing crates of samian that was destroyed in the second London fire *c.* AD 120–5. The *c.* 600 vessels came primarily from Les Martres-de-

Veyre and were also stacked in piles (Marsh 1981: 222). The low ratio of 3.3 stamps per potter implies accumulation of warehouse waste rather than the contents of a store.

An assemblage that included unused samian dating from *c.* AD 130 was found adjacent to several pottery kilns during the excavations at Northgate House, 20–8 Moorgate in London (fill A[1044] of pit A[1066]). The characteristics of the assemblage suggest that it represented stock that had been damaged before sale or use and therefore discarded. As no structures that could be interpreted as shops or warehouses were found nearby, the wares were probably sold from a roadside stall (Seeley and Drummond-Murray 2005: 29–32). Other than this site and the sites in close proximity to the probable site of the Roman bridge across the Thames (New Fresh Wharf/St Magnus House, London Bridge, Regis House and Miles Lane) no significant groups of unused pottery have been discovered elsewhere in London (Marsh 1981: 222; Rhodes 1986: 200).

Five shops in the *vicus* of an auxiliary fort at Castleford (Lagentium), 20 miles south-west of York were destroyed by fire *c.* AD 140–50. Four of the shops were filled with stacks of burnt pottery comprising Colchester *mortaria* and samian from Lezoux, including about 200 decorated bowls (Rush *et al.* 2000) reminiscent of the recovered material from the north of Pan Sand. Despite the fact that this deposit included 200 samian vessels from Lezoux, there are no potters' stamps or dies in common with those recovered from Pudding Pan, which provides a *terminus post quem* for the period of operation of the Pudding Pan potters. Neither are there any stamps in common with the deposits from Colchester, Regis House or Northgate House which is to be expected as all are earlier in date and the Colchester and Regis House assemblages are from different production centres.

At Wroxeter, large collections of decorated and plain samian pottery as well as a number of *mortaria* were discovered in a gutter that ran along the east portico. The samian was found in two groups, one including 210 plain dishes from Lezoux and Rheinzabern and a second comprising eight decorated and 174 plain vessels. Many of the vessels were 'nested' (piled one inside another although they were usually found lying horizontally on the ground) as if they had been tied in stacks or were crated on shelves or benches (*contra* Atkinson 1942: 129; Wacher 1976: 364), as posited at Pompeii (see Atkinson 1914) and at Pudding Pan. It has been suggested that either the plain and decorated wares were displayed for sale separately, or even that the decorated wares may not have belonged to this group (Weber 2013: 192). Seventeen of the Mancetter *mortaria* from the same deposit bore the stamp of the potter Sennius and date to *c.* AD 165–75. A pile of 100 stone bars, possibly whetstones, was also found lying as though packed in a box. A re-examination of the petrology of these bars following similar discoveries at New Fresh Wharf has established that they belong to a very large-scale Kentish Rag industry as evidenced by the Blackfriars boat (Marsden 1990). The plain wares were limited to a few forms, among them Dragendorff forms 31, 33, 35, 36 and 38, dating from the mid 2nd century AD so slightly earlier than the main Pudding Pan assemblage.

The store at Corbridge, destroyed by fire *c.* AD 180, contained pottery, *mortaria* and samian ware closely resembling that from Pudding Pan and the Wroxeter stalls (Smith 1909: 410; *contra* Haverfield 1911: 114; Brassington 1975: 75; Rhodes 1989: 53). The pottery appears to have fallen from shelves where it had been arranged in three groups. By far the largest of these consisted of *mortaria*, the second was composed of coloured coarse wares and the third included approximately 30 plain samian wares from Lezoux, primarily of Dragendorff forms 31 and 33 with a few form 38 bowls (Haverfield 1911: 115; B.R. Hartley 1972: 46; Rhodes 1989: 53). There are a number of common features between Corbridge, Pudding Pan and the Wroxeter stalls, which all included a few common forms with a few samples of other forms. Like Pudding Pan, the Corbridge shop contained only plain wares and some stamps were common to both.

At New Fresh Wharf/St Magnus House a large amount of samian was discovered dating from the mid Antonine period onwards, a high proportion of which was clearly new and unused implying that it may have been damaged or rejected at the quayside (Bird 1986: 139). The deposit comprised two distinct and closely dated groups, one of central Gaulish and the other of east Gaulish origin, all of which seemed to have been deposited at one time. There was a third, earlier group from south Gaul that derived largely from the lowest silt levels beneath the quay and formed only a small fraction of the samian assemblage. The very large group of mid/late Antonine central Gaulish samian from Lezoux included a maximum of 185 attributed decorated bowls and 173 identified potters' stamps. The deposition of unused pottery, some of which may have been 30 years old when discarded in the quay fill, may represent the clearance of disused pottery warehouses to the north of the quay when the area was being redeveloped. Rhodes (1986: 203) suggests that it is unlikely that a fully operational warehouse would have contained large quantities of old stock, reflecting my comments regarding shipments.

Bird (1986: 142) challenges the notion that the deposit represents old stock from nearby shops or warehouses, or damaged goods that had been dumped nearby. She suggests that, in contrast to the low average number of stamps per potter, the relatively high numbers of stamps of certain potters and the uniformity of some of the plain forms, notably Dragendorff form 31 bowls, indicate that this unused samian formed part of a single consignment dating within the period *c.* AD 170–80. Stamps of a number of potters occur several times on plain vessels, which, when compared with the Museum of London collections, underlines the close uniformity of the group and the probability that it represents a single consignment destined for dispersal elsewhere.

The close contemporaneity of the large group of east Gaulish products from Trier and Rheinzabern has been interpreted as a second, later consignment dating to the second quarter of the 3rd century AD when relatively little samian is known to have been imported into Britain, thus providing important evidence for this late trade. The deposit might be contemporary with the construction of the quay as evidence suggests that the samian formed part of a

deliberate infilling of the 3rd-century AD quay during the construction phase.

This samian has been described as new and unused because of two diagnostic features: sand and clay particles from the kiln stacking still adhering to the bases; and red slip covering the trituration grits on the Dragendorff form 45 *mortaria* (Bird 1986). Neither diagnostic can be applied to the Pudding Pan assemblage as the foot-rings have borne the brunt of attrition and sheering in the recovery process and are frequently missing, while no samian *mortaria* have yet been recovered from the site.

The rare discovery of two complete and unblemished samian lamps confirms the impression that a considerable proportion of the damaged vessels were broken as a result of being thrown away rather than the reverse (Rhodes 1986: 199). Other sherds of similar date and type from within the deposit bear signs of considerable use and wear so the fill includes both used and unused pottery from both groups. In common with Pudding Pan many of the unused plain forms are both stamped and complete or virtually complete while discrete groups are wide ranging in date. However, New Fresh Wharf includes a far higher proportion of decorated wares than is usual, the only similar ratio coming from the Roman 'signal station' or mausoleum site at Shadwell (Douglas *et al.* 2002), which includes a number of the same potters. This suggests that plain and decorated wares arrived separately although this is highly speculative.

Other assemblages of unused samian include a dozen or so unstratified, unused basal sherds of late 1st-century AD south Gaulish samian recovered from waterfront excavations at Bitterne Manor, Bitterne, Hampshire in the late 1930s (Rhodes 1989: 51). In addition, a deposit of 37 unused samian vessels from Verulamium Insula XIV has been reinterpreted as stock from a stall beside the street (Millett 1987: 104). Given the proximity of the waterfront it has been speculated that the late 2nd- to early 3rd-century material from Wellington Row, York relates to a warehouse deposit, or discarded stock or cargo (Monaghan 1998: 1115). On the site of the London Bridge excavations of *c.* 1830, Kempe believed he had discovered the remains of shops, including a bakery destroyed in a fire either during the Boudican rebellion or possibly in the later Hadrianic fire. The description of burnt samian in association with molten glass is reminiscent of one of the pottery shops at Colchester (Hull 1958: 153–8; Rhodes 1986: 200) and of the cellar finds at Burghöfe and at Kempten in Germany (Rhodes 1989: 53).

The evidence from the pottery shops at Wroxeter, Colchester and elsewhere indicates that other specialist and perhaps moderately expensive items that were sold alongside samian could have been transported with it (Rhodes 1989; Willis 2005: 6.1). Besides other types of pottery, including *mortaria* and coarse wares (Castleford, Burghöfe), other fine wares (Colchester, Burghöfe) and lamps (Colchester), items sold alongside samian include glassware (Colchester, Burghöfe and Kempten), iron- and bronzework (Kempten and Burghöfe) and hones (Wroxeter and New Fresh Wharf), while the seeds found at Colchester indicate that provisions may have been another accompaniment. It is possible that these objects were transported alongside samian and they provide some indication of what items might have accompanied the Pudding Pan samian. In addition, inscriptions indicate that wine, metals and even cloaks were sometimes traded alongside pottery (Rhodes 1989: 46). This appears to confirm that the *mortaria* and lamps recovered from the Kentish Flats could have constituted part of the various cargoes. These comparisons also confirm the evidence from wear analysis of the Pudding Pan assemblage that samian was usually stacked, often in batches that were either tied or crated together. Comparisons of the stamps from these sites with those from Pudding Pan produce some quite remarkable results, which are discussed below.

The range of products and their dispersal around Britain

Given the tremendous output of the samian industry and the considerable number of contemporary potters not represented in the recovered assemblage (see Stanfield and Simpson 1958: 293) it is difficult to determine the nature of the buried remains. However, analysis of the range of vessels found on terrestrial sites throughout Britain bearing stamps also found at Pudding Pan provides some indication of the range of forms produced by each potter (**Table 16**). This will confirm the known range of forms produced by the Pudding Pan potters that reached Britain. Moreover, given the limited range of products imported at any one time it might provide some indication of the possible destination of the Pudding Pan consignment and also shed more light on the extent and composition of any buried remains.

Three of the potters whose stamps were found at Pudding Pan, Atilianus i, Saturninus ii and Paullus v, exported a range of at least five different forms all of which included Dragendorff forms 31, 31r, 33 and 79. The four potters that produced at least four forms, Cintusmus i, Maccalus, Primanus iii and Severianus i, exported similar ranges of forms. Forms 31 and 33 are undoubtedly the most popular combination of vessels produced, as reflected in the Pudding Pan assemblage.

Relatively few of the potters are represented by their full repertoire of forms in the assemblage recovered to date from Pudding Pan. Paullus v, for example, is known to have exported at least five forms to Britain but appears on only three forms at Pudding Pan. Similarly, Primanus iii and Severianus i appear on two of their four known forms and Aestivus, Albucianus and Caratillus ii each appear on only one of their three known forms. Moreover, many of the forms are represented by solitary specimens of each potter, which suggests that more specimens of these types at least remain buried. In addition, 14 of the Pudding Pan potters are represented on only one form even when terrestrial finds are taken into consideration, which implies specialization in just one form. Eighteen of the potters whose stamps have been found at Pudding Pan are known also to have made decorated bowls at Lezoux, including Arncus, Atilianus, Caletus, Caratillus, Cintusmus, Gaius, Iullinus, Iustus, Marcus, Mascellio, Maternus, Mercator, Namilianus, Paullus, Primanus, Sacrillus, Saturninus and Sextus (Smith 1907; *contra* Haverfield 1911: 116; Stanfield and Simpson 1958: 293; *NOTS* 2008–12). This might suggest that we should expect to find the decorated wares of these potters amongst this consignment. It is possible but there is no evidence to suggest that each consignment contained the full repertoire

	Samian form								
Potter	**31**	**33**	**31r**	**38**	**79**	**79r**	**80**	**Lud Tf**	**No. of forms**
Atilianus i	2	4	0	1	17				5
Paullus v	0	0	1	0	8				5
Cintusmus i	0	12	3	3					4
Maccalus	4	0	1	1					4
Saturninus ii	18	4	21		1	1			5
Primanus iii	0	0	3				1		4
Maior i	1	0	7						3
Maternianus i	1	20	2						3
Severianus i	0	7		0		1			4
Aestivus	18	0		0					3
Albucianus	13	0		0					3
Iullinus ii	0	0		2					3
Caratillus ii	0	0			11				3
Quintus v	2	9			1				3
Arncus	3	11							2
Caletus	13	14							2
Decmus ii	3	19							2
Gippus	1	0							2
Maternus iv	1	7							2
Patto	6	3							2
Genitor ii	1		1						2
Martinus iii	0				3				2
Iustus ii		0	4						2
Macrianus		0	1	0					3
Mainacnus		3	11		0				3
Sextus v		0		3	0				3
Namilianus		6		1					2
Sacrillus		0			4				2
Marcus v			2		0				2
Belsa (Arvenicus)			0			3			2
Catianus ii					2		7	2	3

Table 16 Range of forms produced by Pudding Pan potters from British sites (after Smith 1909). The figures represent the numbers of each type that have been found at Pudding Pan, thus '0' indicates examples found elsewhere but not at Pudding Pan

of each potter and, as stated, plain bowls appear to have been substituted for decorated bowls in this instance. Willis (2011: 198) suggests that the role they had performed may have related to a fashion that was losing popularity.

This evidence might provide some clues as to what remains buried but equally it appears to verify the random nature of supply, whereby traders took whatever was available. The wide-ranging quantities of vessels listed on the graffiti 'tally lists' from La Graufesenque appear to confirm a somewhat erratic production with numbers of vessels fired in one kiln ranging from 30 'Broci' to 183,150 'Acitabli' (Hermet 1934: 347). Moreover, given that the composition of consignments seems to have been driven by supply rather than demand and that stamps appear to have been used to identify potter's work only at the production site, there is no evidence to suggest that an individual potter's work would have been particularly sought after (see Millett 1993: 418; Weber 2013: 207). There seems no reason, therefore, to expect that a consignment would include the complete repertoire of a particular potter. In fact, it seems more likely that even potters who are known to have made several different forms would have concentrated on a limited number of forms for a particular kiln firing. It does seem unlikely, though, that a consignment would contain solitary examples of some potters' products.

Over 200 fragments of the so-called 'bordereaux d'enfourenement' or tally lists have been recovered at La Graufesenque, but the cryptic and fragmentary nature of the graffiti makes interpretation difficult. For example, the nomenclature of the vessels on the graffiti appears to be a hybrid of Latin and Gallic (Hermet 1934: 347). These tally lists comprise a series of potters' names with names, sizes and quantities of vessels scratched on the surface of samian vessels, seemingly enumerating the vessels delivered by various potters to be fired in the same kiln. The tally lists also give the impression that some potters specialized in certain forms and the order in which the vessels are listed appears to reflect the way in which the kilns were loaded.

	Wroxeter gutter	Pudding Pan
Scotland	0.7 (4.9)	0.0 (3.2)
Hadrian's Wall	3.4 (10.2)	7.7 (11.6)
Hinterland forts	3.3 (9.9)	8.6 (16.8)
Corbridge	4.5 (11.5)	7.5 (8.5)
Silchester	3.8 (12.7)	7.9 (13.7)
Wroxeter	5.5 (10.5)	4.6 (13.7)
Leicester	5.5 (13.9	5.2 (15.7)

Table 17 Percentage of dies in common and, in parentheses, other dies of the same potters (after B.R. Hartley 1972: 27, table II)

Comparison of the tally lists shows that the products of various potters were fired in communal kilns and indicates that each kiln operator employed a limited number of fixed loading patterns to arrange the vessels in his kiln. If so, potters may have had to utilize several different kiln operators in order to have their entire range of products fired (King 1980; Polak 1998; Dannell 2002). Consequently, plain and decorated wares may well have been fired separately by kiln operators who specialized in either type, which could explain their separate transportation.

Potters' stamps

It has been suggested that the probability of two contemporaneous assemblages producing a stamp of the same die, or even the same potter, is very low so the absence of particular stamps might not be particularly significant and there might be little overlap even between large assemblages (Millett 1987: 96). This suggests that inferring the nature of the buried remains at Pudding Pan from detailed analysis of the recovered assemblage is problematic. Moreover, even groups closely associated with trading, such as the pottery shops and dockside dumps, ordinarily contain only modest numbers of 'batches' from particular workshops (Millett 1987; 1993; Dickinson and Hartley 2000). Thus even lists of potters from samian assemblages from adjacent areas of forts and towns are unlikely to display similarity (Willis 2005: 10.3).

However, this is not borne out when comparisons are made between the Pudding Pan assemblage and a variety of other similarly dated sites. For example, B.R. Hartley (1972: 27) found the percentage of dies from Pudding Pan in common with similar assemblages 'quite remarkable, considering the relatively small number of dies involved both at Wroxeter and Pudding Pan' (**Table 17**). This table shows that the mean number of dies in common between Pudding Pan and a range of site types is 5.9 per cent while the mean number of stamps in common is 12.1 per cent. This not only contradicts the notion of a general heterogeneity in potters' stamps from different sites but also emphasizes the broad distribution of the products of the Pudding Pan potters. Moreover, this must provide some indication of the scale of production of these potters and also the frequency with which other consignments from these particular kilns reached their destinations.

With the completion of the work to enhance the known assemblage from Pudding Pan the number of potters from Pudding Pan in common with Corbridge and Wroxeter has increased whilst comparison with the potters from New Fresh Wharf produces a quite remarkable result (**Table 18**). The percentage of potters from Pudding Pan in common with Wroxeter has now increased from 13.7 per cent to 20 per cent, and at Corbridge it has increased from 8.5 per cent to 14 per cent. However, the comparison between Pudding Pan and New Fresh Wharf reveals that there are 25 potters in common representing 57 per cent of the group found to date at Pudding Pan (see Bird 1986: 140, 146, n. 3). This must provide the strongest indication of the likely destination of the Pudding Pan consignment and emphasizes London's role as an entrepôt from which samian was distributed around the province. In addition, the date range of these particular sites reveals the period of operation of these potters, spanning a period from the mid to late 2nd century AD and implying a long working association between them.

The higher than average proportions of potters' stamps and dies in common also highlights the close contemporaneity of these sites; indeed it is probably a function of that contemporaneity, particularly the New Fresh Wharf deposit, which focuses the date of the Pudding Pan wreck still further. We have previously established that the deposition occurred between AD 180 and 200 but the extraordinary similarity with the New Fresh Wharf deposit, dated *c.* AD 170–80, again supports the notion, from the stamp die dates, that the sinking occurred towards the earlier end of this range. If the sinking did occur later, then it implies not only a close working relationship between these potters but also that it extended over a considerable number of years. Moreover, the extraordinary similarity of the deposits suggests that a not dissimilar consignment from that lost at Pudding Pan reached its final destination. This not only implies an established trading network, which would provide the best evidence yet for the likely destination of the Pudding Pan shipment, but also either provides clues regarding the composition of the original consignment, or suggests that this was an established trading pathway at this time for these potters. Future discoveries from Pudding Pan may well include more products made by potters represented at New Fresh Wharf (Bird 1986).

In addition, the relatively high number of stamps of certain potters from Lezoux found at New Fresh Wharf is reminiscent of the Pudding Pan assemblage where, although the average number of stamps per potter is considerably higher, there is considerable disparity in the numbers of stamps of different potters. For example, there are comparatively large numbers of stamps of potters such as Saturninus (45), Caletus (27) and Atilianus (24), whereas 12 potters are each represented by only a single stamp. Of

Site	Wroxeter *c.* AD 165–75	New Fresh Wharf *c.* AD 170–80	Corbridge *c.* AD 180
Aestivus			X
Albucianus		X	
Arncus	X		
Asiaticus ii			
Atilianus i		X	
Belsa Arvenicus		X	
Caletus		X	
Campanus ii			
Caratillus ii			
Cassius ii			
Catianus ii	X		
Cintusmus i		X	
Cracinus			
Crispinus ii			
Datius			
Decmus ii			
Doeccus i			
Firminus i-Arean			
Gaius i			
Genitor ii		X	X
Gippus		X	
Iullinus ii	X	X	
Iustus ii	X	X	
Maccalus		X	
Macrianus	X	X	X
Mainacnus			
Maior i		X	
Marcellinus ii			
Marcus v	X	X	X
Martinus iii		X	
Mascellio i		X	
Maternianus i		X	
Maternus iv	X		X
Maulianus			
Mercator iv		X	
Namilianus		X	
Patto			
Paullus v	X	X	
Primanus iii	X	X	
Priscus iii			
Quintus v		X	
Sacrillus		X	
Saturio ii			
Saturninus ii		X	X
Severianus i		X	
Sextus v			
Vitalis i		X	
Total	**9**	**25**	**6**
Percentage of potters in total assemblage that are common to Pudding Pan (%)	**20**	**57**	**14**

Table 18 Comparison of stamps from Pudding Pan with those from Wroxeter, New Fresh Wharf and Corbridge

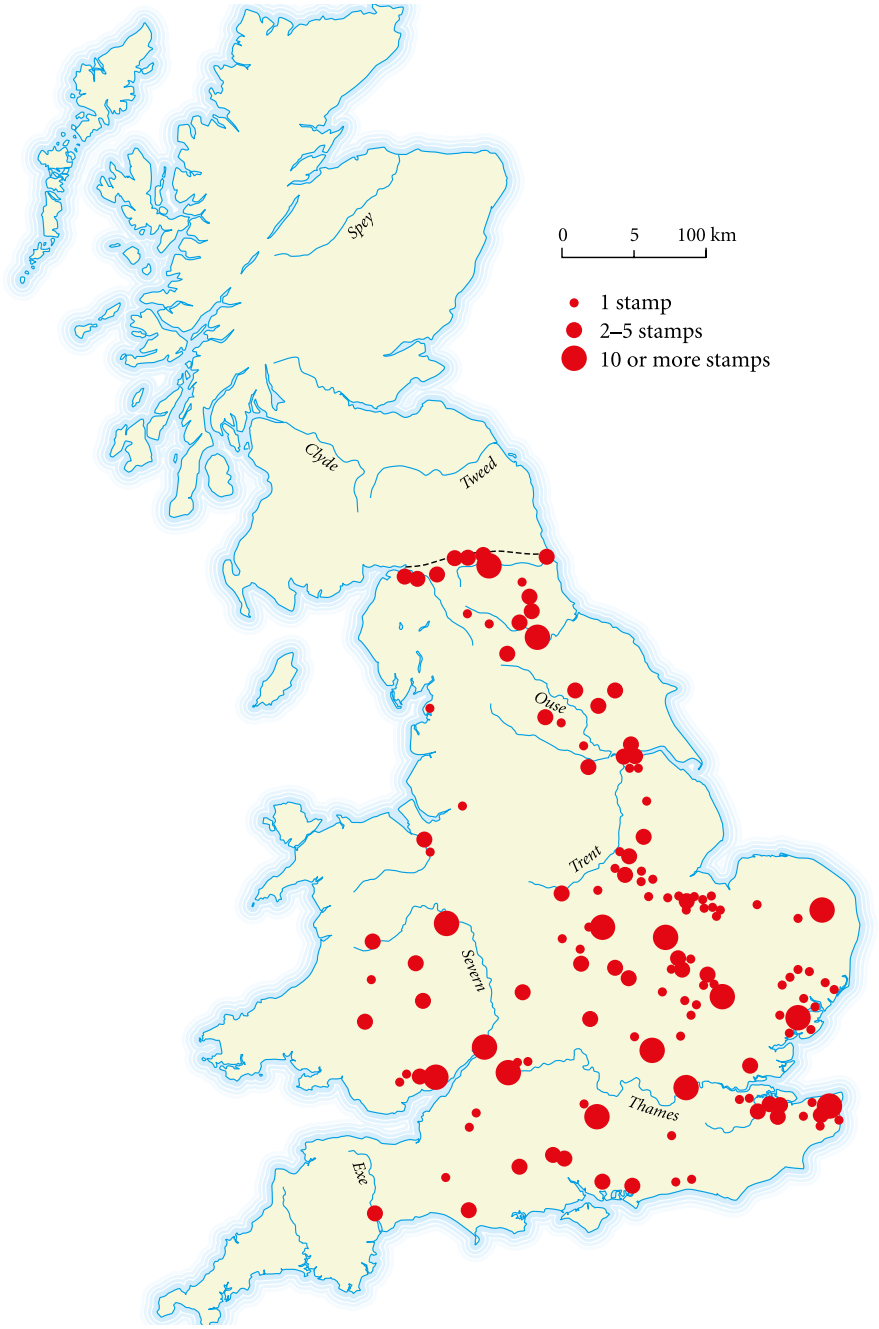


Figure 91 The British distribution of stamps found in the Pudding Pan assemblage (after B.R. Hartley 1972: 28, fig. 2B)

course considerable quantities of the latter potters' products could remain buried on the seabed at Pudding Pan but the similarity with the New Fresh Wharf deposit is striking. It must confirm that the maker of the pot was of little consequence to either supplier or end user and confirms the random nature of supply. The lower average number of stamps per potter on both these sites when compared to kiln and other Continental sites must indicate that these consignments represent the contents of more than one particular kiln, which could also account for the presence of solitary stamps that would otherwise be difficult to explain. This would appear to suggest that the later 2nd-century AD New Fresh Wharf deposit is that of a single consignment (Bird 1986: 142) rather than debris from disused warehouses (Rhodes 1986: 203). More recent analysis (Monteil 2005: 119–21) has suggested that the deposit may in fact represent two depositions of central Gaulish samian with importations continuing into the first decades of the 3rd century AD. However, this does not impact on the proposed dating of the Pudding Pan assemblage as the two 'beacon' exported products of the first half of the 3rd century AD according to Monteil (2005: 121), Dechelette form 72 and Dragendorff form 45, are not present in the recovered assemblage.

The British distribution of stamps common to Pudding Pan indicates that central Gaulish samian ware was distributed more or less evenly throughout Britain in the Antonine period with the notable exception of Scotland, beyond Hadrian's Wall, where there is a complete absence, which suggests that Scotland was largely unoccupied at this time (B.R. Hartley 1972: 29) (**Fig. 91**). This pattern of distribution is based on 46 dies (B.R. Hartley 1972: 27) but will not have changed appreciably with the subsequent increase in the size of the assemblage, as its composition has not radically altered as shown in a previous chapter. If, as

now seems clear, London was the final destination of the Pudding Pan consignment then the distribution of stamps provides some insight into the considerable distribution network as all areas of Britain appear to have had easy access to central Gaulish samian ware in the Antonine period. In contrast, east Gaulish wares broadly tended to be distributed to sites within easy reach of ports on the east coast rather than those inland or in the west (B.R. Hartley 1972: 23).

Rhodes' suggestion (1989: 50) that the 'obvious contender' as the destination port of the Pudding Pan ship was the fort of Reculver seems unlikely. Aside from the dating discrepancy (Rhodes 1989: 50), the ship seems to have arrived from northern France and had therefore already passed through the Wantsum Channel (Walsh *et al.* 2013: 95). The likely site of the 'wreck' thus appears to indicate that the ship had already passed the fort by some distance and is more likely to have been heading towards either London or the northern frontier. It seems inconceivable that a ship could have lost control and been driven past Reculver, sited as it was at the northern end of the Wantsum Channel (cf. Moody 2008).

The absence of decorated wares in deposits at Burghöfe and Corbridge might suggest the northern frontier as the likely destination for a consignment of plain wares since no similar assemblages have been discovered in London to date. This absence could be accounted for, however, by the hierarchical nature of the Roman army rather than by a specific supply as decorated wares have been discovered in other areas of these sites. In addition, it seems that plain and decorated samian wares could well have been imported separately and combined at the quayside to the requirements of the end user (see Weber 2013:199). Thus the similarities between the Pudding Pan assemblage and that found at New Fresh Wharf, plus the fact that many of the Roman lamps and black-slipped wares discovered in Britain have come from the waterfront at London, strongly support the notion both of a close association between the two sites and of London as the likely destination.

Conclusion

In conclusion, this analysis suggests that the Pudding Pan assemblage is but a fraction of a bulk consignment of plain samian wares, most of which remains buried on the Kentish Flats, rather than a significant element of a secondary cargo, the so-called piggy-back trade. On balance, the absence of decorated wares in this sample seems to be a genuine reflection of the composition of the original cargo as supported by the substitution of large plain ware bowls for large decorated bowls. As the composition of consignments arriving in Britain seems to have been determined by the availability of products at the supply end rather than by the demands of the consumer, the varying characteristics of samian assemblages at different site types must reflect the mixing of consignments after arrival in the province to the requirements of the end user.

It is thus perfectly plausible to suggest that there was a regular and substantial cross-Channel trade in bulk consignments of plain and decorated samian wares which may or may not have been transported separately, determined by the availability of products. In this light, rather than representing an anomalous, one-off cargo the Pudding Pan assemblage could in fact represent the norm – hitherto unrecognized – in the cross-Channel mass transportation of plain samian wares. The wide-ranging distribution of central Gaulish samian ware throughout Britain in the Antonine period obscures the likely destination of the Pudding Pan consignment but the remarkable correlation between the potters' stamps from New Fresh Wharf and from Pudding Pan, as well as the similarity of other often rare items such as lamps, which are common to both sites, surely points to London as the destination of this ill-fated cargo.

In the absence of similar maritime evidence it is difficult to prove that the Pudding Pan assemblage represents a typical consignment, representative of a trade in samian wares that has hitherto been masked by other factors. If, however, this is the case, the factors that might explain the overwhelming misconception that has arisen from other related evidence must be explored. The most obvious factor is the almost complete absence of evidence for samian transportation in northern European waters bar Pudding Pan, and the minimal evidence for samian transportation in the Mediterranean. Even the seemingly universal evidence from Mediterranean wreck sites which appears to indicate that samian was transported only as a secondary cargo of combined plain and decorated wares is not as clear cut as it at first appears. Samian is found on very few maritime sites in any significant quantities, representing a minute fraction of the tremendous volume of samian that was produced and distributed by the Gallic kilns.

It could justifiably be argued that the bulk of this production was destined for northern markets on the Rhineland and in Britain (Middleton 1980: 189) so one would not expect to find much evidence for this trade in the Mediterranean. Indeed, Gaulish samian seems to have formed the basis of long-distance trade in the northern provinces. However, even if we set aside the transportation of Gallic samian to Italy (e.g. Atkinson 1914) and Spain (e.g. Nieto Prieto *et al.* 1989) we cannot easily dismiss the wide distribution of Italian *sigillata* around the Mediterranean (Fulford 1987: 70), nor the significant quantities of samian-equivalent red-slipped wares that were transported throughout all regions of the Mediterranean, including Eastern *sigillata*, and the massive trade in North African wares in the later Empire (Hayes 1972), which have left little trace in the maritime archaeological record.

For example, Fulford (1987: 63) found that '*at least* three-quarters (and perhaps as much as 80–90 per cent) of the later Roman pottery assemblage at Ostia is of African (Tunisian) origin', implying that this resulted from the movement of grain, yet there is no concomitant representation in the maritime archaeological record. In addition, there is very little similar proxy evidence found in Italy for the massive trade in grain from the east Mediterranean: negligible quantities of *amphorae* and tablewares such as Eastern *sigillata* A are found at Ostia. Moreover, the wide distribution of African *sigillata* throughout the Mediterranean region occurred during the 3rd and 4th centuries AD, when it is generally accepted that Egyptian grain was no longer of importance to Rome. Indeed, there is no irrefutable evidence that a general trade

in basic foodstuffs was more important than raw materials, manufactured goods or luxuries (Fulford 1987: 70).

Evidence for the transportation of samian in northern European waters is even more seriously lacking as, besides Pudding Pan, no significant quantities of samian have been found on any maritime site. Thus direct evidence for the so-called piggy-back trade in samian is severely limited. It could be that, rather than the Pudding Pan bulk consignment being aberrant, it is the evidence from Mediterranean wreck sites that is anomalous and that there is a more prosaic explanation for the absence of evidence for the more usual trade in bulk consignments of samian. This hypothesis will be explored further in the following chapter in the context of existing Mediterranean shipwreck data in which *amphorae* are absent.

Chapter 8
Comparison between Pudding Pan and Culip IV

> Another disreputable class includes those who buy whole lots from wholesalers to retail immediately. They would not make a profit unless they indulged in misrepresentation, and nothing is more criminal than fraud … Commerce should be considered vulgar if it is a rather small affair. If it is extensive and well-financed, importing many products from all over the world and distributing them to many customers honestly, one should not criticize it severely (Cicero, *On Duties* I.150–2).

The paucity of wreck sites from around the Empire that contained significant quantities of samian or equivalent wares has been established (Chapter 2). The few sites that have been discovered account for a tiny fraction of the acknowledged massive trade in these tablewares (Fulford 2007: 54). Of the *c.* 1,200 wreck sites catalogued by Parker (1992a) only 40 sites contained samian and only six of these, besides Pudding Pan, contained sufficient quantities of samian to indicate that it represented cargo. Looters have effectively destroyed four of these sites, while the fifth was poorly published, and then only in Croatian.

Only the Culip IV site avoided the attention of looters, was properly excavated and fully published (Nieto Prieto 1985; 1986; 1988; Nieto Prieto *et al.* 1989). If, as the evidence now suggests, Pudding Pan represents a bulk consignment of samian wares, it not only emphasizes the absence of similar evidence from the heart of the Empire but also accentuates the importance of the Pudding Pan assemblage. Where are the bulk consignments of samian that failed to reach their destinations around the Mediterranean? This chapter will compare the only two significant maritime samian assemblages, from Culip IV and from Pudding Pan, to provide fresh insights both into the original Pudding Pan consignment and into the nature of samian trade.

Comparisons between these sites are not straightforward as Pudding Pan is more than a century later in date, so the samian assemblages are very different and derive from different regions. The Culip IV samian came from La Graufesenque and, as we have seen, the most effective comparisons can be achieved only between samian assemblages from the same region. Moreover, the samian on Culip IV was clearly supplementary to an *amphora*-borne cargo, thus supporting the notion of a piggy-back trade.

There is no guarantee, furthermore, that evidence from the core of the Empire is applicable on the periphery where the mechanics and mechanisms of samian transportation may have been quite different. Still, even given these reservations the evidence from Culip IV can still provide new insights into the interpretation of the recovered assemblage from Pudding Pan and the nature of samian trade. Like Pudding Pan, the evidence from this important site has not yet been fully utilized, but for very different reasons. Pudding Pan has been neglected until now largely because the site has not been located so its nature remains obscure, whereas Culip IV has been extensively published but primarily in Catalan (see Millett 1993: 415).

Location and general character of Culip IV

Cala Culip is situated on the north-east coast of Spain at the foot of the Pyrenees. It was one of the few refuges on this coast, at a dangerous point for navigation and one that would probably have been avoided had it not been in a

location uniting the north and south of the western Mediterranean. Thus Roman ships coming from the mouth of the Rhône and bypassing the Pyrenees passed Cala Culip while rounding the Cap de Creus en route to Empurias. The 20 shipwrecks dating from the classical period that have been found in this region bear witness to the frequency and difficulty of navigation.

Six wrecks have been found off Cap de Creus at Cala Culip: five (Culip I–V) date from the Roman period and one (Culip VI) from the medieval period. Only two of these wrecks (IV and VI) have avoided the attention of looters, as they were hidden from view by thick seaweed growth. In contrast, elements of the other wrecks have been clearly visible from the surface for some considerable time. For example, a tour guide of the Costa Brava coast, published in 1950, stated that *amphorae* could be seen on the seabed in this area – they have, unsurprisingly, subsequently disappeared (Nieto Prieto *et al.* 1989: 17). The deliberate destruction of these sites is emblematic of the fate that has befallen many of the ancient shipwrecks that have been discovered in the Mediterranean.

Culip I, which has been almost completely looted, and Culip III, which was partially looted, contained Pascual type 1 *amphorae*, while Culip II has been so badly destroyed by looters that it is impossible to ascertain what cargo was being carried. Culip V has not been properly investigated but appears to have been carrying Pelichet type 46 *amphorae*. The cargo of Culip IV, which sank between AD 69 and 79, consisted primarily of samian from La Graufesenque as well as Dressel 20 *amphorae* and fine-wall wares from Baetica. It appears to have landed on a bed of seaweed that continued to grow, protecting the deposit. Consequently, when it was discovered and excavated, between 1984 and 1988, it was covered by a 0.8–1.0m thick layer of seaweed that hid it from the attention of divers, thus preventing its exploitation (ibid.: 28, 30). Culip VI contained medieval ceramics dating from the 14th century. There are indications of another shipment of Dressel 1 *amphorae* but no systematic search has yet been undertaken to locate the wreck.

To date the work has been centred on wrecks I, IV and VI, which are grouped at the bottom of the cove in an area of only 60 × 25m. This is only a fraction of the area of Cala Culip, so it seems very likely that future prospection will reveal further wrecks. The high concentration of wrecks in such a small area highlights the difficulties in prospection for similar sites. That this relatively small area of 1500m^2 could contain three ancient wrecks corroborates not only the use of the cove as a refuge (ibid.: 19) but also the notion of accident 'black spots' around shipping hazards that claimed multiple victims, as appears to have occurred at Pudding Pan. The Culip IV site contained the largest assemblage of samian yet discovered on a shipwreck. While it is approximately 100 years earlier in date than the main Pudding Pan assemblage and from a different production centre, so the potters' stamps are quite different, there are similarities between the two sites that could shed more light on the nature of the original Pudding Pan consignment and on the nature of samian transportation, thus making comparisons worthwhile.

Despite the fact that heavy swells had moved the shallow deposits, including rocks weighing 3–4kg, the samian was in surprisingly good condition with clean break lines and no signs that the pieces had been rolled. This seems to have resulted from the vessel landing on the seabed in an inverted position, so that the hull of the vessel provided a protective covering for the cargo (ibid.: 24). There are several indications that the ship had overturned during the sinking as the *amphorae* and other heavy objects that were presumably placed in the lower part of the hold were found deposited on top of the samian, the fine-wall pottery and the other delicate objects that logically would have been placed uppermost in the ship. In addition, most of the ceramic beakers were upside down with the foot-ring uppermost and the rim facing downwards. The lower layers of the deposit were in smaller pieces owing to the initial impact, the pressure of the deposited cargo and settlement. The fragmentation of the cargo, including the shattering of the *amphorae*, had reduced the volume of the cargo and the smaller fragments had fallen to the bottom of the deposit (ibid.: 29). This deterioration process eventually achieved equilibrium as the deposit stabilized.

These characteristics are reminiscent of the Pudding Pan assemblage, where the majority of the pots were also inverted and where there is similarly little evidence of post-depositional movement, despite the fast-flowing waters of the outer Thames estuary. However, the conclusions drawn from this are quite different from those at Culip IV: the clean break lines seem symptomatic of a well-buried deposit disturbed only when struck by the oyster dredges. This is corroborated by the minimal internal wear and the partial external wear to the lower surfaces evident on most of the pots, as also noted at Culip IV. The lack of post-depositional disturbance implies an inherent cohesive stability in deposited cargoes of tablewares, which bodes well for Pudding Pan.

At Culip IV the seaweed protected the deposit like a 'watertight box'; once removed the deterioration process was reinitiated. The samian and fine-wall wares had survived much better owing to the high temperatures to which they had been subjected, but the *amphorae* were slowly disintegrating back into a clay-like state. In contrast, apart from heavy marine encrustation the *amphorae* recovered from Pudding Pan were in almost near-pristine condition, suggesting that the *amphorae* from Pudding Pan had been better protected as a result of deeper burial in protective silts or in less corrosive conditions. The fine wares from both sites were damaged by the crystallization of salts on the surfaces of the pots that caused crazing of the slip (Nieto Prieto *et al.* 1989 46–7).

At Culip IV the impression that the ship turned upside down was supported by the abundance of Dressel 20 *amphorae* spikes found in the higher levels of the deposit (ibid.: 40). In the case of the Pudding Pan shipment, the abundance of *amphorae* rims and handles and complete absence of spikes would suggest that the ship had remained upright. It seems, therefore, that the samian vessels were transported upright on the Culip IV ship but inverted on the Pudding Pan ship. The transportation of samian in more stable, inverted stacks would seem more logical and is supported by evidence from terrestrial sites but it is not yet clear how pottery was stacked in ships.

An ancient relief in the Museum Lamourguier of Narbonne (ibid.: fig. 158) shows two people carrying what

appear to be ceramics bundled in netting up a gangplank on to a ship. This practice of transporting ceramics still continues in Spain, but no evidence for netting was discovered at Culip IV (ibid.: 231). The Neumagen monument shows *amphorae* protected with jackets of coiled straw, but the Narbonne relief shows no protective straw around the vessels being loaded. Pottery could have been placed in piles in the hold as observed on the Grand Congloué wreck, but it seems logical that pottery would usually have been conveyed in some form of receptacle, such as the crate found at Pompeii (Atkinson 1914; Evans 1981: 526–8). The wear patterns on the Pudding Pan vessels and the lack of uniformity in the Culip IV deposit seems to support the use of crates. The Culip IV excavators looked carefully for packaging and although they found small thin strips of wood they were unable to prove that they were parts of packing cases. The similarity between the samian from Culip IV and the samian contained in the crate at Pompeii, which must date to the year AD 79, suggests a close chronological proximity between both sets (Millett 1993: 416; Nieto Prieto *et al.* 1989: 235).

The well-known consignment of pottery in the charred remains of the wooden crate found at Pompeii (Region VIII.5.9) comprised 90 south Gaulish decorated samian bowls from La Graufesenque and 37 pottery lamps from northern Italy. These were seemingly unused and appear to have been arranged in order in a wooden box. This combination of geographical sources indicates that the shipment did not arrive direct from the places of manufacture and that fine wares were being imported to Italy from abroad. A wholesaler must have been involved assembling mixed cases to clients' requirements from Gaul, a source not mentioned by Pliny. It is likely that this batch was manufactured in the months before the destruction of Pompeii, which indicates contemporaneous forms made by potters working in association. If so, it also shows the extent and nature of decorated motifs at the disposal of such a group. Finds from Ostia support the notion that, before the Flavian era, Gaul had replaced Italian producers in supplying the decorated samian needs of the Italian market (Atkinson 1914; Evans 1981: 527).

The vessel

Further evidence for the inversion of the Culip IV ship at the time of the sinking comes from the absence of any of its principal elements, such as the keel, surviving under the deposit. Only a few insignificant pieces of the hull were recovered. This can be accounted for by the ship having turned upside down at the time of sinking, as then neither the cargo nor the sediments that covered it would be able to protect the hull from the actions of the sea or from the macro and micro fauna whose combined efforts had almost completely destroyed the wood (see Nieto Prieto *et al.* 1989: fig. 150). Remnants of any deck structures should have survived underneath the cargo as a result of inversion, but as none were found it must be assumed that none existed. As the Pudding Pan vessel appears to have sunk upright a significant proportion of the vessel may have survived pinned under the cargo.

Fragments of three *tegulae* and two *imbrices* of types associated with deck structures on other Roman wrecks (see Rule and Monaghan 1993) were discovered on Culip IV. This meagre number of tiles could not, of course, cover the roof of a shelter on the boat although they would have been sufficient to form a flat surface on which to ignite a fire in the galley of the boat, with the *imbrices* forming pan supports. Evidence for fire on the convex surfaces of the *imbrices* supports this notion (Nieto Prieto *et al.* 1989: 217, fig. 153.6). Culip IV must, therefore, have been either an open vessel or have had minimal cover, which is consistent with the small dimensions of the boat and would explain the deposition of material to the west of the main deposit as some cargo spilled out as the vessel overturned (ibid.: 209–12).

The wood that did survive was concentrated in a line extending approximately parallel with a line of submerged rocks, which indicates that the longitudinal axis of the boat was in a similar alignment, with an orientation of north-east to south-west. The deposit extended only some 5m north–south and 3m east–west, supporting the view that this was a small boat. Of the various wooden elements of the vessel that had survived, all but one of the wedges were made from the wood of the olive tree, other elements were made from white pine and the hull fragments and the remaining wedge was made from red pine. These surviving parts display deliberate selection of wood to construct each element of the boat as in each case, except that of one wedge, a different wood has been used. Red pine is present in numerous old vessels (Kyrenia, Cavaliére, Dramont A, Planier III, Nemi, Yassi Ada I) constituting the hull of the ship, perhaps for its impermeability, great mechanical resistance, flexibility and workability as much as for its abundance in the Mediterranean river basins. In addition, wood from the olive tree has been used to make wedges on both the Mahdia and the Bourse boats and white pine was used to make the 'quadernes' of the Cavaliére and Kyrenia boats (ibid.: 209–12). Elements of a pump discovered in the southern area indicate that this was the stern of Culip IV with the prow to the north, as a single pump is usually situated in the rear of a boat. Moreover, most of the *tegula* and *imbrex* fragments were found in the northern zone or the suggested prow of the boat, which is the most logical site for a galley, in order to prevent sparks from the kitchen furnace blowing into the vessel or the sails (ibid.: 212–23).

Without the hull it is clearly impossible to determine the precise dimensions of the boat but there are sufficient data to hypothesize. For example, about 200 iron and 10 copper nails used in the construction of Culip IV were found throughout the excavation. A few pieces of lead sheathing were also found but not enough to determine whether the hull had been completely covered or just patched. When plotted during excavation, the nails and the lead plates (ibid.: figs 152.1, 152.2) reflected the longitudinal concentrations of wood but extended further to approximately 8m, with a few nails found at 9m and 10m, and 3m cross-sectionally. Thus it has been concluded that the Culip IV boat had an overall length of between 9.5 and 10.5m with a beam of around 3m. This is not dissimilar to the dimensions of the Cavalière vessel, which had a length of 12.98m and a beam of 4.6m.

If Culip IV's proposed length of 9.5m is divided by the beam dimension of 3m it produces a coefficient of 3.1, which

is equal or very similar to the coefficients of other ancient boats. For example, the Kyrenia also has a coefficient of 3.1, the Laurons II has one of 3, the Yassi Ada II has one of 2.5, while the Yassi Ada I has a coefficient of 3.9. Thus the relation between the two dimensions proposed for Culip IV is within the canon possible for naval architecture in antiquity (ibid.: 224).

The depth of the vessel is also difficult to determine from the remains of the wood but can be approximated from the arrangement of the cargo within the boat. The boat carried a minimum of 76 Dressel 20 *amphorae*. In a single layer with a height of 0.74m this would occupy an area of 24m², which exceeds the proposed length and beam of the Culip IV boat. The *amphorae* must therefore have travelled in at least two layers, as borne out by the fact that a great number of the handles and rims were damaged by rubbing from the bodies of *amphorae* placed between them on a higher level. The transportation of *amphorae* in layers is common, as witnessed in other shipwreck excavations. The *amphorae* of Culip IV, if placed in two layers with each one on the higher level embedded between four of those on the lower level, would occupy an area of 15m² and require a depth of 1.2m.

This is consistent with the proposed length and beam dimensions, and conforms with the rule that the depth roughly corresponds to one third of the beam. This shallow depth is not surprising as the Laurons boat had a depth of 1.4m. The tonnage of the boat and the distribution of the cargo seem to confirm these dimensions. The displacement of the boat at the time of the sinking can be estimated from the weight of the recovered objects, which provides a minimum figure as some of the objects were undoubtedly lost (see ibid.: fig. 156). Assuming that there was no other significant cargo that has disappeared leaving no archaeological trace, and including the oil contained in the Dressel 20 *amphorae*, the cargo was estimated to weigh *c.* 8 tons. An alternative method of estimation using mathematical calculations produced a similar total weight of 7776kg. The close correspondence between these different methods of approximation and with the archaeological deposit confirms that Culip IV was a small vessel (ibid.: 224–5). If, as the evidence suggests, the Pudding Pan vessel had travelled from northern Gaul then it is probable that it was a larger vessel (see below).

Even though the Dressel 20 *amphorae* were present throughout the area occupied by the boat, they displayed a greater concentration in the central zone (ibid.: figs 42, 43). An arrangement of *amphorae* in two layers with 48 *amphorae* on the bottom arranged in four columns of 12 rows and 33 *amphorae* in three columns and 11 rows on top such that each *amphora* on the upper layer sat between four on the bottom layer (ibid.: fig. 157) results in a maximum of 81 *amphorae*. This is very close to the minimum number of 76 *amphorae* found during the excavation, particularly if the consignment was reduced to accommodate the bilge pump and other ship's fittings. When the deposition of the cargo on the seabed was plotted it illustrated the space left between the main Dressel 20 *amphorae* cargo and the prow and the stern of the boat and also the ample space between the upper layer of *amphorae* and the sides of the boat (ibid.: 229), which could have been filled by the secondary cargo.

The Culip IV wreck thus supports the commonly held belief that secondary cargoes were carried to fill gaps around the primary cargo. Contrary to the evidence from Pudding Pan, the Culip IV authors suggest that this piggy-back trade accounts for the tremendous spread of ceramics around the Empire, which created a succession of the major ceramic types in Roman times, not reflecting changes in fashion or demand but resulting from the growth of new markets of economic importance (ibid.: 204). In no way, however, can the limited quantities of samian found as secondary cargoes account for the undoubtedly massive trade in samian wares that is evident from terrestrial sites.

The contents of the vessel

Over 100,000 artefacts were recovered from Culip IV, most of which were small fragments of samian or fine-wall pottery, with better preservation of foot-rings than rims owing to the more robust manufacture of the form, which contrasts with the vessels recovered from Pudding Pan. The high concentrations of material at Culip IV, with a density of up to 5,000 pieces in 1m², presented considerable problems for recording the location of each individual item. The deposit was excavated in sectors rather than the preferred large-area excavation in order to protect it from looting and from storms. The size of each sector was determined by the amount that could be excavated in one season. Moreover, the deposit was assumed synchronic, deposited as the result of a single event, and was therefore excavated in arbitrary layers using photogrammetry to record the large numbers of vessels from which plans could be drawn. The great similarity of objects also presented problems, as there were thousands of pieces of the same type of ceramic of the same form so that it was extremely difficult to differentiate between them in post-excavation analysis. For example, 7,754 fragments of Dragendorff form 18 *paterae* were recovered (ibid.: 30–40).

Great care was taken to distinguish between the constituent parts of the shipwreck. The primary and secondary cargoes that had a commercial/economic purpose were differentiated from the domestic items of shipboard equipment, the crew's personal possessions and spiritual objects such as talismen. Post-depositional intrusions were also identified. Objects were assigned to one of these groups based on the type of object, its frequency of appearance, signs of use, its date and function and its location within the deposit/boat. The main cargo comprised oil from Baetica carried in a minimum of 76 Dressel 20 *amphorae*, some of which were complete though there was also a considerable quantity of fragments. The secondary cargo included at least 1,475 Mayet-type fine-wall vessels that came from the same region as the Dressel 20 *amphorae* (Baetica), as well as at least 1,947 plain south Gaulish samian vessels of the Hermet form 1 and Dragendorff forms 36, 35, 27, 15/17, 24/25 and 18, and a minimum of 729 decorated vessels of Dragendorff forms 29 and 37 and 24 Déchelette form 67 vessels. Also included in the secondary cargo were 42 oil lamps; all but two of these retained legible potters' stamps in the form 'OPPI'. As expected, the forms and potters' stamps of the Culip IV samian assemblage are very different from Pudding Pan, which is approximately a century later in date: only forms 35

and 36 are common to both. This emphasizes the longevity of these particular forms, which as stated are usually unstamped, spanning the later 1st–later 2nd century AD.

The boat also transported seven small *amphorae*, probably carrying the crew's provisions, the fragments of which were very scattered. However, it was still possible to differentiate between one Pelichet 46, two Haltern 70 and a Dressel 2–4 that were positioned in the front half of the ship, another Pelichet 46 and a Gauloise 4 in the rear half and a Gauloise 1 in the stern (ibid.: 59). Evidence for other provisions for the crew included eight bone fragments from three animals: pig, cow and sheep. Two peach stones were also found, suggesting that the boat sank in the summer when peaches are in season.

Other items, perhaps belonging to the crew, included a single south Gaulish samian lamp of the form Hermet 18 that showed signs of use, possibly to illuminate the boat, and another lamp bearing the stamp MYRO; a set of 23 white and blue/black glass gaming pieces similar to those found on other wrecks such as Diana Marina, Spargi and the Madrague de Giens (see **Fig. 2**), and frequently found in terrestrial deposits; various solitary examples of south Gaulish samian forms; an unguentarium of green glass; two 'plaquetes' of stone of trapezoidal section; and two mortars, one of which was complete with two stamps of FORTVNA DOMITIO, while the other, of Italic production and possibly from Campania, was badly broken. These latter items may have come from the galley area of Culip IV or may be intrusions from the use of Cala Culip as an anchorage for many centuries (ibid.: 215–19).

A single fragment of a large Dragendorff form 27 cup dating from the mid 1st century AD was unusual as all the other solitary vessels were represented by several fragments that could sometimes be completely reconstructed. This piece of TS marmorata from La Graufesenque could have been for the use of the crew rather than part of the commercial cargo, although it was found in the prow area whereas the crew's objects appear to have been concentrated in the stern of the boat. It was therefore interpreted as residual, perhaps from a pot that had broken on a previous trip and had subsequently fallen into one of the numerous niches of the boat (ibid.: 235).

Besides the nails, sheathing and pump a variety of metal objects made from iron, copper, lead, brass and bronze were found, including lead fittings for a sail, lead weights for fishing and three ornamental bronze rings that may have been silver-plated; a concretion revealed a void left by a 'pig foot' (nail bar/claw hammer). The most unusual finds were those of conch shells from a species abundant in the eastern Mediterranean, which may have been used for signalling other vessels. This is the first instance of their discovery on an ancient vessel. A goat horn may have been used as an amulet; unlike the other animal bones and crew equipment that were found at the stern of the boat, this was found at the prow and may have been attached to the highest part of the boat (ibid.: 212).

The *terra sigillata*

The Culip IV samian (referred to as *terra sigillata* by the excavators) consignment seems to have been part of a production set, as a high proportion of the various forms were produced by relatively few potters. For example, 92.1 per cent of the Dragendorff form 29 bowls were signed by four potters, and 80 per cent of the Dragendorff form 15/17 dishes were stamped by only one potter, as were 97.7 per cent of the Dragendorff form 18 plates. Furthermore, two companies of potters are represented on 60.3 per cent of stamps on the Dragendorff form 27 cups, two stamps are present on 94.1 per cent of the Dragendorff form 27B cups, while one stamp appears on 82.6 per cent of the Dragendorff form 24/25B bowls (ibid: 203).

These proportions are considerably higher than those from Pudding Pan where, for example, two potters stamped 51 per cent of Dragendorff form 79 plates, four potters stamped 53 per cent of Dragendorff form 31 cups and five potters stamped 62.5 per cent of Dragendorff form 33 dishes. These figures are, nevertheless, still significant when one bears in mind that the Pudding Pan assemblage currently equates to only one quarter of the samian assemblage from Culip IV. Moreover, the total number of potters represented at Pudding Pan and at Culip IV is very similar. If Pudding Pan reflects the pattern of Culip IV it suggests that the buried remains of the consignment will include significant quantities of vessels manufactured by the potters already identified. It also seems to confirm that the Pudding Pan consignment is likewise part of a production set. It is interesting to note that the Culip IV assemblage similarly included solitary examples of some vessels (ibid: 235).

A comparison of the average number of stamps per potter from Culip IV with other sites is instructive. As established in the previous chapter, the enhanced assemblage from Pudding Pan now produces an average of 9.4 stamps per potter, which is higher than the figures from end-user sites in Britain but lower than the figures from Continental sites such as Burghöfe (14.9 stamps per potter) that are closer to the production sites. However, the figure for Culip IV of 29.05 stamps per potter is of a different order of magnitude, comparable only with those derived from production sites (Rhodes 1989: 47; Millett 1993: 418). This would seem to indicate that this consignment underwent very little contamination from other consignments despite the fact that it appears to have been transported from La Graufesenque to Narbonne and thus that the mixing of consignments occurred further along the supply chain.

Like the New Fresh Wharf assemblage, however, which had a low ratio of stamps to potters, there is considerable internal variation, with 23 of the potters represented on just one or two examples but four potters occurring more than 100 times. In common with New Fresh Wharf and Pudding Pan, there appear to be two different groups of potters represented, one group producing very small quantities and the other producing large individual batches (Millett 1993: 418). Millett suggests that the sizeable batches are consistent with a fresh consignment from the production centre, while the individual samples are reminiscent of groups found in the pottery shops. The latter perhaps represent residual stock or reflect a somewhat haphazard production process in which, from the supply standpoint, the work of an individual potter was irrelevant.

The graffiti from La Graufesenque showed that members of a potter's group changed continuously as each set was

produced by a group of potters associated solely for the planning and execution of a specific batch of ceramics. Thus a potter who made a given form for one particular batch could appear signing a different form in the following production set. This challenges the notion of specialization solely in a particular form and reaffirms the idea that the work for each batch was distributed amongst a number of potters. Of the 1,342 vessels from Culip IV that bore legible stamps the name Iucundus was dominant, appearing on a total of 951 or 70.8 per cent of the vessels. It was represented on all the plain forms and in large quantities on Dragendorff forms 18A, 18B, 15/17, 27A, 27B, 24/25A and 24/25B. Thirty-four different potters had stamped the remaining 391 vessels. The fact that 47 potters have already been identified at Pudding Pan from an assemblage one quarter the size must provide the greatest indication that the recovered assemblage is part of a much larger consignment.

In principle, the predominance of Iucundus is in fact neither strange nor abnormal as shown by the graffiti from La Graufesenque. One graffito, Hermet's no. 3, showed that in a batch of 28,420 vessels, more than 15,000 or 55 per cent were stamped by one potter, Masuetus, on seven different forms (Hermet 1934). It is difficult to draw any firm conclusions from the dominance of these two potters, as the evidence is not entirely consistent. For example, two other graffiti from La Graufesenque, Hermet's nos 6 and 7, present a quite different picture. The first records that the kiln contained 33,845 vessels manufactured by at least six potters, none of whom contributed more than 8,500 vessels. The second batch of 30,350 vessels was produced by eight potters, and the most numerous group of 9,000 vessels was manufactured by an association of two potters.

The varying numbers of vessels that each potter brought to the kiln suggests some flexibility within the various associations. It would seem that each potter determined his own capacity of production and the volume of each potter's production was limited, presumably with prior agreement, only by what could fit within the kiln at any one firing. Comparison between the graffiti and the Culip IV assemblage showed that each potter usually produced only one or two different forms and when they produced two forms both were either bowls or plates. Thus, excluding Iucundus who made several forms, each potter seems normally to have made only one type of vessel or possibly two: Hermet's no. 6 graffito shows that Masuetus made 'acitabili' and 'paraxidi', Priuatus only 'licuias', Felix, Teccius and Tritus 'catili' and Deprosagilos 'paraxili' (ibid.; Nieto Prieto *et al.* 1989: 204–5). The limited evidence from Pudding Pan seems to contradict this, as the most common forms produced together were Dragendorff forms 31 and 33, which seem to have been a cup and bowl 'set'. Indeed, the widest range of forms from Pudding Pan was made by Saturninus, whose stamps are found on five, including cups, bowls and plates.

The variety of potters' stamps represented at Culip IV surprisingly exceeds the sizeable number on each graffito from La Graufesenque. This might have resulted from the trader having to buy individual forms from different potters to complement the bought production set to make up complete sets of tableware (Hermet 1934; Nieto Prieto *et al.* 1989: 204–5). This supports the notion that the kiln was loaded with what was available or with what would fit, rather than with complete tableware sets in mind. It also supports Rhodes' hypothesis (1989) that the ratio of potters to stamps increases with distance from the kiln as 'sets' are mixed.

The basic techniques, problems and solutions adopted in the Roman period by the potters of La Graufesenque can be verified in relatively modern times through comparison with pre-industrial potteries like the one at Quart in Girona, for which there is detailed information. This pottery was awarded a 'Privilegi Real' or royal privilege in 1572. The advantages of these potters' associations included rental of land for the extraction of clays and the introduction of measures to regulate the prices of the pots, thus avoiding competition between potters, which could force prices down. The relationship between La Graufesenque and Narbonne in Roman times is probably not dissimilar to that of the association of Quart and the city of Girona in the early modern period. This association rented, for the use of all potters, a warehouse in the district of Pont Major adjacent to the bridge and to an exit from the city towards the north. This route was used to transport produce into the city of Girona and could then transport the pottery of the association on the return trip. As the centre of production at Quart was to the south of Girona, the association was thus able to cover two routes of intense communication. This scenario could be envisaged for Narbonne, with potters locating their products conveniently for sale directly to the transporters (Nieto Prieto *et al.* 1989: 205).

Although the stamps and forms of the Culip IV samian assemblage are very different from those of Pudding Pan, conceivably reflecting the temporal separation of some 100 years, a comparison of the generic forms produces a quite unexpected result (**Fig. 92**). The characteristics of the samian assemblage from Culip IV are strikingly consistent with those from a variety of terrestrial consumer site types in Britain, both in terms of the relative proportions of decorated bowls, and in the paucity of large plain bowls, and are therefore very different from the characteristics of Pudding Pan. This is a very interesting result as one would expect greater homogeneity between similar site types – wrecks, for example – as was found in the analysis of different terrestrial site types (Willis 2005). Moreover, one would expect less homogeneity between such geographically diverse assemblages, especially between the core and periphery of Empire. However, the variation in the two wreck sites probably reflects the changing tastes over the century between the two deposits.

Thus the seeming homogeneity of similar site types is challenged in this instance but must relate either to the very different spheres in which the Pudding Pan and Culip IV vessels were operating, or to the different tasks in which they were engaged. The close correlation with the characteristics of samian assemblages from consumer sites in Britain suggests that the Culip IV samian may have been selected with a particular end-user or market in mind. If so, the high number of stamps per potter would seem to suggest that this selection occurred either at the production centre or on the quayside from a recently arrived, very large, cohesive consignment. Clearly, there are complex mechanisms at work here that require further analysis and interpretation (see below).

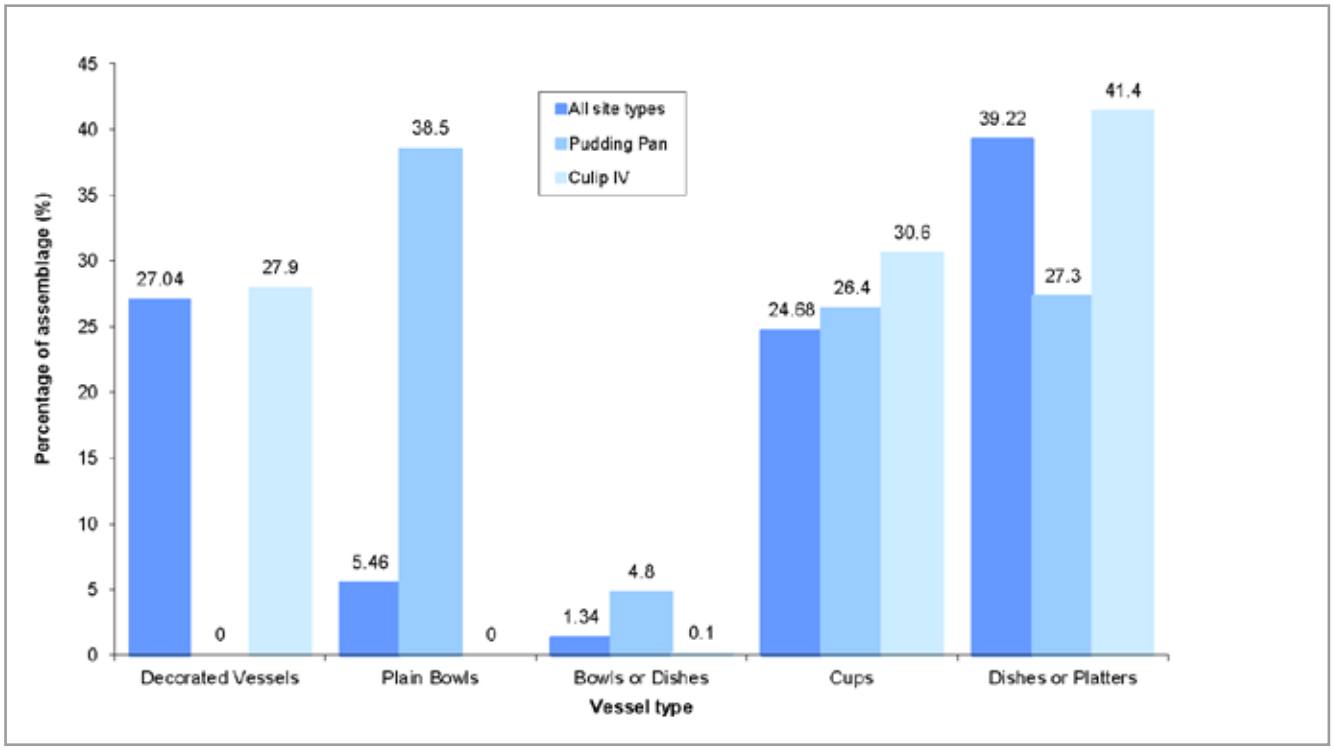


Figure 92 Comparison of the characteristics of the samian assemblage from Culip IV with those from Pudding Pan and the average (mean) from a variety of Romano-British terrestrial site types

The 1,475 fine-wall vessels weighed 93.3kg and occupied a volume of slightly over one cubic metre; 1,947 plain samian vessels weighed 379.7kg and occupied less than one cubic metre; while the 729 decorated samian vessels of Dragendorff forms 29 and 37 weighed approximately 375kg and occupied around 1.5 cubic metres. These wares thus occupied a total volume of only 3.5 cubic metres and weighed less than 900kg (Nieto Prieto *et al.* 1989: fig. 156). They could, for example, easily be divided into 30 packages each weighing less than 30kg, which a single person would be able to manoeuvre and which would fit more conveniently into spaces, being perfectly manageable as much by weight as by volume. As verified by the dispersion of the material during the excavation, these 'packages' had mainly been arranged in the rear half of the boat with a minority in the prow (ibid.: figs 57, 114, 126 and 140). Some of the 'packages' positioned above the *amphorae* spilled out as the boat overturned and were found slightly north of the main deposit (ibid.: 230). As Millett (1993: 418; *contra* Willis 2005: 6.3; 7.3.1) suggests:

> These figures really do put the overall volume and importance of the trade in fine wares into perspective … It becomes clear just how easily the widespread diffusion of samian can have resulted from a 'piggy-back' trade.

If so, this has serious repercussions for the interpretation of Pudding Pan as a bulk consignment, but further investigation is required. The most common ships from all periods were small vessels carrying *c.* 75 tonnes of cargo (Pomey and Tchernia 1978; Parker 1992a: 26).

Consequences for Pudding Pan

This places the recovered Pudding Pan assemblage of *c.* 526 plain samian vessels, or approximately one quarter of the Culip IV assemblage, firmly in perspective. By this reckoning the samian recovered from Pudding Pan would occupy a space of less than 0.25 cubic metres, but can we accept the veracity of these figures and can they be applied in this way? It is still possible that the recovered assemblage from Pudding Pan represents a fraction of a bulk samian consignment. It is interesting to note that the number of decorated bowls in the Culip IV assemblage represents approximately one third that of the plain samian wares, but is a similar weight and occupies one third greater volume. Decorated bowls are generally larger than their plain counterparts, which would account for this disparity. However, this emphasizes that a simple correlation is not possible and that the characteristics of each samian assemblage must be fully considered.

By a rough calculation this figure equates approximately to the volume of six standard museum storage boxes; approximately one quarter of the Pudding Pan material is stored in five such boxes in Whitstable Museum. Admittedly, the vessels are not packed tightly or uniformly, and are protected by packaging. Even so, this suggests that the Culip IV figures are conservative, especially given the acknowledged random output of the production centres. Moreover, the relatively fragile nature of samian vessels, the need to protect the glossy finish, and the near-pristine condition of many that have been recovered from the archaeological record suggest that some form of protective packaging was used despite the absence of iconographic evidence. This packaging is likely to have been considerably more bulky than modern packing materials. Obviously this discrepancy could be explained as a result of the different characteristics of the two assemblages; Pudding Pan contains proportionately greater numbers of large bowls (38.5 per cent as opposed to 27.9 per cent decorated bowls from Culip IV) (see **Fig. 92**).

Samian form	Mean diameter (mm)	Pots per square metre	Mean height (mm)	Mean foot-ring height (mm)	Layer thickness (mm)	No. of pots per stack	Pots per cubic metre
31	184	25	61	9	29	33	825
31r	242	16	72	10	30	32	512
31r	275	9	80	9	29	32	288
33	104	81	54	8	28	34	2754
33	140	49	71	7	27	35	1715
35	110	81	43	11	31	31	2511
36	188	25	49	8	28	34	850
36	262	9	69	15	35	27	243
38	140	49	64	8	28	34	1666
46	103	81	43	12	32	30	2430
79	183	25	42	11	31	32	800
79r	272	9	55	14	34	28	252
80	100	81	41	14	34	29	2349

Table 19 Estimation of the number of pots per cubic metre based on the mean dimensions of the most common samian forms from Pudding Pan

It is possible to estimate the number of vessels of each samian form commonly found at Pudding Pan that could be fitted into an arbitrary one cubic metre space based upon the mean dimensions of the recovered assemblage (see **Table 19**). The layer thickness represents the vertical space occupied by one vessel in a stack and is based upon the mean foot-ring height of each form plus 20mm, which represents the body thickness of each form and some minimal packaging (e.g. straw). The variation in the number of vessels is quite striking, ranging from 243 large Dragendorff form 36 bowls to 2754 small Dragendorff form 33 cups. Thus the figures presented in the Culip IV report are very much site-specific, dependent on the composition of the particular samian consignment.

If, for example, a consignment included the equivalent of one cubic metre of each of the forms listed in **Table 19** this would represent a total consignment of 17,195 samian vessels occupying a space of 13 cubic metres. Calculations above indicated a consignment of 12,000 vessels at Pudding Pan based on a recovery rate of 5 per cent. As noted, it has been calculated that the main consignment of 76 Dressel 20 *amphorae* at Culip IV occupied a space of 15 cubic metres. These figures do emphasize the marginal nature of the Pudding Pan assemblage but do not completely undermine the notion that it represents a bulk consignment. However, this does not challenge the tenet of the argument, which suggests that considerable quantities of samian could be transported in relatively confined spaces, thus supporting the notion of a purely piggy-back trade.

In actuality, so few wrecks containing significant quantities of samian have been discovered, and even fewer published in any substantial detail, that it neither accounts for the massive trade in samian nor confirms the predominance of either primary or secondary cargoes of samian. Therefore, in the absence of firm evidence to the contrary, it is still possible that Pudding Pan represents a bulk consignment of samian wares. Nothing else recovered from the site contests this notion while this study seems to corroborate a bulk consignment. It is difficult to imagine what else the ship might have been carrying to Britannia. The obvious answer is some *amphora*-based product, yet analysis of the *amphora* finds challenges this. Moreover, there appears to have been little or no reason to import grain especially to London in the later 2nd century AD, so apart from *amphora*-based products the only requirement seems to have been for specialist wares such as samian or *mortaria* (Millett 1990: 56).

The boat's sphere of operation

Objects of diverse provenance found in the excavation of a wreck have often been used to determine the route followed by the ship through association with the places of production of the objects that the ship transported (Owen 1970: 28; cf. Tomber 1993: 148). In addition, it was common on terrestrial excavations to conclude that associated objects reflected economic and cultural relations between the place of production and the place of consumption, which presumed the existence of a direct route that linked both places. However, the study of wreck sites, including Culip IV, suggests an alternative organization of maritime commerce in antiquity that can be explained with reference to ports and cities in a hypothetical geographical framework. The heterogeneous composition of the Culip IV shipment, which originated in Baetica, Rome and La Graufesenque, supports Narbonne as the boat's port of origin as these products are unlikely to have been found together in the vicinity of Cap de Creus, other than at Narbonne.

Cap de Creus, where Culip IV sank, is geographically situated between these three zones of production, whose merchandise were all represented in considerable quantities. Had the ship been engaged in cabotage one would expect to see a reduction in the number of objects from the production zone previously visited as the ship called at each zone and sold some of its cargo. This appears to invalidate the traditionally accepted transport scheme (see Nieto Prieto *et al.* 1989: fig. 159A; *contra* Millett 1993: 419), as exemplified by the Ulu Burun or St Peter Port wrecks, although the *modus operandi* may have been quite different between core and periphery. The presence in the same boat of significant quantities of products of very diverse provenance is not

exclusive to Culip IV and is generalized sufficiently to be able to consider the practice habitual. For example, the site of Cap Bear contained Pascual I *amphorae* from Tarraconnensis, Dressel I *amphorae* probably from central southern Italy and Baetican Dressel 20 *amphorae*. Similarly, the Cabrera III site contained materials from Baetica, from Lusitania and from Tripolitania, while the Isle of Pedrosa site had pieces of mill made with rocks that originated from such diverse locations as Girona, Agde and Sicily.

The authors of the Culip IV report suggest that these vessels were not engaged in cabotage as, although this type of 'anarchic' commerce may once have been commonplace, it was unlikely in the heavily structured and regulated naval commerce of Imperial times. In their view, the impracticalities of these erratic trips would make it extremely difficult to maintain stable contacts with people located in different ports and to negotiate the most favourable trading arrangements. A stranger habitually navigating in unknown places would increase the risk of accident and loss of his capital, be unfamiliar with local market conditions and at a disadvantage compared to local traders with local knowledge (Nieto Prieto *et al.* 1989: 239). This seems a rather over-simplistic view, as there would be ample room for cabotage even in the highly regulated Imperial age by traders with no notion of 'yield' and little consideration of risk. Indeed, the Theodosian Code threatened shippers carrying fiscal goods in the eastern Mediterranean with physical punishment if they stopped to sell merchandise *en route* rather than sailing direct to their destination (Tomber 1993: 147). The need for legislation suggests that cabotage was a commonplace practice; the best evidence for tramping comes from the guide for Red Sea traders, the *Periplus Maris Erythraei* (Tomber 1993: 148).

The evidence from Culip IV implies the existence of ports or 'entrepôts' at which ships arrived from diverse origins, with sufficient infrastructure to handle and store great quantities of merchandise that could be resold and redistributed by boat. This type of commercial operation required a complex organization, for which there is limited archaeological or literary evidence. Vitruvius (*De Architectura* X, 2) describes basic means to handle the merchandise using machines, called 'phalangarii' and 'saccarii', to load and unload boats. Constructions like the *horrea* of Rome and the Piazzale delle Corporazioni of Ostia facilitated the storage and commercialization of products. However, a complex infrastructure was necessary for this type of commercial activity, which would require, for example, shipyards for the repair of ships, an administration service, *urinatores* etc.

The concept of grandiose port works is, however, over-simplistic as economic forces largely dictated the size of ship and even large Roman ships had a relatively shallow draft of less than 3m. Thus it is important to remember that ports can exist without harbours, docks or quays in situations where vessels can be beached, goods can be loaded, unloaded and stored and transactions undertaken. The development of Roman London's quay is frequently cited in discussions regarding the establishment of the port as a result of trade when in actuality it has little relevance, as the quay was not a prerequisite for the port (Millett 1990: 89; cf. Rickman 1988: 259). Moreover, given the extensive evidence for transshipment from large sea-going vessels to smaller boats in the Roman period the possibilities for beaching must have been limitless, although it would be naïve to suggest that beaching was extensively used (Rickman 1985: 108).

Obviously not all ports possessed, nor needed the extensive infrastructure of these principal ports. Secondary ports handled small volumes of goods and were not involved in long-distance trade but served the needs of their own population and the hinterland through contact with the nearest principal port. Thus the primary ports engaged in two modes of transportation utilizing two types of vessel. One mode consisted of boats with typically heterogeneous main cargoes engaged in the commerce of redistribution, involving short-distance trade connecting the main port with the secondary ports under its economic influence. The second mode involved ships engaged in long-distance trade on direct routes with other main ports carrying homogeneous main cargoes, not in terms of the type of object transported, but in terms of its area of production. In addition, secondary shipments involved two phases of transportation. In the first, products were brought to the main port from its zone of influence. These were then stored until in the second phase another ship loaded the merchandise to transport it to another main port (Nieto Prieto *et al.* 1989: 239–41).

The study of the Culip IV shipment verified that its economic function was quite distinct from the large ships with hundreds or thousands of *amphorae* more suited to long-distance trips over open sea. Comparison with the Pudding Pan assemblage has also established their dissimilarity, as Pudding Pan seems representative of extra-regional, rather than long-distance, trade between two main ports. Unsuited to long crossings, Culip IV was dedicated to the commerce of redistribution in a close geographical area under the economic influence of the principal port of Narbonne, far from which it never ventured. The port of Empurias on the coast of Girona could be reached in a day and was the probable destination as it had a population large enough for the consumption of this shipment, or the cargo could have been redistributed from there (ibid.: 226).

The artefacts found at Culip IV represent a wide geographical area, from the Aegean to Andalusia, demonstrating the enormous facility for communication between all points of the Mediterranean. This exposes the risk of supposing similar provenance of associated objects found on terrestrial excavations, as each one may have arrived by a different route and with different motivations. Culip IV seems to represent an example of the commerce of redistribution from a main port, in this case Narbonne. At the time of the sinking during the reign of Vespasian, this port had sufficient infrastructure and sufficient commercial importance to receive shipments of oil transported in Dressel 20 *amphorae* and fine-wall ceramics direct from Baetica and it also received ships from Italy that transported, among other products, the oil lamps stamped OPPI (ibid.: 243; cf. Rickman 1988: 264).

The tremendous influx of products to the port of Narbonne required redistribution via secondary shipments. The potters of La Graufesenque took advantage of these circumstances, organizing and increasing their production and placing their products on the Narbonnese market. The Culip IV merchant must have loaded his ship at the warehouses of Narbonne to head straight for Tarraconensis with merchandise originating from diverse areas of the Mediterranean. Culip IV demonstrates that no port on the Gironian coast received large homogeneous shipments of oil direct from Baetica so it had to be redistributed from Narbonne (Nieto Prieto *et al.* 1989: 243). This provides a plausible explanation why 'a substantial proportion of the assemblage found was moving towards its point of manufacture, not away from it' (Millett 1993: 417).

The scenario envisaged for Culip IV suggests a commercial maritime transport network developed in three different and complementary levels: the direct route that united the principal ports; redistribution from the main ports to the secondary ports in their zone of economic influence; and a third level of interaction with the hinterland of each secondary port. These three different types of commerce required three different types of boat, whose cargoes would vary from the outward to the return journey, so there are at least six different historic scenarios that need to be considered in the study of wreck sites (Nieto Prieto *et al.* 1989: 243).

Narbonne came to prominence following the decline of Massilia (Marseilles), the most important Greek port in Gaul, which by Strabo's day was known principally as a university town (Strabo, *Geography* IV. 180–1). This decline occurred primarily because Massilia was separated from the Rhône valley, which was the main artery used by the Romans through Gaul. Even though Narbonne was located about 20km from the sea its position, on a waterway connecting the River Aude to the Mediterranean, commanded one of the great routes through south-west Gaul, providing access between the Mediterranean and the Bordeaux district on the Atlantic coast. However, by the mid 2nd century AD there were signs of decline, primarily owing to an eastward shift of political and economic emphasis but also possibly because of siltation problems. Arles then became the dominant port of southern Gaul through to the time of the late Empire, even though it was further inland than Narbonne and had difficult links to the sea. This was undoubtedly owing to its position on the Rhône, which provided access via the waterways to all parts of Gaul and particularly to the strategically important Rhineland frontier (Rickman 1985: 109).

The importance of Narbonne and Arles resulted from favourable geographical and political factors, but smaller centres like Port Vendres (Coll *et al.* 1975), Agde, Lattara, Maguelone and the other ports-of-call must have taken their place as part of a network of coastal trade (Rickman 1988: 260). In southern Spain the river port of Hispalis (Seville) succeeded the natural coastal port of Gades (Cadiz) in the 2nd century AD, handling the significant trade in oil, wine and minerals from the Baetican region (Rickman 1985: 110). It is interesting to note that despite the considerable garum industry in this area and an ancient list of 'ports', no harbour facilities have been discovered (Hohlfelder 1976) thus supporting the notion of extensive use of beaching and transshipment.

The emphasis of archaeological research has now moved away from extant remains and technological developments, focusing more on the siting of the port, its supporting infrastructure and hinterland connections (Rickman 1985). But research into ports as integrated networks providing connectivity across the Empire is still rare (see Rickman 1988: 257; Horden and Purcell 2000). Consequently, besides the paucity of shipwrecks containing tablewares, another significant link in the pattern of trade is largely missing. Without evidence of these smaller harbours or a more representative sample of shipwrecks it is difficult to obtain an accurate perspective of the coastal trading network or to understand the connectivity of ports in the Roman world. This emphasizes the tremendous importance and significance of shipwrecks like Culip IV and Pudding Pan.

This comparison between these two temporally and geographically diverse sites has proved most worthwhile and has produced quite surprising results. The samian assemblage from Culip IV was produced at La Graufesenque in the third quarter of the 1st century AD and was found at the core of the Empire. In contrast, the samian from Pudding Pan was made at Lezoux a century later and was found on the periphery of the Empire. The mutual exclusivity of the samian forms and potters' stamps was thus anticipated, but analysis of the generic characteristics of the two samian assemblages revealed a striking similarity between Culip IV and British consumer sites, quite different to those of Pudding Pan. This was completely unexpected because research (Willis 2005) has highlighted the similar characteristics displayed by similar type sites. Once more this stresses the unusual nature of the Pudding Pan assemblage.

The heterogeneous characteristics of the Culip IV and Pudding Pan assemblages must be explained by the different roles being carried out by the two ships. According to the excavators, Culip IV was a small ship engaged in what they term 'secondary shipments for redistribution' of goods from a primary port to the secondary ports of the region or the hinterland. In this scheme, Pudding Pan represents a long-distance trading vessel *en route* from an as yet unidentified primary port in northern Gaul to a primary port in Britannia, such as the entrepôt at London, where the bulk consignment would have been combined with other shipments to the needs of a particular market or end user. This neatly accounts for the varied nature of the two samian assemblages: one would expect a bulk consignment *en route* between two principal ports, but a mixed consignment with samian as a supplementary cargo on a vessel travelling between a principal port and its hinterland. This could explain the predominance of wrecks containing secondary cargoes of samian, as these operations would have been more frequent than bulk consignments travelling between principal ports.

The comparatively small volume occupied by this not inconsiderable assemblage may support the notion that samian was transported as a secondary cargo but does not prove that this was always the case. The fact that it occupied

such a small space may have encouraged this piecemeal, supplementary trade but this does not confirm that this was the only method by which it was conveyed. As we have seen, the relatively few maritime sites that include significant quantities of samian can in no way account for this massive trade. Moreover, there is no evidence to suggest that Pudding Pan represents anything other than a bulk consignment of samian. Thus it may be that vessels engaged in the principal trade between major ports in the Mediterranean have not yet been found.

Chapter 9
The Implications of this Study

> At present, the sole representative of this commerce is the site known since the 18th century as the Pudding Pan Rock, near Whitstable in Kent. And similarly, the continued exchanges of the medieval period have not been matched by the discovery of a single wreck site. This is presumably because such sites will mostly lie in the dangerous and unattractive waters of the Straits of Dover and the southern North Sea; it probably also reflects the tastes and interests of those currently active in British maritime archaeology (Muckelroy 1978: 143).
>
> With few notable exceptions, terrestrial and maritime archaeologists rarely converge to share results (Green 1998: 170–1).
>
> [O]ther archaeologists still tend to avoid maritime archaeology, or, to refer it to a junior position as just a subsidiary specialization (Westerdahl 1998: 365).

One of the fundamental issues to emerge from this research is the poverty of evidence from both northern Europe and the Mediterranean for the maritime transportation of bulk pottery consignments in the Roman era. This has serious implications for the interpretation of the later 2nd-century AD Pudding Pan assemblage, which appears to represent a pottery shipment (*contra* Fulford 1987: 60–1). This study has presented compelling evidence that the scarcity of pottery cargoes in the maritime archaeological record, rather than reflecting an aversion to this activity in antiquity owing to economic expedience, represents a modern detection bias that is heavily weighted in favour of the discovery of *amphora*-laden wrecks.

The possibility that poor survivability of this type of wreck could account for their rarity is countered by the discovery of pottery cargoes on multiple wreck sites: five of the six wrecks that contained significant samian cargoes were discovered during the investigation of other wrecks in the same vicinity, while the sixth comprised a composite cargo that included *amphorae*, which were the primary indicators of this site. Thus the assumption that pottery rarely if ever comprised a primary cargo seems somewhat tenuous. The paucity of bulk pottery consignments clearly relates to our inability to locate these sites rather than the poor preservation of these wrecks or an aversion to this practice in antiquity. In this light, it is perfectly acceptable to interpret the recovered assemblage from Pudding Pan as a bulk samian consignment without fear of being accused of 'misinterpreting the archaeology' (cf. Fulford 1987: 60–1).

The problems of detection are compounded by the actions of looters, who have destroyed the majority of these wrecks prior to serious investigation. This invariably accounts for the scarcity of detailed publications of these particular types of cargo, which explains why this evidence has long been overlooked. Given the almost universal acceptance of the predominance of maritime over other forms of transport, the paucity of evidence for particular categories of cargo, which has been so glibly dismissed (ibid.), must have a detrimental impact on our understanding of trade. This is particularly germane as pottery has been used as a proxy for a supposedly more significant trade upon which the transportation of pottery was dependent: the so-called parasitic or piggy-back trade.

The paucity of evidence for pottery transportation by sea emphasizes the importance and significance of the Pudding

Pan wreck, which appears to represent a bulk consignment of plain samian wares *en route* from northern France to Britain. Pudding Pan is one of only two known Roman wrecks from maritime contexts in British waters. More significantly, throughout the Empire only one other wreck (Culip IV) containing a cargo of samian has been rigorously investigated and fully published; no cargo displaying similar characteristics to Pudding Pan has ever been discovered. Moreover, this later 2nd-century AD wreck dates from a period that is not particularly well represented in the maritime archaeological record.

Despite our inability to locate the sources of this Roman material, these seemingly uncontextualized artefacts have made a significant contribution to our understanding of the nature, location and condition of the sources. The seemingly bulk transportation of utilitarian pottery would also have serious implications for our understanding not only of trade but also of the use of pottery as a proxy for other archaeologically invisible goods. The aim of this concluding chapter is to consider the implications of these findings both on current theories of trade and also on the maritime archaeology of the Roman era as it is currently practised.

The importance of Pudding Pan

This study has scrutinized the assemblage recovered from the Kentish Flats in order to elucidate as much information as possible from these uncontextualized artefacts about their provenance, the nature of the original consignments and the location of the sources on the seabed. As stated in Chapter 1, in a sense these artefacts are contextualized in that they are synchronic and have been shown to come from a cohesive, structured deposit. The assessment of Pudding Pan revealed how little we actually knew about this 'known' site. The recovered assemblage is far greater than had been previously imagined, having been widely dispersed both nationally and internationally. Although the sources have not been located, this enhanced assemblage can make a significant contribution to our understanding of trade in its own right without the discovery of the wreck site.

Many of the myths and misconceptions that have arisen about the site of Pudding Pan over the last 300 years have been identified and clarified in this study, and our knowledge of the recovered assemblage and the sources from which it came has been considerably advanced. Analysis has confirmed the existence of three discretely dated groups from the 1st, 2nd and 3rd centuries AD, although there is insufficient evidence to determine the nature and location of the 3rd-century source. The confusion between Pudding Pan and Pan Sand has obscured the locations from which the various samian groups have been recovered, but the 1st-century AD samian probably came from the same source as the *mortaria* and *amphorae* dated *c.* AD 65–85, which are known to have been recovered from north of Pan Sand, although it is unclear whether the source represents a shipwreck or a jettisoned cargo.

In contrast, it now seems clear that the later 2nd-century AD samian represents a bulk consignment of plain samian wares from a ship that sank between AD 180 and 200 *en route* to Britain from northern France. In the absence of evidence for post-depositional movement the presence of oysters on almost one fifth of these vessels indicates that the ship sank in the vicinity of Pudding Pan. There is remarkably close correlation between the potters' stamps from Pudding Pan and those from the London waterfront at New Fresh Wharf, with 57 per cent of the former represented at the latter site. As New Fresh Wharf has been dated *c.* AD 170–80, this not only indicates the likely destination of the Pudding Pan cargo but also possibly refines the date of the sinking still further. There is, however, an element of circularity in this argument as the dating of New Fresh Wharf is partially dependent upon some stamp correlations with the 'precocious' Pudding Pan assemblage. A date closer to AD 180 is supported by the dates of the stamp dies.

Enquiries at local and national institutions and with local groups, including the commercial fishermen of Whitstable, resulted in the doubling of the recorded assemblage to a statistically significant sample of *c.* 550 samian vessels. Historically, the assemblage has failed to make a significant impact on samian studies other than as a central reference point for dating excavated 2nd-century AD samian groups, probably as a result of the lack of interest in the site throughout much of the 20th century. Hence the pressing need for this study. These investigations have also confirmed the range of Roman material other than samian ware that has been recovered from the Kentish Flats, including central Gaulish black-slipped ware, North African red-slipped ware, a *terra rubra* cup, *amphorae*, *mortaria*, lamps, *tegulae*, *imbrices*, a stone anchor and a variety of artefacts from other periods (Walsh 1998).

The biographies of individual Pudding Pan samian vessels revealed the complex route through which most had reached their final destination. It is clear that a significant proportion of the vessels recorded in 1909 form part of an unquantifiable contingent that remains in private collections, as no records of their entry into public institutions could be found. This analysis illustrated the impact that the major investigations had as an impetus for public institutions to collect Pudding Pan material. The biographies provided sufficient *termini ante* and *post quos* of individual vessels to enable analysis of the rate and nature of the recoveries over time and this indicated that, despite numerous claims to the contrary, variations in the rate and nature of the recoveries over the last 300 years are almost imperceptible. This is the first time that the uniform rate of recovery has been explicitly demonstrated, providing the greatest indication yet that we are dealing with a deeply buried deposit of some cohesion that is far from exhausted.

The samian assemblage recovered from Pudding Pan includes an unusually high proportion of complete or near-complete vessels that were probably manufactured shortly before their loss, thus providing evidence for the range of contemporary samian forms fashionable at a particular time. The assemblage also provides information on contemporary potters, their styles, techniques and manufacturing processes, as well as details of cargo composition and stowage. It is clear from analysis of the wear and damage patterns that the majority of the recovered vessels were sitting on the seabed in inverted stacks, separately packaged according to form and/or potter. Similar characteristics were identified in assemblages from

quayside dumps, warehouse and shop deposits, a process which also provided some indication of the goods that probably accompanied samian imports. The damage sustained by the foot-rings on the Pudding Pan vessels has been related to the means by which the vessels have been recovered by the oyster dredges.

The complete absence of decorated samian wares, which has been shown to be a genuine anomaly rather than a recovery/collection bias or recording irregularity, is unusual as terrestrial assemblages usually include both plain and decorated wares in varying proportions. The scarcity of plain-only samian deposits, even from assemblages closely associated with trade such as quayside dumps, warehouse and shop deposits, suggests that if separate consignments were the norm then they must have been mixed at the dockside prior to redistribution. This emphasizes the difficulties of interpreting the trade and marketing of samian wares from detritus discarded on end-user sites.

Comparisons of the characteristics of the Pudding Pan samian with those of similar assemblages from terrestrial sites demonstrated that the vast majority of all terrestrial site types have significant proportions of large decorated bowls and minimal proportions of large plain bowls. This characteristic is completely reversed at Pudding Pan, with no decorated bowls but significant quantities of large plain bowls. This suggests that, rather than remaining buried at the wreck site, decorated wares in this particular consignment had been replaced by large plain bowls (Monteil 2005: 93).

The comparison between Pudding Pan and Culip IV, the only other significant maritime samian assemblage to have been rigorously investigated and extensively published, produced similar results. Although no direct comparisons between the two assemblages were possible, owing to the difference in date and therefore production sites, analysis of the characteristics of the two assemblages was quite revealing. The characteristics of the Culip IV assemblage were very similar to those from Romano-British terrestrial sites and therefore quite distinct from Pudding Pan, with a significant proportion of large decorated bowls and very few large plain bowls.

This seeming discrepancy may be explained by changes in fashion or may reflect the different operations undertaken by each vessel. Culip IV was engaged in the redistribution of goods and provisions from a main port or entrepôt to a secondary port, which explains why some of the goods were being carried back towards the area from which they had originated. In contrast, Pudding Pan seems to represent a bulk consignment *en route* from the production centre in France to a main entrepôt, in this case London. Hence, unlike the unadulterated Pudding Pan consignment, the Culip IV consignment involved a mixture of several different consignments that had been offloaded at the entrepôt of Narbonne and then reloaded for redistribution.

The impact on current theories of trade

It is now apparent that this bulk consignment of plain samian wares from Pudding Pan represents either a 'one-off' special consignment destined for a particular purpose or a trading norm that has hitherto gone unnoticed in the archaeological record. Although the rarity of similar cargoes implies a special consignment it is now clear that this scarcity reflects the difficulty of locating these sites rather than reflecting ancient practices. Consequently, it must be assumed that similar shipments were not uncommon but remain concealed on the seabed owing to the invisibility of this particular type of cargo and doubtless other cargoes.

Besides the obvious greater visibility of *amphorae* cargoes there is evidence that pottery cargoes are more prone to colonization by heavy concentrations of seaweed that camouflage the deposits and thus prevent their detection (Parker 1980: 47; Nieto Prieto *et al.* 1989). Our inability to detect pottery cargoes could have considerable repercussions for our understanding of ancient trade if, as now seems probable, pottery is in fact an artificial indicator of a more significant trade. If pottery was transported in its own right then, although pottery found in the archaeological record can indicate the direction of trade, it is less indicative of the volume and nature of trade.

The few bulk consignments of pottery that have been found on Mediterranean shipwrecks confirm that pottery cargoes were conveyed in their own right, but they have been ignored in favour of the so-called parasitic, piggy-back trade evident on so many wreck sites. This oversight seems to stem from the destruction by looters of the majority of sites containing bulk consignments of pottery, which were consequently poorly investigated and poorly published. Moreover, the marginal quantities of pottery found on piggy-back sites accounts for only a minute fraction of the tremendous volumes of pottery found on terrestrial sites. Thus, rather than an accurate reflection of ancient maritime practices, the overwhelming evidence from Mediterranean wreck sites for parasitic piggy-back trade may stem from the disproportionate discovery of vessels engaged in redistributive trade due to the presence in these consignments of *amphorae* that are far more visible under water than deposits from which they are absent.

The impact of this conclusion is far reaching not only for our current understanding of ancient trade but also for the maritime archaeology of the Roman era. If pottery was transported in its own right as a bulk consignment then the use of pottery as a proxy for a more substantial, but archaeologically invisible, trade is effectively undermined and needs to be reconsidered. This is not to suggest that a piggy-back trade did not exist, which would be nonsensical; clearly a significant but unknown proportion of trade was parasitic but to suggest that it solely accounts for the massive distribution of certain pottery types is perhaps a misinterpretation of the archaeology (*pace* Fulford 1987: 60–1).

There are two issues here. On the one hand there is our inability to detect a particular class of cargo; on the other there is our possible misinterpretation of the vast majority of cargoes discovered in the Mediterranean. Perhaps the volume and importance of parasitic trade has been over-emphasized as wrecks engaged in redistributive trade have been misinterpreted. The above model proposes a primary trade conveying homogeneous cargoes between major ports and a secondary redistributive trade conveying heterogenous cargoes assembled at a main entrepôt to the

secondary ports of its hinterland. Pudding Pan appears to represent the former while Culip IV is an example of the latter, and the distinction between the two is obvious.

Small quantities of a variety of commodities amidst a largely homogeneous primary cargo could clearly be defined as parasitic, but how do we differentiate between the wrecks of ships engaged in redistributive trade with those engaged in parasitic trade? Both would have contained a variety of merchandise comprising 'primary' and 'secondary' cargoes. If redistributive trade has been misinterpreted as parasitic trade then this considerably alters the relationship between different commodities on the ship and calls into question the whole motivation for carrying supplementary cargoes. Rather than a surreptitious cargo 'smuggled' aboard to supplement the income of the trader dependent upon more significant valuable cargoes or state contracts, these supplementary cargoes may have made up a legitimate constituent in a universal trading network.

Thus, to emphasize that the distribution of pottery was dependent upon parasitic trade is to misunderstand the nature of the ancient trading network. This model accommodates both types of trade with pottery carried as a bulk primary consignment from the production area to a main entrepôt and as a secondary commodity being redistributed from the main port to the secondary ports within its sphere of influence. In this scheme, opportunist, piggy-back trade was a marginal practice rather than the primary means by which pottery was distributed, which never satisfactorily explained the success and wide dispersal of the massive output of the Gaulish, North African and eastern Mediterranean pottery industries.

The implications for the maritime archaeology of the Roman era

This research has raised three serious concerns regarding the way in which the maritime archaeology of the Roman era is currently conducted. The first is our inability to locate a particular category of cargo. The flaws of focusing only on the most visible and best-preserved sites have long been acknowledged – in so doing, we are closing our minds to the possible variety of evidence that exists for maritime transportation and are pre-judging the nature of ancient trade. The second is our inability to protect underwater sites once they have been discovered. Although legislation has been drafted to combat this threat to our underwater heritage its efficacy has yet to be tested. Thirdly, there is a paucity of rigorous investigations and subsequent publications. While in some cases this can be attributed to the actions of looters, the quality of many maritime publications leaves much to be desired. Consequently, there is a tendency for mainstream archaeology to ignore maritime evidence and there are relatively few examples of research that straddles both domains.

It comes as no revelation that there is disproportionate typological, geographical and temporal representation in the maritime archaeological record, as this has been identified previously (Parker 1992a). While the disproportionate temporal representation of wrecks dating from the High Empire appears to reflect a genuine burgeoning maritime transport system in that period, the inconsistent geographical and typological array of Roman wrecks has resulted from a heavy detection bias. It is accepted that the disproportionate geographical representation reflects varying levels of underwater activity, hence the paucity of maritime evidence from northern Europe, from areas of the Mediterranean with less well-developed tourism industries and from deep-water sites that until recently remained inaccessible (see McCann and Freed 1994; Parker 1996).

However, while it has been acknowledged that, typologically, *amphorae*-laden wrecks dominate the maritime archaeological record this has been excused on the grounds that the other important cargoes comprised grain, which would survive only in exceptional circumstances. The significance of cargo types other than grain and *amphora*-borne products has been almost completely dismissed, as reflected by Fulford's comments (1987: 60–1), quoted above, that the identification of pottery cargoes merely represents a misinterpretation of the archaeology.

Thus before this study the absence of pottery cargoes in the archaeological record was explained by the operation of a parasitic pottery trade, which saw pottery transported only as a secondary cargo. This study has now demonstrated the flaws in this argument, which is central to the interpretation of the assemblage recovered from Pudding Pan as a primary samian cargo. As argued above, the archaeological misinterpretation is of composite cargoes on ships engaged in the redistribution of goods from entrepôts to their hinterlands as evidence of parasitic trade. Our inability to locate a whole class of evidence for the mass transporation of pottery has serious implications as our concept of the trade in more significant but archaeologically invisible commodities is so dependent upon using pottery, which survives so well in the archaeological record, as a proxy.

The root cause of these disproportionate representations lies in the reactive rather than proactive nature of maritime archaeology, with near-universal dependence on the serendipitous discovery of shipwrecks, which is particularly acute for wrecks that pre-date the early modern era. In fact, very few significant wrecks from any period have been discovered using proactive techniques, hence the difficulty of detecting particular types of wreck or indeed the full range of craft that were utilized in the Roman era. Now this oversight has been identified steps can be taken to rectify this situation. In the light of the conclusions of this study there is a pressing need to reinvestigate the sites in the Mediterranean on which significant quantities of pottery have already been discovered. This study has gone some way to highlight the extent of the task for Romano-British maritime archaeology although this is just a start.

The lack of underwater activity and poor underwater visibility in British waters has had a significant impact on our inability to discover wrecks from the Roman era serendipitously; hence the need for proactive research as presented here. Moreover, it is difficult to determine the nature and extent of Roman maritime activities in British waters as no corpus of maritime finds currently exists, although isolated areas have been methodically surveyed (Tomalin 1997). A comprehensive survey of England's coastal heritage revealed considerable but patchy coverage

(Fulford *et al.* 1997) although changes to Historic England's (formerly English Heritage's) remit should have impacted on the range and quality of coastal, inter-tidal and underwater data. Without primary evidence for trade in the form of ports, quays, harbours and the watercraft that conveyed goods between them it is impossible fully to comprehend the true nature of northern European trade. This research has shown how liaisons with various local groups can add substantially to our knowledge of a 'known' site and make a significant contribution to the maritime record.

The results of this study highlight the potential of conducting similar surveys on a far wider scale; indeed the evidence for pottery transportation from the Mediterranean has been massively under-utilized and requires similar detailed reassessment. The enhanced assemblage from Pudding Pan has elevated its importance to the extent that it warranted detailed in-depth analysis. The application of this approach to other areas both in Britain and in the Mediterranean must therefore await future research. The results of these surveys (Walsh 1999; 2002) illustrate not only how outdated is our knowledge of maritime finds but also the tremendous potential of continuing this work in other areas of Britain.

Further work of this nature needs to be undertaken as a matter of urgency in order to utilize the unique knowledge of commercial fishermen before it is lost. If the results of this survey on one small, but admittedly well-known, site could be replicated then it could have a significant impact on the maritime archaeology of Roman Britain. Although considerable quantities of Roman artefacts have been recovered from maritime contexts around Britain's coasts these have not translated into discoveries of wreck sites, from which at least some of the artefacts must have come. The difficulties of detecting maritime sites have been illustrated at Pudding Pan; even when proactive methods are adopted there are still considerable obstacles to overcome as remains are likely to be buried and therefore difficult to locate using conventional geophysical prospection techniques, diving conditions around Britain are far from ideal and artefact recovery methods result in rather vague locational information. Nevertheless, these difficulties should not prevent us from at least attempting to find these sites.

The obstacles that prevent the detection of ancient wrecks in northern waters also protect them from predatory divers, so once found they should render significantly more evidence than those in the Mediterranean that have been heavily plundered. Much of the more ephemeral but vital information, for which maritime archaeology is renowned, regarding the cargo, its composition and its provenance should be preserved thereby broadening our comprehension of trade and exchange in the Roman era. For example, the site of Cala Rossano in the Mediterranean contained complete *amphorae* with unusual contents inside, including spices, hazelnuts, grape stalks and a 'dense sludge', but sadly the site was looted and dispersed without study (Parker 1992b: 93). A greater understanding of the relationship between *amphorae* shapes, their contents and their combinations would be of tremendous benefit. As mentioned above the London 555 *amphora* containing 6,206 olive pits recovered from Pudding Pan bodes well for future discoveries and provides a much-needed impetus for us to redouble our efforts.

If a whole body of evidence for the maritime transportation of pottery is missing, as a result of either our inability to detect this type of wreck or limited investigative efforts rather than because of an absence of this form of trade or of this type of evidence, then how successful or extensive is the maritime archaeology of the Roman era? This innovative approach to the study of an uncontextualized assemblage breaks new ground in its attempts to prove that these tablewares have considerable worth in their own right other than as mere indicators of shipwrecks. This research has shown that the assemblage can be contextualized and can produce academically rigorous results without the need to find the shipwreck.

The assemblage has challenged some preconceived notions of trade from terrestrial contexts. The approach taken is novel because it attempts to integrate maritime evidence with evidence from terrestrial sites in order to place the assemblage in its context as part of a wider trading network. Meaningful integration of evidence from terrestrial and maritime contexts is still comparatively rare. Despite the rhetoric of a seamless approach between terrestrial and maritime archaeologies there is still minimal evidence of any significant cross-fertilization, particularly in the Roman era (Green 1998: 170–1; Westerdahl 1998: 365).

One searches in vain for tangible evidence of cross-fertilization between mainstream and maritime archaeology in the Roman era. Certainly maritime evidence has made a considerable contribution to the study of *amphorae* (see Peacock and Williams 1986) and of African red-slipped ware (Hayes 1972) but maritime archaeological papers in mainstream peer-reviewed academic journals are still rare.

The impact that our inability to locate particular types of wreck has on our understanding of trade is compounded by the scarcity of research into maritime-related sites, particularly from a maritime perspective. Maritime archaeology encompasses not only shipwrecks, artefacts from the sea and submerged landscapes, but also ports and harbours, wharves and quays, warehouses, navigational markers (lighthouses and beacons), shipbuilding yards, fishing and other maritime community settlements, salt- and pottery-making facilities, and even imported exotic goods which in British contexts involve a sea voyage. If no one is actively working in the field – no researchers, practitioners or archivists – it is difficult to see in this context how a maritime archaeology of Roman Britain exists. Despite the abundance of physical evidence Mediterranean maritime archaeology, barring a few notable exceptions, is even less well developed, particularly from a theoretical perspective (Westerdahl 1998: 365). The paucity of in-depth, detailed, published analyses of data from Roman Mediterranean shipwrecks is of serious concern and cannot be wholly blamed on the plunder of wrecks.

Even if we cannot locate ancient shipwrecks this study has shown that the study of a conventionally 'uncontextualized' assemblage can still have a significant impact. If we are to understand fully the nature of ancient trade we cannot ignore other assemblages from maritime contexts.

Moreover, maritime archaeology encompasses far more than just shipwrecks and their cargoes and there is no reason why these aspects could not be developed more effectively (Walsh *et al.* 2013). The investigation of the full range of evidence for maritime and maritime-related activities, which played such a key role in trade particularly with the island province of Britannia, and the comprehensive adoption of the seamless approach between terrestrial and maritime archaeologies would then imbue terrestrial archaeology with a maritime perspective.

Plates

It seems fitting to illustrate here one of the first attempts at samian classification (designated PPR forms 1–16) which was based on the 'Pudding Pan Rock' (sic) series (see p. 30 and **Fig. 43**, this volume) but which was never adopted. It was created by Reginald Smith, who was Keeper of British and Medieval Antiquities at the British Museum in the 1920s, and who published the last detailed studies of Pudding Pan (Smith 1907; 1909). The British Museum has one of the largest collections of samian recovered from Pudding Pan (many of which have been photographed for this section). This section includes other artefacts recovered from Pudding Pan that are also held in the British Museum collection, including an African Red Slipped (ARS) bowl and roof tiles (a *tegula* and an *imbrex*). As stated above (p. 56), there is a problem with Smith's identification of the Curle forms 15 and 23 and the Dragendorff form 46 which makes the identification of forms PPR7, PPR8 and PPR15 problematic. Owing to the wide variation in the dimensions of the vessels illustrated here they are not shown to scale. Dimensions for these vessels can be found in Appendix 1.

Plate 1 Profile and plan of PPR 1, now more commonly known as a Walters form 79r. British Museum, 1903,1115.221

Plate 2 Profile and plan of PPR 2, now more commonly known as a Walters form 79. British Museum, M.1753

Plate 3 Profile and plan of PPR 3, now more commonly known as a Walters form 80. British Museum, M.1750

Plate 4 Profile and plan of PPR 4, now more commonly known as a Dragendorff form 36. British Museum, 1920,1123.9

Plate 5 Profile and plan of PPR 5 now more commonly known as a Dragendorff form 36. British Museum, M.2405

Plate 6 Profile and plan of PPR 6, now more commonly known as a Dragendorff form 35. British Museum, 1920,1123.14. This example is atypical as most forms 35 have barbotine decoration around the rim like the forms 36

Plate 7 Profile and plan of PPR 7, now more commonly known as a Curle form 23. Whitstable Museum

Plate 8 Profile and plan of PPR 8, now more commonly known as a Curle form 23. British Museum, 1920,1123.23

Plate 9 Profile and plan of PPR 9, now more commonly known as a Dragendorff form 31r. British Museum, 1910,1025.24

Plate 10 Profile and plan of PPR 10, now more commonly known as a Dragendorff form 31r. British Museum, 1920,1123.26

Plate 11 Profile and plan of PPR 11, now more commonly known as a Dragendorff form 31. British Museum, 1908,0727.5

Plate 12 Profile and reverse of PPR 12, now more commonly known as a Dragendorff form 33. British Museum, 1937,0316.8

Plate 13 Profile and plan of PPR 13, now more commonly known as a Dragendorff form 33. British Museum, M.1694

Plate 14 Profile and plan of PPR 14, now more commonly known as a Dragendorff form 38. British Museum, 1950,0502.9

Plate 15 Profile and plan of PPR 15. A precise equivalent of this form has not been recorded during the current study. The nearest equivalent is the Curle form 23. British Museum, 1920,1123.22

Plate 16 Profile and plan of Ludowici Tf. British Museum, 1937,0316.1 (not in PPR series)

Plate 17 Profile and plan of African red slipped bowl form 3B from Pudding Pan. British Museum, 1997,0912.33

Plate 18 Flat ceramic roof tile (*tegula*) from Pudding Pan. British Museum, 1909,1109.1

Plate 19 Curved ceramic roof tile (*imbrex*) from Pudding Pan. British Museum, 1909,1109.2

Of the 526 complete or near-complete samian vessels recovered from the Kentish Flats, 452 vessels bear a maker's mark of some description in the centre including 392 legible names representing 47 different potters. This section includes photographs and drawings of each of the legible potter's marks; the Roman numerals after each potter's name distinguish between different potters with the same name while the following number and letter indicate the particular stamp die used (see *NOTS* 2008–12). All stamp illustrations in this section have been illustrated to the same scale.

Plate 20 Aestivus 2a. British Museum, 1910,1025.26

Plate 21 Albucianus 6a. Whitstable Museum, Box 27 (27)

Plate 22 Albucianus 6g. Whitstable Museum, Box 27 (8)

Plate 23 Arncus 1a. Whitstable Museum, Box 26 (15)

Plate 24 Asiaticus ii 5a. Canterbury Museum, 1123

Plate 25 Atilianus i 5a. Whitstable Museum, W.1988.1000.17

Plate 26 Belsa (Arvernicus)? 1a. Whitstable Museum, W.1988.1000.17

Plate 27 Caletus 2a. Whitstable Museum, Box 27 (10)

Plate 28 Campanus ii 2a. Whitstable Museum, Box 26 (63)

Plate 29 Caratillus ii 1a. Whitstable Museum, Box 25 (65)

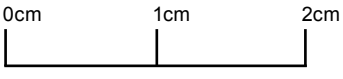


Plate 30 Catianus ii 6a. Whitstable Museum, Box 25 (65)

Plate 35 Decmus ii 3b. Whitstable Museum, Box 26 (46)

Plate 31 Cintusmus i 5a. Whitstable Museum, Box 26 (50)

Plate 36 Doeccus i (Doveccus) 11f. British Museum, 1925,0502.29

Plate 32 Cracina 2a. Powell-Cotton Museum, S74

Plate 37 Firminus i Arean-2a. British Museum, 1937,0316.3

Plate 33 Crispinus ii 2a. Powell-Cotton Museum, S59

Plate 38 Gaius i 1-a. British Museum, 1920,1123.19

Plate 34 Datius 2a. Maidstone Museum, 1587

Plate 39 Genitor ii 5b. Whitby Museum, M0192

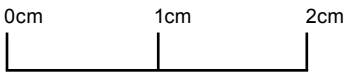


Plate 40 Iullinus ii 3a. British Museum, 1937,0316.4

Plate 46 Maior i 6a. British Museum, 1901,1733

Plate 41 Iustus ii 2b. British Museum, 1920.1123.30

Plate 47 Marcellinus ii (Marcellinius?) 2a. British Museum, 1937.316.6

Plate 42 Maccalus 3a. Herne Bay Museum, H1196

Plate 48 Marcus v 9a. British Museum, 1920,1123.26

Plate 43 Macrianus 1a. Liverpool Museum, M7467

Plate 49 Martinus iii 1a. British Museum, 1920,1123.18

Plate 44 Mainacnus 2a. British Museum, 1908,0727.4

Plate 50 Mascellio i 4a. Vessel not located

Plate 45 Maior i 3a. British Museum, M.1660

Plate 51 Maternianus i (Maternnianus) 3a. Whitstable Museum, Box 25 (38)

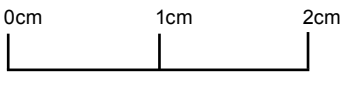


Plate 52 Maternus iv 1a. British Museum, M.1721

Plate 58 Paullus v 8c. Whitstable Museum, Box 26 (66)

Plate 53 Maternus iv 1e. Ashmolean Museum, 1909.1157

Plate 59 Primanus iii 6d ((this stamp/die identification is difficult to verify as the stamp is almost illegible). Ashmolean Museum, 1938.362

Plate 54 Maulianus 1a. Herne Bay Museum, H1187

Plate 60 Primanus iii 6f. Whitstable Museum, 1988.1000.17

Plate 55 Mercator iv 5a. British Museum, 1937,0316.7

Plate 61 Priscus iii 4d. Powell-Cotton Museum, S68

Plate 56 Namilianus 3b. Whitstable Museum, Box 26 (16)

Plate 62 Quintus v 5a. Whitstable Museum, Box 24 (71)

Plate 57 Patto 1a. Whitstable Museum, Box 25 (35)

Plate 63 Sacrillus 3a. Whitstable Museum, Box 26 (64)

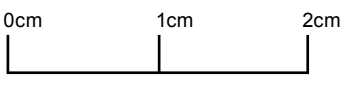


Plate 64 Saturio ii (Saturus)? 1a (this stamp/die identification is difficult to verify as the stamp is almost illegible). Guildhall Museum, Rochester, A1759

Plate 67 Severianus i 2a. Liverpool Museum, M7439

Plate 65 Saturninus ii 8a. Whitstable Museum, Box 27 (12)

Plate 68 Sextus v 4d. Whitstable Museum, Box 25 (58)

Plate 66 Severianus i 1a. Whitstable Museum, Box 25 (19)

Plate 69 Vitalis i 1b. Folkestone Museum, F879

Plates 70–1 are stamps that were reported to rather than inspected by *NOTS* (2008–12) and are therefore illustrated here without an accompanying drawing (not to scale).

Plate 70 Saturninus ii Ψ-c. British Museum, 1908,0727.5

Plate 71 Reverse stamp of Saturninus ii Ψ-c stamp. Herne Bay Museum, H1197

A number of stamp dies allegedly from Pudding Pan over which there has been some doubt regarding their identification (*NOTS* 2008–12; www.RGZM.de) were investigated during this study.

Campanus ii 2-a – was identified as Campanus ii 2a stamp; Catianus ii 6a' – was identified as a Catianus ii 6a stamp; Maior i 2-a – was identified as a Maior i 6a stamp; Caratillus ii 1-b and Maternus iv 1-a – were not seen as these were reported on vessels that are now missing from Swansea.

Plates 72–5 illustrate maker's marks that do not include the potter's name. Not illustrated to scale.

Plate 72 7 segment rosette. Powell-Cotton Museum, S74

Plate 73 8 8 segment rosette. Powell-Cotton Museum, S78

Plate 74 12 segment rosette. Powell-Cotton Museum, S.93

Plate 75 Concentric circles. Powell-Cotton Museum, S97

Appendix 1 Catalogue of Samian Wares Recovered from the Kentish Flats

The catalogue presented in this appendix lists all the recovered samian artefacts located during this study. The vessels were recorded at various levels of detail depending on whether they were inspected by, or reported to, the author. The catalogue includes details of vessel form, potters' stamp, vessel condition (damage, wear and marine growth), vessel and stamp dimensions, and museum accession details.

Key		
Form	r	rouletting decoration
Vessel	C	vessel largely intact with minimal damage that may include a missing foot-ring
	B	vessel broken but largely intact (>50% of vessel survives); may have been repaired
	F	fragment of vessel where <50% of vessel survives (base, rim or body sherd)
	r/b	fragment includes elements of rim and base
	EVE	estimated vessel equivalent
Rim/foot	mf	missing foot-ring
	br bf	broken rim or broken foot-ring
	wf	worn foot-ring (rims are generally worn)
	cr cf	chipped rim or chipped foot-ring
Wear	0	no wear
	1	minimal wear (standard internal wear)
	2	moderate wear
	3	heavy wear
	T	evidence of tilt (clearest indication measured by degrees)
	w	suggestion of tilt in partially worn glaze
	g	suggestion of tilt in uneven marine growth
	b	suggestion of tilt in partial breakage
	P	pitting caused by salt crystallization
	G	heavy growth obscuring evidence of tilt
	S	pre-firing stacking mark caused by foot-ring of adjacent foot-ring in stack
	W	post-firing wear mark caused by foot-ring of adjacent foot-ring in stack
Marine growth	oys	oyster
	m	mould/sawdust
	w	worms
	b	barnacles
	p	polo
	rem.	removed growth

Key for catalogue of samian wares recovered from the Kentish Flats

Catalogue of samian wares recovered from the Kentish Flats, arranged by potter

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.001	31	054	Aestivus	2a	C				
1.002	31	054	Aestivus	2a	C	cr cf wf	3	2	w
1.003	31	054	Aestivus	2a	C	br mf	3 T=w	3 W	b m
1.004	31	054	Aestivus	2a	C				
1.005	31	054	Aestivus	2a	C	wf	3	2 T=w	oys
1.006	31	054	Aestivus	2a	B	mf	3	2	oys
1.007	31	054	Aestivus	2a	B	wf	3	2	b
1.008	31	054	Aestivus	2a	C	bf wf	2 T=35°	1	oys
1.009	31	054	Aestivus	2a	C	bf wf	3 T=w	1	
1.010	31	054	Aestivus	2a	C	wf	3	1	p w s
1.011	31	054	Aestivus	2a	C	wf	2 T=w	1 W	m
1.012	31	054	Aestivus	2a	C	bf	2 T=w	0 S=80mm	b
1.013	31	054	Aestivus	2a	C	wf	2 T=w	2 T=w	none
1.014	31	054	Aestivus	2a	C	cr bf wf	1	3 W	none
1.015	31	054	Aestivus	2a	C	bf wf	3	0	b m rem.
1.016	31	054	Aestivus	2a	C	bf wf	2	1	
1.017	31	054	Aestivus	2a	C	bf	2 T=10°	1	oys
1.018	31	054	Aestivus	2a	C	bf	2 T=5°	1	
1.019	31	054	Aestivus	2a	C	bf	3	1	m rem.
1.020	31	054	Aestivus	2a	B 70o EVE		2 T	2	m rem.
1.021	31	054	Albucianus	6a	C	bf	1	1	
1.022	31	054	Albucianus	6a	C	mf	3 T=w	2 W	none
1.023	31	054	Albucianus	6a	C	wf	3	1 W	b rem.
1.024	31	054	Albucianus	6a	C	cr bf wf	0	1 W	
1.025	31	054	Albucianus	6a	C	mf	2 T=w	1 S=80mm	p s rem.
1.026	31	054	Albucianus	6a	C	mf	3	1	rem.
1.027	31	054	Albucianus	6a	C	cr	1 T=w	1	m w
1.028	31	054	Albucianus	6a	C	bf wf	2	1	b rem.
1.029	31	054	Albucianus	6a	C	mf	2	1	w b
1.030	31	054	Albucianus	6a	C	C	2 T=30°	1	oys
1.031	31	054	Albucianus	6a	C	mf	3	1	w
1.032	31	054	Albucianus	6a	B	wf	3	1	oys
1.033	31	054	Albucianus	6a	C	mf	2 T=18°	1	w
1.034	31	054	Albucianus	6a					
1.035	31	054	Albucianus	6g	C	wr mf	3	1 W	
1.036	31	054	Albucianus	6g	C	mf	3 Tw	1 P S	m rem.
1.037	31	054	Albucianus	6g	C	cf wf	2	1 P W=85mm	rem.
1.038	31	054	Albucianus	6g	C	bf wf	3	1	oys
1.039	31	054	Albucianus	6g	B	wf	3 T=5°	1	m w
1.040	31	054	Arncus	1a	C	mf	3	1	b m w
1.041	31	054	Arncus	1a	C				
1.042	31	054	Arncus	1a	C	C	3	1	oys
1.043	33	036	Arncus	1a	C	wf	3	1 W=45mm	b m w
1.044	33	036	Arncus	1a	C	bf wf	3	1 S=50mm	b rem.
1.045	33	036	Arncus	1a	C	mf	3	0	m w b
1.046	33	036	Arncus	1a	C	mf	3	3 T=w	oys
1.047	33	036	Arncus	1a	C	mf	3	2	w
1.048	33	036	Arncus	1a	C	mf	3	2	m b
1.049	33	036	Arncus	1a	C	mf	3	2	m w
1.050	33	036	Arncus	1a	C	bf wf	3	1	m
1.051	33	036	Arncus	1a	C	bf wf	3	1	oys
1.052	33	036	Arncus	1a	B	mf	3	2	m b

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.001								Manchester Museum	37423 R868
1.002	186			106				Whitby Museum	ARC1786
1.003	181				98			Whitby Museum	ARC1787
1.004								Folkestone Museum	F875
1.005	181	55	46	92		3	32	Whitstable Museum	Box 25 (30)
1.006	188		44			4	32	Whitstable Museum	Box 27 (57)
1.007	188	59	50	90		3	32	Whitstable Museum	Box 27 (59)
1.008	187	62	53	95		3	33	Whitstable Museum	Box 27 (60)
1.009	188							Guildhall, Rochester	917
1.010	181							British Museum	1901.1735
1.011	189	61	53	90	85	2.5	32	British Museum	1910,1025.26
1.012	187	61	52		88	3	32	British Museum	1910,1025.25
1.013	184			94				British Museum	1920,1123.33
1.014	188	62.5	56	93				Liverpool Museum	M6425
1.015	187	69	61	87		2.7	33	Liverpool Museum	M7470
1.016	185			94				Museum of London	81.164/S
1.017	190	58	49			3	33	Whitstable Collector	RA
1.018	185	59	48			3	33	Whitstable Museum	Box 1 Wallace
1.019	187	59	50	95	89	3	34	Powell-Cotton Museum	S62
1.020	188	58	48	90	86	3	35	Powell-Cotton Museum	S63
1.021	178		36	93				British Museum	1814,0705.38
1.022	185		54		90	2.2	24	Liverpool Museum	M7444
1.023	177	66	55	87		2.5	37	Liverpool Museum	M7446
1.024	180	67	53		88	3	27	British Museum	2000,0101.75
1.025	177		55		86	4	26	British Museum	M.1643
1.026	189		56			4	26	Herne Bay Museum	H1194
1.027	186							Maidstone Museum	5PP19
1.028	188	58	51		91	4.5	33	Swansea Museum	1908.11.33a
1.029	195		59		96	4.5	33	Swansea Museum	A908.11.44
1.030	181	62	53	90		3	26	Whitstable Museum	Box 1 Wallace
1.031	188		52			3	25	Whitstable Museum	Box 25 (28)
1.032	178	62	52	88		3	26	Whitstable Museum	Box 27 (27)
1.033	181		52			3	25	Whitstable Museum	W.1988.1000.17
1.034								Swansea Museum	X1 11f
1.035	186		53	90		3	24	Society of Antiquaries	574.3 (C.30)
1.036	185		52			4	25	Powell-Cotton Museum	S69
1.037	184	61	52	91	85	4	25	British Museum	1901.1734
1.038								Fisherman B	JM
1.039	185	64	56			4	25	Whitstable Museum	Box 27 (8)
1.040	182		55		93	2	34	British Museum	Unnumbered
1.041								Folkestone Museum	F876
1.042	183	56	46	94		3	33	Whitstable Collector	RA
1.043	133	70.5	64		48	4	30	British Museum	1908,0727.7
1.044	138	73	62		51	2.5	28	British Museum	1920,1123.34
1.045	137							Maidstone Museum	Box RB21A
1.046	140							Maidstone Museum	Box RB21A
1.047	136		46		51	3.8	26	Swansea Museum	1908.11.24a
1.048	135		61			3	28	Whitstable Museum	Box 26 (15)
1.049	136		60			3	28	Whitstable Museum	Box 26 (20)
1.050	136	67	62			3	28	Whitstable Museum	Box 26 (21)
1.051	136	72	64			3	27	Whitstable Museum	Box 26 (22)
1.052	136		60			3	27	Whitstable Museum	Box 26 (23)

Catalogue of samian wares recovered from the Kentish Flats, arranged by potter

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.053	33	036	Arncus	1a	C	mf	3	1	m rem.
1.054	33	036	Arncus	1a	C	mf	2 T 25o	1	m rem.
1.055	33	036	Arncus	1a	C	mf	2 T 20o	1 P	oys
1.056	33	036	Arncus	1a	F r/b	mf			
1.057	Lud Tf	029	Asiaticus ii	5a	C	bf	1	1	
1.058	31	054	Atilianus i	5a	C	bf wf	3	1	w oys rem.
1.059	33	036	Atilianus i	5a	C	bf wf	1	1	m
1.060	33	036	Atilianus i	5a	C	mf	1	1	m rem.
1.061	33	036	Atilianus i	5a	C	wr cr mf	3 T=w	1	b w p
1.062	33	036	Atilianus i	5a	C	mf	3	1 W	
1.063	38	088	Atilianus i	5a	C	cr mf	3	1	b rem.
1.064	79	032A	Atilianus i	5a	C	wf	2 T=w	1	
1.065	79	032A	Atilianus i	5a	C	wf	1 T=w	1	m
1.066	79	032A	Atilianus i	5a	C	cf	3	0 W=96mm	rem.
1.067	79	032A	Atilianus i	5a	C	wf	3	1 W	none
1.068	79	032A	Atilianus i	5a	C	bf wf	1	1 T=w W	none
1.069	79	032A	Atilianus i	5a	B	bf wf	3 T=w	1	oys
1.070	79	032A	Atilianus i	5a	C	br bf wf	3	1	
1.071	79	032A	Atilianus i	5a	C	wf	1	0 W	rem.
1.072	79	032A	Atilianus i	5a	C	cr wf	0	2 P	none
1.073	79	032A	Atilianus i	5a	C	cf	1 T=w	2 P	
1.074	79	032A	Atilianus i	5a	C	bf wf	3	1 W	m rem.
1.075	79	032A	Atilianus i	5a	C	wf	3 T=w	1	rem.
1.076	79	032A	Atilianus i	5a	C	wr cf	3 T=w	1 W=95mm	none
1.077	79	032A	Atilianus i	5a					
1.078	79	032A	Atilianus i	5a	C	bf wf	0	0 W	
1.079	79	032A	Atilianus i	5a	C	bf	0	0 W	
1.080	79	032A	Atilianus i	5a	C	bf wf	3	1 W	
1.081	79	032A	Atilianus i	5a	C		2 T	1 P	
1.082	79	032A	Atilianus i	5a					
1.083	79r	032P	Belsa (Arvernicus)?	1a	C	cr	1	2 T S=140mm	none
1.084	79r	032P	Belsa (Arvernicus)?	1a	C				
1.085	79r	032P	Belsa (Arvernicus)?	1a	C	bf wf	2 T=15°	1 S	rem.
1.086	79r	032P	Belsa (Arvernicus)?	1a	C	mf	3	1	
1.087	31	054	Caletus	2a	C	mf	3	0 W	
1.088	31	054	Caletus	2a	C	wf	2	1	oys
1.089	31	054	Caletus	2a	C	mf	3	1	oys
1.090	31	054	Caletus	2a	B	wf	3	1	oys
1.091	31	054	Caletus	2a	B	mf	3 T=w	1 P	m w
1.092	31	054	Caletus	2a	C	bf wf	3 T=30°	1	m w b
1.093	31	054	Caletus	2a	B	wf	3	1	w m
1.094	31	054	Caletus	2a	C	cr wr mf	3 T=w	1 S W=70mm	w p
1.095	31	054	Caletus	2a	C	mf	3 T=16°	2	rem.
1.096	31	054	Caletus	2a	C	mf	3	1	rem.
1.097	31	054	Caletus	2a	C	mf	3	1	oys
1.098	31	054	Caletus	2a	C	mf	3	1	oys

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.053	135		60	50		3	28	Powell-Cotton Museum	S86
1.054	142		62		50	3	30	Powell-Cotton Museum	S87
1.055	136		65		47			Powell-Cotton Museum	S96
1.056			62			3	27	Whitstable Museum	Box 24 (73)
1.057	144							Canterbury Museum	1123
1.058	187	57			98	2.7	33	National Museums Scotland	1911.292
1.059	138	62				3.4	27	National Museums Scotland	1911.287
1.060	141		83			3.5	26	National Museums Scotland	1911.288
1.061	143		72			3.5	29	Ashmolean Museum	1909.1156
1.062	141		66		50	5	28	British Museum	M.1681
1.063	143		64		56	3.4	30	Liverpool Museum	M7453
1.064	189			100				Museum of London	34.285
1.065	182							Folkestone Museum	F872
1.066	181	38	27	97		3	28	Jewry Wall, Leicester	A851.1951(E261A)
1.067	181	40			96	3.2	38.5	Kelvingrove Museum	1903.269.I
1.068	180	39	28	102		2.5	28	Liverpool Museum	M7469
1.069	175							Maidstone Museum	Box RB21B
1.070	186							Maidstone Museum	Box RB21B
1.071	182	36			96	3.2	38	National Museums Scotland	1911.289
1.072	181	42			94	3.4	38	National Museums Scotland	1911.290
1.073	181	40	33	102	90	3.5	28	National Museum Wales	02.18
1.074	183	35.5	30		101	3.5	28.5	Swansea Museum	1908.11.2a
1.075	183	38	30	104		3	28	Whitstable Museum	W.1988.1000.17
1.076	182	38	29	100		3	28	Ashmolean Museum	R 332
1.077	172	38						Ashmolean Museum	1920.229
1.078	184	44	31		96	3.5	29	British Museum	M.1752
1.079	181	41	28.5		94	3	28	British Museum	M.1753
1.080	182	41	29		100	4	29	British Museum	M.1754
1.081	187	37	26	103	99	4	29	Powell-Cotton Museum	S72
1.082								Skipton Museum	B17
1.083	277			140				British Museum	1920,1123.15
1.084								Manchester Museum	37422 R867
1.085	276	54	43			3	26	Whitstable Museum	W.1988.1000.17
1.086	274		47		140	3	26	Powell-Cotton Museum	S61
1.087	181		57			3.6	22	Liverpool Museum	M7445
1.088	178							Maidstone Museum	Box RB21A
1.089	178		49			3	22	Whitstable Museum	Box 25 (26)
1.090	175	62	53	89		4	24	Whitstable Museum	Box 26 (?)
1.091	180		55			3	23	Whitstable Museum	Box 27 (10)
1.092	176	60	52	87		3	20	Whitstable Museum	Box 27 (10)
1.093	182	56	47			4	24	Whitstable Museum	Box 27 (4)
1.094	180		50			3	24	Pitt Rivers, Oxford	1884.37.30
1.095	179		50			4	24	Herne Bay Museum	H1195
1.096	181		49			4	22	Herne Bay Museum	H1195
1.097	179		49			4	23	Whitstable Collector	RA
1.098	176		53			3	25	Whitstable Collector	RA

Catalogue of samian wares recovered from the Kentish Flats, arranged by potter

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.099	31	054	Caletus	2a	C	mf	2 Tw 20o	1	m rem.
1.100	31	054	Caletus	2a	F base	mf			
1.101	33	036	Caletus	2a	C		1	1	oys
1.102	33	036	Caletus	2a	C	bf wf	2 T=50°	2	rem.
1.103	33	036	Caletus	2a	C	bf wf	2 T=60°	2	rem.
1.104	33	036	Caletus	2a	C	bf	2 T=45°	3 T=w	rem.
1.105	33	036	Caletus	2a	B		2	2	m rem.
1.106	33	036	Caletus	2a	C	wf	1	1	w b
1.107	33	036	Caletus	2a	C	bf (10% left)	3 T=g	1 W	oys b
1.108	33	036	Caletus	2a	C	bf wf	3	2	w m
1.109	33	036	Caletus	2a	C	wf	0	0 W	b
1.110	33	036	Caletus	2a	C		2 T 45o	2	m rem.
1.111	33	036	Caletus	2a	C	mf	2 T=25°	1	
1.112	33	036	Caletus	2a	C	cf	1	1	
1.113	33	036	Caletus	2a	C	mf	2 T=10°	1	
1.114	33	036	Caletus	2a	C	mf	2 T=25°	2	w
1.115	33	036	Caletus	2a	C	C	2 T=40°	1	rem.
1.116	33	036	Campanus ii	2a					
1.117	79	032A	Campanus ii	2a	B		3 T=w	1	m
1.118	79	032A	Campanus ii	2a	C				
1.119	79	032A	Campanus ii	2-a	C	cf wf	3	2 W	none
1.120	79	032A	Campanus ii	2a	C	wf	3	1	oys
1.121	79	032A	Caratillus ii	1a	C	bf wf	1 T=w	1 W=100mm	m
1.122	79	032A	Caratillus ii	1a	C	bf wf	3	1	
1.123	79	032A	Caratillus ii	1a	C	bf	3 T=w	1	rem.
1.124	79	032A	Caratillus ii	1a	C	bf	3	1	
1.125	79	032A	Caratillus ii	1a	C	bf wf	3 T=w	1	oys
1.126	79	032A	Caratillus ii	1a	C	wf	3	0 W	
1.127	79	032A	Caratillus ii	1a	C				
1.128	79	032A	Caratillus ii	1a	C	mf	3	1	m rem.
1.129	79	032A	Caratillus ii	1a	C				
1.130	79	032A	Caratillus ii	1a	C	bf wf	2 T=w	1 S=100mm	none
1.131	79	032A	Caratillus ii	1a					
1.132	79	032A	Caratillus ii	1a	C	bf	3 T	1	rem.
1.133	79	032A	Caratillus ii	1-b					
1.134	79	032A	Catianus ii	6a	B	wf	3	1	m
1.135	79	032A	Catianus ii	6a'					
1.136	80	031	Catianus ii	6a	C	wf	3	1 W=50mm	b m
1.137	80	031	Catianus ii	6a	C		3	1	
1.138	80	031	Catianus ii	6a	C	wf	3 T=w	0 W	
1.139	80	031	Catianus ii	6a	C	bf wf	3	1	m
1.140	80	031	Catianus ii	6a	C	bf wf	3	1 W=50mm	m
1.141	80	031	Catianus ii	6a	C	bf wf	3	1	rem.
1.142	80	031	Catianus ii	6a	C				
1.143	Lud Tf	029	Catianus ii	6a	C	wf	1 P	1 P	w
1.144	Lud Tf	029	Catianus ii	6a	C	bf wf	3	1	w m
1.145	Lud Tf	029	Catianus ii	6a					
1.146	31r	056	Cintusmus i	5a	B 70%	cr mf	3	1	oys w p b
1.147	31r	056	Cintusmus i	5a	C	wf	1	1	none
1.148	31r	056	Cintusmus i	5a	C	bf	0	0 W	oys
1.149	33	036	Cintusmus i	5a	C	cr mf	3	2	m rem.
1.150	33	036	Cintusmus i	5a	C	bf wf	3	1	m w

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.099	181		52		86	4	26	Powell-Cotton Museum	S66
1.100						3	25	Whitstable Museum	Box 24 (75)
1.101	107							Canterbury Museum	Box 2 (48)
1.102	103	53	43	47		4	25	Herne Bay Museum	H1192
1.103	103	54	43	45		4	23	Herne Bay Museum	H1192
1.104	105	55	44	46		4	22	Herne Bay Museum	H1192
1.105	107							Maidstone Museum	Box RB21B
1.106	103							Maidstone Museum	Box RB21B
1.107	107	54	46		44	5	25	Swansea Museum	A908.11.15
1.108	100	49	40			3	24	Whitstable Museum	Box 26 (37)
1.109	103	50	43		41	3	24	British Museum	M.1694
1.110	104	55	44	46	40	4	25	Powell-Cotton Museum	S92
1.111	105		44			4	24	Whitstable Museum	Box 1 Wallace
1.112	105	55	44	46		4	24	Whitstable Museum	Box 1 Wallace
1.113	107		44			4	25	Whitstable Museum	Box 1 Wallace
1.114	107		46			3	23	Whitstable Museum	Box 26 (53)
1.115	105	53	43	48		3	24	Whitstable Museum	W.1988.1000.17
1.116								Swansea Museum	1908.11.16a
1.117								Herne Bay Museum	H406/1
1.118	170	40						British Museum	1908,0727.3
1.119	180	42	33	98	93	3.5	26	Swansea Museum	no number
1.120	177	31	18	93		4	26	Whitstable Museum	Box 26 (63)
1.121	183	44	34		103	4.5	30	British Museum	1920,1123.17
1.122	183	43	35	106		4	28	Herne Bay Museum	H1186
1.123	182	43	32	102		4	30	Whitstable Collector	RA
1.124	180	43	31	109		4	28	Whitstable Museum	Box 1 Wallace
1.125	185	43	32	105		4	29	Whitstable Museum	Box 25 (65)
1.126	185	46	36		105	5.5	29	British Museum	M.1755
1.127	178	45						Plymouth Museum	4469
1.128	184		34		101	4	29	Powell-Cotton Museum	S73
1.129								National Maritime Museum, London	ARC 1979/7L
1.130	180			101				British Museum	1920,1123.16
1.131	c178	c45						Museum of London	3295
1.132	182	45	34			4	28	Whitstable Collector	RA
1.133								Swansea Museum	no number
1.134	189	44	34			4	24	Whitstable Museum	Box 26 (67)
1.135								Swansea Museum	1908.11.4a
1.136	101	39	30	52	47	3	26	British Museum	1901.1736
1.137	97			51				British Museum	1920,1123.21
1.138	100	49	26		46	2.5	25	British Museum	M.1750
1.139	101							Canterbury Museum	1199
1.140	98	37	26	52	48	2.5	27	Controlled dredge	MW
1.141	100							Maidstone Museum	Box RB21C
1.142	233							Liverpool Museum	M7463
1.143	109	39	28	54	47	3	25	British Museum	1937,0316.1
1.144	114	39	28	55		3	24	Whitstable Museum	Box 25 (13)
1.145								Birmingham Museum	414.40
1.146	235		64		92	3	25	Fisherman C	SG
1.147	243	79	67.5	106	99	2.8	27	British Museum	1920,1123.29
1.148	240	75	61		101	4	25	British Museum	M.1650
1.149	112		48		39	4	29	Powell-Cotton Museum	S29
1.150	109							Canterbury Museum	1055

Catalogue of samian wares recovered from the Kentish Flats, arranged by potter

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.151	33	036	Cintusmus i	5a	C		3	1	m
1.152	33	036	Cintusmus i	5a	C	bf wf	3	1	m
1.153	33	036	Cintusmus i	5a	B	wf	3	2	b m
1.154	33	036	Cintusmus i	5a	C	C	3	1	
1.155	33	036	Cintusmus i	5a	C	mf	3	2	w
1.156	33	036	Cintusmus i	5a	C	bf wf	3	3	m w
1.157	33	036	Cintusmus i	5a	C	bf wf	3	2	m
1.158	33	036	Cintusmus i	5a	C	bf wf	3	1	oys
1.159	33	036	Cintusmus i	5a	C	wf	3	1 W	b m
1.160	33	036	Cintusmus i	5a	C		3	1	w
1.161	33	036	Cintusmus i	5a	F base	_			
1.162	38	088	Cintusmus i	5a	C	mf	3	1	m rem.
1.163	38	088	Cintusmus i	5a	C	mf	3	1	rem.
1.164	38	088	Cintusmus i	5a	C	mf	3 T=w	0	w
1.165	79	032A	Cracina	2a	C	bf wf	3	1	oys
1.166	79	032A	Cracina	2a	C	bf	3	1	m rem.
1.167	31r	056	Crispinus ii	2a	C	wr bf wf	3	1 S	w p
1.168	31r	056	Crispinus ii	2a	C	mf	3	1	none
1.169	31r	056	Crispinus ii	2a	C	cr bf	3 T 15o	0 S	
1.170	36	015A	Datius	2a	C	br	1	1	
1.171	31	054	Decmus ii	3b	C	mf	2 T=w	1 W	oys rem.
1.172	31	054	Decmus ii	3b	C	wf	2 T=30°	1	m w
1.173	31	054	Decmus ii	3b	C	mf	3	2	w
1.174	31	054	Decmus ii	3b	C	bf	2 T 20o	1	oys b w m
1.175	33	036	Decmus ii	3b	C		2 T=75°	2 T=w	rem.
1.176	33	036	Decmus ii	3b	C		2 T=35°	3 T=w	rem.
1.177	33	036	Decmus ii	3b	B	br	2	2	m
1.178	33	036	Decmus ii	3b	C		3 T=w	1 P	
1.179	33	036	Decmus ii	3b	C	wf	3 T=w	1 W	m
1.180	33	036	Decmus ii	3b	C	bf wf	3 T=w	1 T=g W	w
1.181	33	036	Decmus ii	3b	C	wf	1 T=w	1	oys
1.182	33	036	Decmus ii	3b	C	bf wf	2 T=10°	1	m
1.183	33	036	Decmus ii	3b	C	C	2 T=20°	1	oys
1.184	33	036	Decmus ii	3b	C	wr	2 T=g	2 T=w	w p
1.185	33	036	Decmus ii	3b	C	wf	2 T=w	1	
1.186	33	036	Decmus ii	3b	C	cf wf	1 T=55°	1 S=35mm	m
1.187	33	036	Decmus ii	3b	C	wf	2 T=w	0 W	
1.188	33	036	Decmus ii	3b	B 85%	cr bf wf	3 T=break	1 P	oys w p
1.189	33	036	Decmus ii	3b	C	C	2 T=30°	2 T=w	rem.
1.190	33	036	Decmus ii	3b	C	C	2 T=35°	2 T=w	rem.
1.191	33	036	Decmus ii	3b	C	C	1 T=w	1	
1.192	33	036	Decmus ii	3b	C	C	1	1	
1.193	33	036	Decmus ii	3b	C	C	2 T=45°	2 T=w	
1.194	33	036	Decmus ii	3b	C		2 T 150o	2	m rem.
1.195	33	036	Decmus ii	3b	C				
1.196	C15	045A	Doeccus i	11f	C	wf	1	2	oys
1.197	80	031	Firminus i-Arean	2a	C	wf	2	1 W=55mm	w rem.
1.198	79	032A	Gaius i	1-a	C	bf wf	3	3 T=w	oys m p
1.199	79	032A	Gaius i	1-a	C				
1.200	31	054	Genitor ii	5b	C	bf wf	2 T=w	2 W	w p
1.201	38	088	Iullinus ii	3a	C	mf	2	1	m rem.

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.151	108	68	51	43.5		5	29	Liverpool Museum	M7458
1.152	106							Maidstone Museum	Box RB21B
1.153	111	56	48		40	4	26	Swansea Museum	1908.11.17a
1.154	107	58	49	46		4	24	Whitstable Museum	Box 1 Wallace
1.155	106		47			4	29	Whitstable Museum	Box 25 (39)
1.156	104	46	38	42		4	29	Whitstable Museum	Box 26 (50)
1.157	110		42			3	28	Whitstable Museum	Box 26 (51)
1.158	104	49	42					Whitstable Museum	W.1988.1000.17
1.159	109	53		48	45	4.5		British Museum	1977,0501.9
1.160	106	53						Jewry Wall, Leicester	AIII.1927 SLC
1.161				42		4	27	Whitstable Museum	Box 24 (72)
1.162	146		60		59	4	29	Powell-Cotton Museum	S76
1.163	146		68		61	4	29	British Museum	1920,1123.35
1.164	146		65		55	4	29	British Museum	1908,0727.10
1.165	175							Maidstone Museum	Box RB21B
1.166	171	45	35	90	85	4	30	Powell-Cotton Museum	S74
1.167	243	73	62	102		4	*c.* 25	Ashmolean Museum	1912.58
1.168	248		72		94	4	28	British Museum	1901.1706
1.169	246	77	59	102	93	5	30	Powell-Cotton Museum	S59
1.170	162							Maidstone Museum	Box RB21A
1.171	185		54.5		99	4	25	Swansea Museum	1908.11.36a
1.172	191	62	53	92		3	25	Whitstable Museum	Box 27 (2)
1.173	186		44			3	28	Whitstable Museum	Box 27 (3)
1.174	183	57	48	95	91	4	26	Saffron Walden Museum	L2059
1.175	106	55	45	46		3	26	Herne Bay Museum	H1191
1.176	103	53	45	47		4	26	Herne Bay Museum	H1191
1.177	104							Maidstone Museum	Box RB21B
1.178	106							Maidstone Museum	Box RB21B
1.179	105	56	48		44	3	25	Swansea Museum	1908.11.12a
1.180	103	54	45		43	3.5	25	Swansea Museum	1908.11.13a
1.181	99	47	40		39	3.5	24	Swansea Museum	1908.11.14a
1.182	104	57	49			3	26	Whitstable Museum	Box 26 (?)
1.183	104	49	41			4	25	Whitstable Museum	Box 26 (46)
1.184	103			49				Whitby Museum	ARC1762
1.185	105			47				Museum of London	21964
1.186	104	53	44	44	39	4	17	British Museum	1937,0316.2
1.187	104	50	42		43	5.5	25	British Museum	M.1707
1.188	105	50	43		45	3		Fisherman C	SG
1.189	106	52	43	45		4	25	Whitstable Collector	RA
1.190	105	57	46	46		4	25	Whitstable Collector	RA
1.191	107	52	43	48		4	26	Whitstable Museum	1986.17.1.1
1.192	103	52	41	44		4	26	Whitstable Museum	Box 1 Wallace
1.193	103	55	44	45		4	26	Whitstable Museum	Box 1 Wallace
1.194	105	52	43	46	42	3	27	Powell-Cotton Museum	S30
1.195	104							Powell-Cotton Museum	S91
1.196	199	65	53	12	71			British Museum	1925,0502.29
1.197	100	40	29	55	51	3	39	British Museum	1937,0316.3
1.198	191	45	30	95	90	3	26	British Museum	1920,1123.19
1.199								National Maritime Museum, London	ARC 1979/8L
1.200	182			108				Whitby Museum	ARC1763
1.201	141		66		53	3	27	British Museum	1937,0316.4

Catalogue of samian wares recovered from the Kentish Flats, arranged by potter

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.202	38	088	Iullinus ii	3a	C	mf	1 T=w	0	w
1.203	31r	056	Iustus ii	2b	C	bf wf	2 T=w	1	w
1.204	31r	056	Iustus ii	2b	B>50%	bf wf	3	1	
1.205	31r	056	Iustus ii	2b	C	cr	3 T=w	1	none
1.206	31r	056	Iustus ii	2b	C	wf	1 T=w	1	
1.207	31	054	Macallus	3a	C	mf	3 T=15°	1	rem.
1.208	31	054	Macallus	3a	C	bf wf	2	1	m
1.209	31	054	Macallus	3a	C	bf wf	3	1	m w p
1.210	31	054	Macallus	3a	F base	bf wf			b
1.211	31r	056	Macallus	3a	C	bf wf	2 T=w	0	w
1.212	31r	056	Macrianus	1a	B>50%	wf	1 T=w	1 W	none
1.213	33	036	Mainacnus	2a	C	wf	3	1	w
1.214	33	036	Mainacnus	2a					
1.215	31r	056	Mainacnus	2a					
1.216	31r	056	Mainacnus	2a	C	bf wf	2 T=w	1 W	oys
1.217	31r	056	Mainacnus	2a	C	br wf	1 T=w	1	
1.218	31r	056	Mainacnus	2a	C	cr wr bf	3 T=b	1 W	w p
1.219	31r	056	Mainacnus	2a	C	bf wf	3 T=g	1 W	b rem.
1.220	31r	056	Mainacnus	2a	B 85%	br wf	3 T=w	3	b w
1.221	31r	056	Mainacnus	2a	C	bf	2 T=15°	1	
1.222	31r	056	Mainacnus	2a	C	bf	2 T 30o	1 S	m rem.
1.223	31r	056	Mainacnus	2a	C	bf	3	1	m rem.
1.224	31r	056	Mainacnus	2a	B 60o EVE		3 T	1	m rem.
1.225	31r	056	Mainacnus	2a	C	wf	1 T=w	1	b m w
1.226	31r	056	Mainacnus	2a	B	br cf wf	2 T=20°	1 P W=114mm	
1.227	31r	056	Mainacnus	2a	C	bf wf	3	1	b
1.228	31r	056	Mainacnus	2a	F r/b 13%	mf	3	1	oys p w
1.229	80	031	Mainacnus	2a					
1.230	31	054	Maior i	3a	C	bf wf	3 T=w	1 S=85mm	oys w
1.231	31r	056	Maior i	6a	C	mf	3	1	oys
1.232	31r	056	Maior i	6a	C	bf wf	1 T=w	1	oys w s
1.233	31r	056	Maior i	6a	C	cr wf	3 T=w	1 T=w	m
1.234	31r	056	Maior i	6a	C		2 T=w	1	oys
1.235	31r	056	Maior i	6a	B 75%	cr br wf	2 T=60°	1 W=94mm	p b w
1.236	31r	056	Marcellinus ii	2a	C	mf	3	1	oys w
1.237	31r	056	Marcellinus ii	2a					
1.238	31r	056	Marcus v	9a	C	bf wf	1 T=w	1 W	none
1.239	38	088	Marcus v	9a	C	bf	2 T 30o	2 P	
1.240	79	032A	Martinus iii	1a	C	wf	3	1 S=100mm	rem.
1.241	79	032A	Martinus iii	1a	C	br bf wf	3	1	m b
1.242	33	036	Mascellio i	4a	C	bf wf	3	2	m w
1.243	31	054	Maternianus i	3a	C	bf wf	3	1	oys
1.244	31r	056	Maternianus i	3a	C	bf wf	3	1	m
1.245	33	036	Maternianus i	3a	C	bf	3	1 T=w W	
1.246	33	036	Maternianus i	3a	B 50%	bf wf	3	1	b m
1.247	33	036	Maternianus i	3a	C	bf wf	3	2 W	m w b
1.248	33	036	Maternianus i	3a	C	wf	3	1	rem.
1.249	33	036	Maternianus i	3a	C	cr bf wf	3	1 W	m
1.250	33	036	Maternianus i	3a	C	wr cr mf	3	1 W?	b w p
1.251	33	036	Maternianus i	3a	C	wf	3	2	b rem.
1.252	33	036	Maternianus i	3a	C	bf wf	3	1	m w

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.202	140		68		51	3	28	British Museum	1950,0502.9
1.203								Fisherman B	JM
1.204	282							Guildhall, Rochester	921
1.205	276	73	57		110	3	28	British Museum	1920,1123.30
1.206	249	67	54	101		3.2	30	Liverpool Museum	M7433
1.207	182		50			3	26	Herne Bay Museum	H1196
1.208	180							Maidstone Museum	Box RB21A
1.209	185							Whitstable Museum	Box 27 (11)
1.210					90	3	25	Fisherman C	SG
1.211	242	74	63.5		99	4	26	British Museum	1937,0316.5
1.212	220	50						Liverpool Museum	M7467
1.213	101							Guildhall, Rochester	64
1.214								Swansea Museum	no number
1.215								Institute of Archaeology, London	?
1.216	249	75	61	116		4	30	Liverpool Museum	M7435
1.217	268							Maidstone Museum	Box RB21C
1.218	243	69	57	101		3	30	Society of Antiquaries	574.4 (C.30)
1.219	247	89	78		101	4	31	Swansea Museum	A908.11.29
1.220	234			113				Whitby Museum	ARC1788
1.221	244	76	61	105		4	29	Whitstable Museum	Box 24
1.222	278		65		109	4	31	Powell-Cotton Museum	S57
1.223	251	77	65		98	5	32	Powell-Cotton Museum	S58
1.224	245	74	60	98	90	3	24	Powell-Cotton Museum	S60
1.225	243	75.5	62	105	94	4.5	30	British Museum	1908,0727.4
1.226	287	84	71	116	110	3	30	Fisherman C	SG
1.227	288							Maidstone Museum	Box RB21C
1.228			76			4		Fisherman C	SG
1.229								Exeter Museum	31.37/1947/2
1.230	183	59	46		88	5	27	British Museum	M.1660
1.231	248							Maidstone Museum	Box RB21C
1.232	251							British Museum	1901.1733
1.233	240			88	81	2.5	23	British Museum	1920,1123.25
1.234	254			100				British Museum	1920,1123.28
1.235	*c.* 238	73	59	94	88	3	24	Controlled dredge	MW
1.236	251	64	58		98	2	29	British Museum	1937,0316.6
1.237								Swansea Museum	LX 9a
1.238	235							British Museum	1920,1123.26
1.239	137	70	59	62	56			Powell-Cotton Museum	S77
1.240	191	47	32	105	101	3.5	27	British Museum	1920,1123.18
1.241	184							Maidstone Museum	Box RB21B
1.242	106							Canterbury Museum	Box 2 (74)
1.243	175	48	41			2	29	Whitstable Museum	Box 25 (29)
1.244								Prof. D. Peacock	
1.245	104	53	48	39		2.4	26	Liverpool Museum	M7460
1.246	103	53	47		36	3.7	27	Swansea Museum	no number
1.247	103	52	47		40	3.5	26	Swansea Museum	1908.11.20a
1.248	103	52	46		38	3	27	Swansea Museum	1908.11.21a
1.249	101	51	45		37	3	26	Swansea Museum	1908.11.23a
1.250	102		44			2.5	26	Ashmolean Museum	1909.1158
1.251	100	51	47	36	34	2.5	26	British Museum	.1377.70 (M1724)
1.252	101							Maidstone Museum	Box RB21B

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Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.253	33	036	Maternianus i	3a					
1.254	33	036	Maternianus i	3a	C	bf wf	3	1	
1.255	33	036	Maternianus i	3a	C	mf	3	1	w
1.256	33	036	Maternianus i	3a	C	mf	3	1	rem.
1.257	33	036	Maternianus i	3a	B	mf	3	2	w
1.258	33	036	Maternianus i	3a	C	mf	3 T=w	1	b
1.259	33	036	Maternianus i	3a	C	mf	3	2	m
1.260	33	036	Maternianus i	3a	C	bf wf	3	2	m w
1.261	33	036	Maternianus i	3a	C	C	3	1	
1.262	33	036	Maternianus i	3a	C	mf	3	1	w m
1.263	33	036	Maternianus i	3a	C	mf	3	1	w b
1.264	33	036	Maternianus i	3a	C	wf	3	2	m rem.
1.265	33	036	Maternianus i	3a	C	bf wf	3	2	m w b
1.266	33	036	Maternianus i	3a	C	bf wf	3	3	oys
1.267	33	036	Maternianus i	3a					
1.268	31	054	Maternus iv	1-a					
1.269	33	036	Maternus iv	1e					
1.270	33	036	Maternus iv	1a	C	cf wf	3	1	b m
1.271	33	036	Maternus iv	1a	C	wf	0	0 S=35mm	
1.272	33	036	Maternus iv	1a	C	bf	2 T=w	0 S	b
1.273	33	036	Maternus iv	1a	C		3	1	b m rem.
1.274	33	036	Maternus iv	1a	C		3	1	b m
1.275	79	032A	Maulianus	1a	C	bf wf	3	1	w m
1.276	79	032A	Maulianus	1a	C	cr	3	1	m rem.
1.277	79	032A	Mercator iv	5a	C	mf	3 T=w	1	oys b w
1.278	31r	056	Namilianus	3b					
1.279	33	036	Namilianus	3b	C	mf	2	0 W	w
1.280	33	036	Namilianus	3b	C	mf	3	1	m
1.281	33	036	Namilianus	3b	C	mf	3	2	b m
1.282	33	036	Namilianus	3b	C	bf wf	3	2	m w b
1.283	33	036	Namilianus	3b	C		3	2	m rem.
1.284	33	036	Namilianus	3b	C	mf	1	1	
1.285	33	036	Namilianus	3b	C	C	1	1	
1.286	38	088	Namilianus	3b	C	wr mf	3	1 P	b w p
1.287	31	054	Patto	1a	C	bf wf	3	1	w
1.288	31	054	Patto	1a	C	mf	3	1 W	
1.289	31	054	Patto	1a	C	wf	1 T=10°	1	m w b
1.290	31	054	Patto	1a	C	wf	2 T=20°	1	oys
1.291	31	054	Patto	1a	C	bf	3 T	1 S	m rem.
1.292	31	054	Patto	1a	C	cr bf	2 Tw P	1	m rem.
1.293	31	054	Patto	1a	C	bf wf	2 T=20°	1	w m
1.294	31	054	Patto	1a	B	wf	3 T=20°	1	m
1.295	31	054	Patto	1a					
1.296	33	036	Patto	1a	C	bf wf	3 T=w	1 W	m
1.297	33	036	Patto	1a	C	bf wf	3	2	m w
1.298	33	036	Patto	1a	B 75%	bf			oys
1.299	33	036	Patto	1a	C	bf wf	3	1	w
1.300	31r	056	Paullus v	8c	C	mf	3	1	oys
1.301	79	032A	Paullus v	8c	C	wr wf	3 T=w	1 W=92mm	none
1.302	79	032A	Paullus v	8c	C	wf	3 T=w	0 W	
1.303	79	032A	Paullus v	8c	C	br bf wf	3	1	m b w
1.304	79	032A	Paullus v	8c	C	bf wf	3	1	m b w

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.253	100							Maidstone Museum	Box RB21B
1.254	100	50	46			3	25	Whitstable Museum	Box 25 (36)
1.255	100		44			2	25	Whitstable Museum	Box 25 (38)
1.256	104		46			2	25	Whitstable Museum	Box 25 (47)
1.257	103		42			3	26	Whitstable Museum	Box 26 (42)
1.258	99		45			3	26	Whitstable Museum	Box 26 (43)
1.259	102		43			2	25	Whitstable Museum	Box 26 (45)
1.260	103		44			3	25	Whitstable Museum	Box 26 (49)
1.261	107					2	25	Whitstable Museum	Box 26 (54)
1.262	100		43			3	26	Whitstable Museum	Box 26 (55)
1.263	102					2	26	Whitstable Museum	W.1988.1000.17
1.264	107	50	42	40	36	3	27	Powell-Cotton Museum	S90
1.265	102	51	45	39		2	25	Whitstable Museum	Box 26 (56)
1.266	102	56	47	40		2	25	Whitstable Museum	Box 25 (41)
1.267								Swansea Museum	A908.11.19
1.268								Swansea Museum	no number
1.269	105	62						Ashmolean Museum	1909.1157
1.270	103	55	48	41	38	3	30	British Museum	0393.65
1.271	107	61	50		40	3.5	26	British Museum	M.1721
1.272	105	57	46		42	4	30	British Museum	M.1722
1.273	106	58	51	37.5		4	31	Liverpool Museum	M7457
1.274	106							Maidstone Museum	Box RB21B
1.275	185	45	32	102		6	26	Herne Bay Museum	H1187
1.276	182	43	35	97	91	5	27	Powell-Cotton Museum	S75
1.277	175		31.5		88	4.5	2.8	British Museum	1937,0316.7
1.278								Manchester Museum	37431 R879
1.279	142		70		48	3	28	British Museum	1937,0316.8
1.280	140		70			3	30	Whitstable Museum	Box 25 (24)
1.281	137		56			3	32	Whitstable Museum	Box 26 (16)
1.282	137	80	68	54		3	31	Whitstable Museum	Box 26 (18)
1.283	108	60	52	42	37	3	32	Powell-Cotton Museum	S89
1.284	103		46			3	26	Whitstable Museum	Box 1 Wallace
1.285	100	54	45	41		3	26	Whitstable Museum	Box 1 Wallace
1.286	131		67			3.5	31	Ashmolean Museum	1910.1
1.287	189			90				Guildhall, Rochester	915
1.288	190		57		95	3	23	Swansea Museum	A908.11.38
1.289	187	64	55	91		3	25	Whitstable Museum	Box 27 (6)
1.290	192	62	49	95		3	22	Whitstable Museum	Box 27 (61)
1.291	188	67	55		92	3	26	Powell-Cotton Museum	S65
1.292	191	60	52	90	85	3	26	Powell-Cotton Museum	S67
1.293	187	69	58			3	22	Whitstable Museum	Box 25 (33)
1.294								Herne Bay Museum	H406/2
1.295								Swansea Museum	1908.11.34a
1.296	106	57	54		39	4	23	British Museum	M.2144
1.297	100	54	48	37		3	23	Whitstable Museum	Box 26 (52)
1.298		56	50	42		3	23	Whitstable Museum	Box 24 (70)
1.299	106	58	52			3	22	Whitstable Museum	Box 25 (35)
1.300	248		64			3	33	Whitstable Collector	RA
1.301	188	45	33	101		4	24.5	Ashmolean Museum	1961.254
1.302	186	43	32		93	3	26	British Museum	M.1756
1.303	185							Maidstone Museum	Box RB21B
1.304	183							Maidstone Museum	Box RB21B

Catalogue of samian wares recovered from the Kentish Flats, arranged by potter

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.305	79	032A	Paullus v	8c	B	wf	3	1	w m
1.306	79	032A	Paullus v	8c	B	bf wf	3 T=w	1 S=100mm	oys m
1.307	79	032A	Paullus v	8c	C	wf	3 T=w	1	
1.308	79	032A	Paullus v	8c	C	cr cf wf	3	1 W	p
1.309	79	032A	Paullus v	8c	C	bf	3	1 P	m rem.
1.310	Lud Tf	029	Paullus v	8c			1	1	
1.311	31r	056	Primanus iii	6f	C	wf	3 T=18°	1	m
1.312	31r	056	Primanus iii	6f	C	cr bf wf	1	1	w b m
1.313	80	031	Primanus iii	6d	B 60%	br cf wf	0	0	w
1.314	31	054	Priscus iii	4d	C	cr mf	3	1 S	m rem.
1.315	31	054	Quintus v	5a	C	bf wf	1	1	
1.316	31	054	Quintus v	5a	C	bf	2 T=5°	1	oys
1.317	31	054	Quintus v	5a	C	cr mf	3	1 S	oys
1.318	33	036	Quintus v	5a	C	wr wf	3	1 W	p w
1.319	33	036	Quintus v	5a	C	bf wf	3	1	m b w
1.320	33	036	Quintus v	5a	C	bf wf	3	1 W	rem.
1.321	33	036	Quintus v	5a	F	bf wf		1	
1.322	33	036	Quintus v	5a	F	wf	3	1	
1.323	33	036	Quintus v	5a	F base	_			
1.324	33	036	Quintus v	5a					
1.325	79	032A	Quintus v	5a					
1.326	79	032A	Sacrillus	3a	B	bf wf	3	1	
1.327	79	032A	Sacrillus	3a	C	bf wf	3	1 W=100mm	none
1.328	79	032A	Sacrillus	3a	C				
1.329	79	032A	Sacrillus	3a	B	wf	3	1	m w b
1.330	31r	056	Saturio ii	1a	C		1	1	
1.331	31	054	Saturninus ii	8a	C	cf	3 T 20o	1	m rem.
1.332	31	054	Saturninus ii	8a	C	wr cr mf	3 T=w	1	b w p
1.333	31	054	Saturninus ii	8a	C	bf	3	0	m b
1.334	31	054	Saturninus ii	8a	C	wr wf	2 T=w	1	
1.335	31	054	Saturninus ii	8a	C	bf wf	2 T=w	1	
1.336	31	054	Saturninus ii	8a	C	mf	3 T=w	0 W	
1.337	31	054	Saturninus ii	8a	C	bf wf	3	1	oys
1.338	31	054	Saturninus ii	8a	C 88%	br wr mf	3 T=w	1	w p
1.339	31	054	Saturninus ii	8a	C	mf	3	1	none
1.340	31	054	Saturninus ii	8a	B 70%	br wf	1	2 P	w
1.341	31	054	Saturninus ii	8a	C	mf	2 T=10°	1	oys
1.342	31	054	Saturninus ii	8a	C	cf	3	1	oys
1.343	31	054	Saturninus ii	8a	C		3 T=w	1	oys
1.344	31	054	Saturninus ii	8a	C	wf	3 T=w	2	m
1.345	31	054	Saturninus ii	8a	C	wf	3	2	oys
1.346	31	054	Saturninus ii	8a	C	bf wf	3	1	oys
1.347	31	054	Saturninus ii	8a	C	mf	3	1	oys
1.348	31	054	Saturninus ii	8a	C	mf	3	1	oys
1.349	31	054	Saturninus ii	8a	C	bf wf	3	1 P	w
1.350	31	054	Saturninus ii	Ψ-c	C	bf wf	3 T=25°	1	rem.
1.351	31	054	Saturninus ii	Ψ-c					
1.352	31r	056	Saturninus ii	8a	C	wf	3	0	b
1.353	31r	056	Saturninus ii	8a	B 75%	br mf	3	1	w p b
1.354	31r	056	Saturninus ii	8a	C	bf	3	1	oys m w
1.355	31r	056	Saturninus ii	8a	C	cf	2	0 W	b
1.356	31r	056	Saturninus ii	8a	C	wf	0	0 W	

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.305	191	44	30	104		4	24	Whitstable Museum	Box 26 (66)
1.306	184	45	35	100	95	5	26	British Museum	1920,1123.20
1.307	184	46	35	93		4	26	Liverpool Museum	M7447
1.308	182			101				Whitby Museum	ARC1761
1.309	183	43	34	94	86	4	26	Powell-Cotton Museum	S71
1.310								Liverpool Museum	M6135
1.311	251	77	65	105		3	30	Whitstable Museum	W.1988.1000.17
1.312	245	83.5	71.5		91.5	2.5	35	British Museum	1950,0502.10
1.313	103	36	25	53		4	Incomp	Ashmolean Museum	1938.362
1.314	176		51		87	3	27	Powell-Cotton Museum	S68
1.315	183			96				British Museum	1920,1123.31
1.316	182	58	49			4	23	Whitstable Collector	RA
1.317	182		55			4	28	Powell-Cotton Museum	S70
1.318	135	74	63	56		3.5	26	Ashmolean Museum	None
1.319	99							Maidstone Museum	Box RB21B
1.320	135	75	63		51	4	38	Swansea Museum	A908.11.23
1.321								British Museum	M.1737
1.322				51				British Museum	M.1738
1.323				55		4	25	Whitstable Museum	Box 24 (71)
1.324								Swansea Museum	1908.11.25a
1.325	*c.* 184	*c.* 57						Museum of London	3262
1.326								Fisherman B	JM
1.327	188	47	36	101		3	26	Liverpool Museum	M7434
1.328	180	49						British Museum	1908,0727.2
1.329	183	44	29	104		4	25	Whitstable Museum	Box 26 (64)
1.330	247			107				Guildhall, Rochester	A1759
1.331	183	57	68	95	91	3	35	Powell-Cotton Museum	S64
1.332	183		51			3	32	Ashmolean Museum	1909.1159
1.333	180	59	54		89	3	34	British Museum	1920,1123.32
1.334	191	64	52	95				Collector B	PS
1.335	190							Guildhall, Rochester	916
1.336	186		56		103	1.5	33	Liverpool Museum	M7440
1.337	186							Maidstone Museum	Box RB21A
1.338	183		55		*c.* 90	3	32	Society of Antiquaries	574.2 (C.30)
1.339	186		52		94	2.8	31.5	Swansea Museum	1908.11.35a
1.340	178			101				Whitby Museum	ARC1789
1.341	189		56			3	31	Whitstable Collector	RA
1.342	189	62	51	95		3	33	Whitstable Collector	RA
1.343	185	57	51	94		3	32	Whitstable Museum	Box 25 (25)
1.344	187	64	54	96		3	32	Whitstable Museum	Box 27 (1)
1.345	189	59	46	92		3		Whitstable Museum	Box 27 (12)
1.346	182	62	52	90		3	31	Whitstable Museum	Box 27 (31)
1.347	187		48			3	33	Whitstable Museum	Box 27 (62)
1.348	190		50			3	31	Whitstable Museum	Box 27 (7)
1.349	191	64	53	92		3	33	Whitstable Museum	Box 27 (9)
1.350	183	56	48			3	29	Herne Bay Museum	H1197
1.351								British Museum	1908,0727.5
1.352	235	64	43		98	4	32	British Museum	M.1672
1.353	279		77		107	3	32	Fisherman C	SG
1.354	241	82	70		97	3	35	Saffron Walden Museum	1927.15
1.355	260	84	71		197	3	31.5	British Museum	Am1776,1206.1
1.356	272	80	64		103	3	32	British Museum	1910,1025.24

Catalogue of samian wares recovered from the Kentish Flats, arranged by potter

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.357	31r	056	Saturninus ii	8a	C	wf	1	1	
1.358	31r	056	Saturninus ii	8a	C	bf wf	3	1	
1.359	31r	056	Saturninus ii	8a	C	bf wf	1 T=w	1 S	
1.360	31r	056	Saturninus ii	8a	C	bf wf	2 T=w	1	p
1.361	31r	056	Saturninus ii	8a	C	bf	2 T=w	0 W	rem.
1.362	31r	056	Saturninus ii	8a	C		1	1	p
1.363	31r	056	Saturninus ii	8a	C	bf wf	2 T=w	1	w p b
1.364	31r	056	Saturninus ii	8a	C	wf	2 T=25°	1	m
1.365	31r	056	Saturninus ii	8a	C	bf wf	1 T=w	0	none
1.366	31r	056	Saturninus ii	8a	C	cr bf wf	1 T=w	0	none
1.367	31r	056	Saturninus ii	8a	B	wf	3 T=w	1	rem.
1.368	31r	056	Saturninus ii	8a	C	mf	3	2	rem.
1.369	31r	056	Saturninus ii	8a	C	bf	3 T=w	1 W	rem.
1.370	31r	056	Saturninus ii	8a	C	mf	3	1	oys w
1.371	31r	056	Saturninus ii	8a	C	mf	3	1	oys
1.372	31r	056	Saturninus ii	8a	F	bf wf			oys
1.373	31r	056	Saturninus ii	8a	F base	_			
1.374	33	036	Saturninus ii	8a	C	wf	3	1	m rem.
1.375	33	036	Saturninus ii	8a	C	wf	3 T=w	1	m b
1.376	33	036	Saturninus ii	8a	C		3	1	w b
1.377	33	036	Saturninus ii	8a	C	bf wf	3 T=g	1 W	m
1.378	33	036	Saturninus ii	8a	C	bf wf	3	2	m
1.379	79	032A	Saturninus ii	8a					
1.380	79r	032P	Saturninus ii	8a	C	br bf wf	3	1 W	m
1.381	79r	032P	Severianus i	2a	C	cr mf	3 T=w	0	none
1.382	33	036	Severianus i	1a	C	mf	3	1	oys
1.383	33	036	Severianus i	1a	C	wr bf cf	3	1	b w p
1.384	33	036	Severianus i	1a	C	mf	1	1 W=50mm	oys w b
1.385	33	036	Severianus i	1a	C	wf	3	1	
1.386	33	036	Severianus i	1a	C	bf wf	3	2	m w b
1.387	33	036	Severianus i	1a	C	bf wf	3	2	oys
1.388	33	036	Severianus i	1a	C	bf wf	2	1	m w p
1.389	38	088	Sextus v	4d	C	mf	3 T=w	0	m b
1.390	38	088	Sextus v	4d	C	wf	3	1	
1.391	38	088	Sextus v	4d	C	mf	2	1	w m
1.392	31	054	Vitalis i	1b	F				
1.393	C15	045P	Concentric circles		C	cf	3	2	oys
1.394	C15	045P	Rosette 7 seg		C	cr	2 T	1 P	
1.395	C15	045P	Rosette 8 seg		C	bf wf	3	0 W	oys
1.396	C15	045P	Rosette 8 seg		C		3	0 W 120mm	
1.397	C15	045P	Rosette 8 seg		C	bf wf	3	1 T=w	p
1.398	C15	045P	Rosette 8 seg		C		2 T=w	1 W=110mm	w
1.399	C15	045A	Rosette 8 seg		C	mf			
1.400	C23	045P	Rosette 8 seg		C	mf	3 T	2	m rem.
1.401	C23	043A	Rosette 12 seg		C	wf	1 T=g	3	b rem.
1.402	C23	043A	Rosette 12 seg		C	wf	1	1	
1.403	C23	043A	Rosette 12 seg		C	bf wf	2 T=w	0 W	w
1.404	46	042/4	Rosette 12 seg		C		2	2	
1.405	46	042/4	Rosette 12 seg		C	bf wf	3	1	oys
1.406	46	042/4	Rosette 12 seg		C	wf	3	1	
1.407	46	042/4	Rosette 12 seg		C		3 T=w	1 W=40mm	oys

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.357	262	81	73		101	3	32	British Museum	1920,1123.24
1.358	241			105				British Museum	1920,1123.27
1.359	235	74	61		103	3	32	British Museum	M.1669
1.360	268			113				British Museum	M.1670
1.361	268		71		112	2.5	35	British Museum	M.1671
1.362	233		46	104				British Museum	Unnumbered
1.363	234			102				Guildhall, Rochester	918
1.364	238	72	63	102		3	32	Herne Bay Museum	H1188
1.365	270	84			110	3.3	33	Kelvingrove Museum	1903.269.h
1.366	234	68	59	103		2	33	Liverpool Museum	M7436
1.367	280	86	65	119				Liverpool Museum	M7466
1.368	236		68		96	2	32	Swansea Museum	1908.11.30a
1.369	237	72	67		94	3	32	Swansea Museum	1908.11.31a
1.370	251		79		96	2.4	31	Swansea Museum	1908.11.32a
1.371	273		76			3	32	Whitstable Museum	Box 24
1.372	279							Maidstone Museum	Box RB21C
1.373								Whitstable Museum	Box 24 (76)
1.374	106	56	49	42	38	3	34	Powell-Cotton Museum	S88
1.375	102	54	49		60	2.5	33	British Museum	M.1740
1.376	106							Maidstone Museum	Box RB21B
1.377	107	54	50	43	40	2	31	Swansea Museum	1908.11.18a
1.378	105	57	49			2	33	Whitstable Museum	Box 26 (?)
1.379	*c.* 267	*c.* 76						Museum of London	3261
1.380								Fisherman A	AR
1.381	251		38		125	5.4	27.5	Liverpool Museum	M7439
1.382	149		70			3	25	Whitstable Museum	Box 25 (19)
1.383	143	*c.* 80	72			3.5	26	Ashmolean Museum	1910.2
1.384	145		71		55	4	26	British Museum	1908,0727.6
1.385	148			56				Liverpool Museum	M7452
1.386	135	75	67	51		3	27	Whitstable Museum	Box 26 (14)
1.387	148	75	66			4	27	Whitstable Museum	Box 26 (17)
1.388	148							Maidstone Museum	Box RB21A
1.389	142		68		56	4	31	British Museum	1908,0727.9
1.390	137	75		67				Liverpool Museum	M7451
1.391	139		64			3	30	Whitstable Museum	Box 25 (58)
1.392								Folkestone Museum	F879
1.393	269	72	59	122	118			Powell-Cotton Museum	S97
1.394	251	65	51	109	104			Powell-Cotton Museum	S94
1.395	240	67	52		98			British Museum	2000,0101.73
1.396	285	75	60		111			British Museum	Unnumbered
1.397	238		33					British Museum	Unnumbered
1.398	285		55					British Museum	2000,0101.74
1.399	194							Powell-Cotton Museum	S78
1.400	188		47		74?			Powell-Cotton Museum	S95
1.401	105	43	33	46	43			Swansea Museum	1908.11.26a
1.402	106	43	33	47	44			Swansea Museum	1908.11.27a
1.403	195	54	41		80.5			British Museum	1920,1123.22
1.404	103	45	34	48	43			Powell-Cotton Museum	S93
1.405	102							Canterbury Museum	Box 2 (1145)
1.406	103							Maidstone Museum	Box RB21A
1.407	102			44				British Museum	1920,1123.23

Catalogue of samian wares recovered from the Kentish Flats, arranged by potter

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.408	46	042/4	Rosette 12 seg		C		3	0	p w
1.409	46	042/4	Rosette 12 seg		C		2 T=w	2 W=40mm	
1.410	46	042/4	Rosette 12 seg		C	mf	3	1	w
1.411	46	042/4	Rosette 12 seg		C	bf wf	3	2	oys
1.412	46	042/4	Rosette 12 seg		C	wf	3	1	
1.413	46	042/4	Rosette 12 seg		C	wf	3	1	
1.414	O&P LV13	042	Rosette 12 seg		C	cf wf	3	1	b m
1.415	O&P LV13	042	Rosette 12 seg		C	cr bf wf	3	3	b m w
1.416	O&P LV13	042	Rosette 12 seg		C	bf wf	3	3 W=38mm	m w rem.
1.417	18	058	No stamp		C		3 P	1	m
1.418	35	014	No stamp		B 85%	br cf wf	2 T=90°	2 T=w	w
1.419	35	014	No stamp		C	mf	3 T=w	1	w
1.420	35	014	No stamp		C	bf wf	2 T=w	1 S=50mm	
1.421	35	014	No stamp		C	wf	2 T=w	1 W	none
1.422	35	014	No stamp		C	mf	3	1 W	oys b
1.423	35	014	No stamp		C	bf wf	3	1	oys
1.424	35	014	No stamp		C	?	?	?	
1.425	35	014	No stamp		C	wf	1 T=w	2	
1.426	35	014	No stamp		C	mf	3	1	
1.427	35	014	No stamp		C	mf	3	1	
1.428	35	014	No stamp		C	mf	3	1	
1.429	35	014	No stamp						
1.430	35	014	No stamp						
1.431	35	014	No stamp		C	br wf	2 T=w	2 W	b
1.432	35	014	No stamp		C	C	3	1	rem.
1.433	35	014	No stamp		B	bf	3 T=w	1	
1.434	35	014	No stamp		C	wf	3	1	
1.435	35	014	No stamp		C	wf	1 T=w	1	w
1.436	35	014	No stamp		C	cf	1	1	
1.437	35	014	No stamp		C	cr	2	2	rem.
1.438	35	014	No stamp		C				
1.439	35	014	No stamp		F base	_			
1.440	36	015A	No stamp		C	wr mf	3	1	
1.441	36	015A	No stamp		C	wr bf wf	2 T=w	1 P	p
1.442	36	015A	No stamp		C	wr cf wf	3 T=w	1	p
1.443	36	015A	No stamp		C	cr mf	3 T=w	0	oys w
1.444	36	015A	No stamp		C	cr mf	1	0 S=80mm	oys
1.445	36	015P	No stamp		C	mf	3	0 S=110mm	w
1.446	36	015P	No stamp		C	wf	2 T=w	2 T=w	p
1.447	36	015A	No stamp		B 90%	br wf	1	1 P	none
1.448	36	015A	No stamp		B 95%	br wf	0	0 W=60mm	none
1.449	36	015A	No stamp		C	cr mf	2	0 W	b
1.450	36	015A	No stamp		C		0	0 W	
1.451	36	015P	No stamp		C	bf wf	3 T=w	2 T=w	oys
1.452	36	015A	No stamp		C	cr wr wf			
1.453	36	015A	No stamp		C	wr wf	3	2	
1.454	36	015A	No stamp		C	bf wf	3	0	oys m p
1.455	36	015A	No stamp		C	mf	2	2	w m
1.456	36	015A	No stamp		C	bf wf	3	1	rem.
1.457	36	015A	No stamp		C	cr cf	3 T=10°	1	oys b m
1.458	36	015A	No stamp		C	cr wf	0	0 W	none
1.459	36	015A	No stamp		C	bf wf	3	1	none
1.460	36	015P	No stamp		C				

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.408	104		27	44				British Museum	Unnumbered
1.409	103		26	43				British Museum	Unnumbered
1.410	106		36			14		Whitstable Museum	Box 25 (69)
1.411	104	43	35	43		14		Whitstable Museum	Box 26 (68)
1.412	103	43	36		40			British Museum	2000,0101.71
1.413	100	45	36		41			British Museum	2000,0101.72
1.414	106	41	33	43	41	14		British Museum	1901.1737
1.415	105	43	38	44		15		Jewry Wall, Leicester	A852.1951(E261B)
1.416	105	45	38	44		15		Jewry Wall, Leicester	AIII.1927.66
1.417	165	42		79				Liverpool Museum	M7524
1.418	120	45	33	51				Ashmolean Museum	1948.250
1.419	109		36		40			British Museum	1908,0727.8
1.420	119							British Museum	1920,1123.12
1.421	118							British Museum	1920,1123.14
1.422			55		85			British Museum	M.2844
1.423	118							Canterbury Museum	Box 2 (1172)
1.424								Folkestone Museum	F873
1.425	117	44	34	50				Herne Bay Museum	H1193
1.426	119							Maidstone Museum	Box RB21A
1.427	120							Maidstone Museum	Box RB21A
1.428	118							Maidstone Museum	Box RB21A
1.429	121							Maidstone Museum	Box RB21A
1.430	*c.* 114	*c.* 51						Museum of London	3151
1.431	122	*c.* 26	*c.* 19	59				Whitby Museum	ARC1790
1.432	120	44	32	49				Whitstable Collector	RA
1.433	120	44	32					Whitstable Museum	Box 24 (?)
1.434	115	32	22	49				Whitstable Museum	Box 25 (?)
1.435	113	43	34	46				Whitstable Museum	Box 26 (?)
1.436	121	47	36	52	44			Powell-Cotton Museum	S84
1.437	118	43	31	51	42			Powell-Cotton Museum	S85
1.438	100							Powell-Cotton Museum	S98
1.439								Whitstable Museum	Box 24 (72)
1.440	194		48					Ashmolean Museum	1909.1160
1.441	189	56	43	79				Ashmolean Museum	1925.630
1.442	190	49	39	87				Ashmolean Museum	1961.255
1.443	190		46		77			British Museum	1920,1123.10
1.444	194		42		79			British Museum	1920,1123.11
1.445	271		57		96			British Museum	1920,1123.9
1.446	261			94				British Museum	1920,1123.13
1.447	196	54	39	84	81			British Museum	1853,0502.33 (M2404)
1.448	170	41	33	64	62			British Museum	1853,0502.34
1.449	195		42		84			British Museum	M.2403
1.450	186	39	36		56			British Museum	M.2405
1.451	240		44					British Museum	Unnumbered
1.452								Collector A	LH
1.453	184	54	42	86				Collector B	PS
1.454	194	53	44					Herne Bay Museum	CANHB2001.1
1.455	195		42					Herne Bay Museum	H1189
1.456	199	48	39	93				Herne Bay Museum	H1190
1.457	187	50	39	83				Jewry Wall, Leicester	A853.1951(E261C)
1.458	158	37			60			Kelvingrove Museum	1903.269.m
1.459	185	50						Liverpool Museum	M7448
1.460	241							Maidstone Museum	Display

Catalogue of samian wares recovered from the Kentish Flats, arranged by potter

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.461	36	015A	No stamp		C				
1.462	36	015A	No stamp						
1.463	36	015A	No stamp						
1.464	36	015A	No stamp		C	wf	1	0 W	w
1.465	36	015P	No stamp		C				
1.466	36	015A	No stamp		C	wf	3	1	
1.467	36	015P	No stamp		C	mf	3	1 W	w
1.468	36	015P	No stamp		C	bf wf	2 T=w	1	oys b w
1.469	36	015A	No stamp		C	bf wf	2	0	rem.
1.470	36	015A	No stamp		C	bf wf	3 T=w	0	oys b w
1.471	36	015A	No stamp		C	bf wf	2 T=20°	2 W	oys b w p
1.472	36	015A	No stamp		C	cr bf	3	1	rem.
1.473	36	015A	No stamp		C	bf wf	2 T=w	1	m
1.474	36	015A	No stamp		C	mf	3 T=w	1	m w
1.475	36	015P	No stamp		C	mf	3	1	w
1.476	36	015P	No stamp		C	bf wf	2 T=w	1 T	
1.477	36	015A	No stamp		C	br	2 T 45o	1	
1.478	36	015A	No stamp		C		3 T	1	m rem.
1.479	36	015A	No stamp		C	bf	2 T 15o	1	m rem.
1.480	36	015A	No stamp		C	bf	3	2 P	
1.481	36	015P	No stamp		C	bf	3	1	m rem.
1.482	36	015P	No stamp		C	mf	3	0	
1.483	36	015A	No stamp		F base	mf	3	1	p w
1.484	36	015A	No stamp		F base	bf	2	0	w b
1.485	38	088	No stamp		C	cr wf bs	2	3	none
1.486	79r	032P	No stamp		C	cr wr bf	1 T=w	1 P	oys b m
1.487	79r	032P	No stamp		B 65%	br cf wf	2	1	rem.
1.488	C15	045P	No stamp		C	cf	3	1	oys
1.489	C23	043A	No stamp		C				
1.490	31	054	MI……AF		C	cr wr wf	3 T=w	1 W=75mm	p
1.491	18	058	OF……...		C	wf	3	0	
1.492	18/31	058	V\CV.I…EA		C	cr bf wf	3	1	
1.493	18/31	058	……CI		C	wf			
1.494	38	088	……N		F 50%	bf	3	1	
1.495	31	054	……F		C	bf wf	3 T=20°	1	rem.
1.496	31r	056	…I>……M		C	bf wf	3 T=w	1	m b rem.
1.497	31	054	Worn away		B eve 80%		2	3	rem.
1.498	31	054	Worn away		B 65%	br mf	3	1 W=80mm	w b p
1.499	31	054	Worn away		F base	bf cf wf			p
1.500	31	054	Worn away		F base	bf wf		3	b p
1.501	31	054	Worn away		F base	bf wf			p w
1.502	31	054	Worn away		F		3	1	oys
1.503	38	088	Worn away		C	wf	2	3	rem.
1.504	46	042/4	Worn away						
1.505	79	032A	Worn away		C	bf wf	3 T=w	1	m
1.506	79	032A	Worn away		C	wr wf	1	3 P	
1.507	31r	056	Worn away		C 88%	br wr bf	3	2	b w p
1.508	Ritt83	?	Worn away		C	cr wf	1	1	
1.509	31	054	Illegible		C	wf	3	0	
1.510	31	054	Illegible		C	mf	3	1	w p b
1.511	31	054	Illegible		C	wf	0	0 W=80mm	w
1.512	31	054	Illegible		C	bf	1	1	none

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.461								Manchester Museum	37424 R869
1.462								Manchester Museum	37427 R875
1.463								Manchester Museum	37430 R878
1.464	193	46			80			National Museums Scotland	1911.291
1.465	248	64						Plymouth Museum	4470
1.466	194	74	53		89			Swansea Museum	A908.11.6
1.467	274		62		90			Swansea Museum	A908.11.7
1.468	252	63	52		78			Swansea Museum	A908.11.9
1.469	196	53	44		79			Swansea Museum	A908.11.10
1.470	194			90				Whitby Museum	ARC1791
1.471	188							Whitby Museum	ARC1760
1.472	190	40	30					Whitstable Collection	RA
1.473	194	50	38	81				Whitstable Museum	Box 25 (?)
1.474	197		39					Whitstable Museum	Box 27 (?)
1.475	279		58					Whitstable Museum	W.1988.1000.17
1.476	264		42					British Museum	Unnumbered
1.477	192	58	44	80	75			Powell-Cotton Museum	S79
1.478	201	53	42	83	79			Powell-Cotton Museum	S80
1.479	186	49	38		76			Powell-Cotton Museum	S81
1.480	195	51	38	81				Powell-Cotton Museum	S82
1.481	254	59	47	105	95			Powell-Cotton Museum	S83
1.482	264		53		91			British Museum	2000,0101.70
1.483					88			Fisherman C	SG
1.484					101			Fisherman C	SG
1.485								Whitby Museum	ARC1765
1.486	265	59	45	150	134			British Museum	1903,1115.221
1.487	268	51	34	145	133			British Museum	1908,0727.1
1.488	220	62	51	90				Whitstable Museum	Box 1 Wallace
1.489								Manchester Museum	37421 R866
1.490	182	60	52	89		4	*c.* 24	Pitt Rivers, Oxford	1884.37.29
1.491	155							Canterbury Museum	?
1.492	102							Maidstone Museum	Box RB21A
1.493	65	24						Jewry Wall, Leicester	AIII.1927
1.494	132	66	58	59				Whitstable Museum	1986.17.1.2
1.495	188	63	50			2	23	Whitstable Museum	W.1988.1000.17
1.496	235	67	57	100		4	27	Jewry Wall, Leicester	AIII.1927.67
1.497	178	48	39	89	86			Saffron Walden Museum	180.191
1.498	184		49		90	3	33	Fisherman C	SG
1.499				97		2	22	Controlled dredge	MW
1.500					85			Fisherman C	SG
1.501					85			Fisherman C	SG
1.502				89				Whitstable Museum	Box 25 (74)
1.503	136	52	39	65	60			British Museum	1920,1123.36
1.504	*c.* 89	*c.* 32						Museum of London	3185
1.505	175							Folkestone Museum	F871
1.506	176	45	33	103				Society of Antiquaries	574.1 (C.30)
1.507	272	73	61	103		2	29	Society of Antiquaries	574.5 (C.30)
1.508	131			66				Dartford Museum	1939/87
1.509	190							Canterbury Museum	?
1.510	184							Whitby Museum	ARC1764
1.511	189	63	52.5	96	91	3.5	30	British Museum	1908,0727.5
1.512	178			93				British Museum	M.1641

Catalogue of samian wares recovered from the Kentish Flats, arranged by potter

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter	Die	Vessel: complete (C) broken (B)	Rim/foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear including diameter of foot-ring impression	Marine growth
1.513	31	054	Illegible		F 50%	bf wf	3	1	w
1.514	31	054	Illegible						
1.515	32	?	Illegible		C	cr wf	1	1	rem.
1.516	80	031	Illegible						
1.517	80	031	Illegible		C		1	1	
1.518	31r	056	Illegible		C				
1.519	31r	056	Illegible		B>50%		3	1	oys
1.520	31r	056	Illegible		B>50%	bf	1	1	
1.521	31r	056	Illegible		F base	cr bf cf			
1.522	C15	045P	Illegible		C	bf wf	2 T=10°	3 P	b m
1.523	C23	043A	Illegible		C	wf	3	0	
1.524	Cup	?	Illegible						
1.525	Loes 8ab	?	Illegible		C		1	1	
1.526	?	?	?		C				

Catalogue of samian ware fragments recovered from the Kentish Flats, arranged by form

Assemblage catalogue no.	Form: Dragendorff Walters Curle Ludowici	Bet and Delor (2000) equivalent no.	Potter's stamp	Vessel fragment EVE	Rim/foot: missing broken chipped worn	External wear including evidence of tilt	Internal wear including diameter of foot-ring impression
1.527	31	054	Missing	F rim			
1.528	31	054	Missing	F rim 22%		3	3
1.529	31	054	Missing	F rim		3	0 W
1.530	31	054	Missing	F body		3	3 W
1.531	31	054	Missing	F rim			
1.532	31	054	Missing	F rim			
1.533	31	054	Missing	F rim			
1.534	31	054	Missing	F rim			
1.535	31r	056	Missing	F			
1.536	31r	056	Missing	F base	bf cf wf	3	1
1.537	31r	056	Missing	F rim		1	1
1.538	31r	056	Missing	F r/b 30%	cr bf wf	3	1
1.539	31r	056	Missing	F r/b 29%	bf	3	3
1.540	31r	056	Missing	F rim 13%		3	1
1.541	31r	056	Missing	F rim 13%		3	1
1.542	31r	056	Missing	F r/b 15%	mf	3	1
1.543	31r	056	Missing	F rim 10%		3	1
1.544	31r	056	Missing	F body			
1.545	31r	056	Missing	F r/b			
1.546	31r	056	Missing	F r/b	bf		
1.547	31r	056	Missing	F rim			
1.548	36	015A	No stamp	F rim		3	1
1.549	36	015P	No stamp	B 39%	br bf wf	2 T=20°	3 W=102mm
1.550	36	015A	No stamp	F r/b 33%	bf wf	3	1 W
1.551	36	015A	No stamp	B 12%	br bf wf	3	1 W=102mm
1.552	36	015A	No stamp	B 10%	br bf wf	2 T=15°	3 W
1.553	79	032A	Missing	F rim			
1.554	79r	032P	Missing	F r/b			
1.555	?	?	Missing	F			
1.556	?	?	Missing				
1.557	?	?	Missing				
1.558	?	?	Maternianus				

Assemblage catalogue no.	Rim diameter (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Stamp width (mm)	Stamp length (mm)	Museum or private collection	Museum accession number
1.513								Fisherman A	AR
1.514	*c.* 140	*c.* 51						Museum of London	3149
1.515	254							Maidstone Museum	Box RB21C
1.516								Manchester Museum	R880
1.517	90	32						Jewry Wall, Leicester	AIII.1927
1.518								Manchester Museum	37420 R865
1.519	282							Guildhall, Rochester	Unnumbered
1.520	240							Guildhall, Rochester	Unnumbered
1.521								Maidstone Museum	Box RB21C
1.522	287	76	62	120				Whitstable Museum	Box 25 (?)
1.523	187							Canterbury Museum	?
1.524								Jewry Wall, Leicester	AIII.1927
1.525	76	48						Jewry Wall, Leicester	AIII.1927.234
1.526								Graham, Billy (TV Evangelist)	

Assemblage catalogue no.	Marine growth	Rim diamater (mm)	Height (mm)	Height minus foot-ring (mm)	Foot-ring diameter (mm)	Diameter at top of foot-ring (mm)	Museum or private collection	Museum accession number
1.527							Fisherman A	AR
1.528	p						Fisherman C	SG
1.529		146					Dr M. Redknap	
1.530							Dr M. Redknap	
1.531							Whitstable Museum	Box 24 (?)
1.532							Whitstable Museum	Box 24 (?)
1.533							Whitstable Museum	Box 24 (?)
1.534							Whitstable Museum	Box 24 (?)
1.535	w s						British Museum	1937,1210.2
1.536	oys p						Controlled dredge	MW
1.537	p w						Drift dive	JA
1.538	b w		67	78			Fisherman C	SG
1.539	oys b p		81	67			Fisherman C	SG
1.540	oys p						Fisherman C	SG
1.541	oys p w						Fisherman C	SG
1.542	oys w p						Fisherman C	SG
1.543	p w						Fisherman C	SG
1.544							Fisherman C	SG
1.545				72			Whitstable Museum	Box 24 (?)
1.546	oys						Maidstone Museum	Box RB21C
1.547							Maidstone Museum	Box RB21C
1.548	w p						Fisherman A	AR
1.549	w	277	76	63		95	Fisherman C	SG
1.550	w b						Fisherman C	SG
1.551	w b			47		90	Fisherman C	SG
1.552	w p		69	55		94	Fisherman C	SG
1.553							Whitstable Museum	Box 24 (?)
1.554							Whitstable Museum	Box 24 (?)
1.555							British Museum	1937,1210.1
1.556							British Museum	1937,1210.3
1.557							British Museum	M.1720
1.558							British Museum	M.1723

Appendix 2 Other Artefacts from Pudding Pan

This catalogue lists all the non-samian artefacts inspected during this research including description, dating and identification of each object.

Catalogue no.	Location	Accession no.	Description	Identification
2.01	Fisherman C	SG	*amphora* top, handles and stopper	Gauloise 4 (northern France, 50–250 AD, wine)
2.02	Fisherman C	SG	*amphora* handle	Dressel 20 (50–250 AD, oil)
2.03	Wheelers Oysters		*amphora* spike	Dressel 20 (Spanish, 80–250 AD, oil)
2.04	Fisherman F	DW	*amphora* top with one and half handles	Dressel 20 (Spanish, 130–70 AD, oil)
2.05	Fisherman C	SG	*amphora* top with one handle	Dressel 20 (120–80 AD, oil)
2.06	East Quay Restaurant	JG	*amphora* top with one handle	Dressel 20 (Baetica, 200–60 AD, oil)
2.07	Fisherman B	JM	*amphora* top with two handles	Gauloise 4 (northern France, 50–250 AD, wine)
2.08	Folkestone Museum	Unnumbered	*amphora*: complete	Class 6 Dr. 1/Pascual 1? Spanish, 1–80 AD (wine)
2.09	National Maritime Museum	BT	*amphora*: complete with 6,500 olives	London 555 (northern France, 50–130 AD, olives)
2.10	Fisherman D	PE	*amphora*: complete, globular	Gauloise 12 (northern France, AD 1–299, wine)
2.11	Whitstable Museum	Unnumbered	complete large grey spouted bowl	*mortarium* stamped Q. VAL
2.12	Whitstable Museum	Unnumbered	complete large grey spouted bowl	*mortarium* unstamped
2.13	East Quay Restaurant	JG	fragment large grey spouted bowl	*mortarium* stamped CAVARIVS
2.14	Whitstable Museum	Unnumbered	heavily abraded red-slipped lamp	samian lamp
2.15	Whitstable Museum	Unnumbered	heavily abraded red-slipped lamp	samian lamp
2.16	Cambridge University Museum of Archaeology and Anthropology	1922.896	low two-handled bowl	Dr 9 'Sugar Basin'? Central Gaulish black-slipped ware
2.17	Whitstable Museum	Box 25 (?)	black base fragment	Dr 9 'Sugar Basin' Central Gaulish black-slipped ware
2.18	Maidstone Museum	Box RB21C	small red fine ware cup	*terra rubra* form 56C unstamped
2.19	British Museum	1997,0912.33	red-slipped bowl with barbotine decoration	ARS 3B
2.20	Jewry Wall, Leicester		plain red-slipped bowl	ARS 39
2.21	Liverpool Museum	M7576	two-handled red ware jar with vertical rim	143mm rim diameter
2.22	Liverpool Museum	DP Temp 2696	red coarse ware sherds, encrusted	sherds, no stamps
2.23	Ashmolean Museum	Unnumbered	roof tile 420 x 270–310mm	*tegula*
2.24	Ashmolean Museum		roof tile 420mm	*tegula*
2.25	Maidstone Museum	Unnumbered	roof tile 420 x 360mm	*tegula*
2.26	Maidstone Museum	Unnumbered	roof tile 420 x 360mm	*tegula*
2.27	British Museum	1909,1109.1	roof tile 450 x 330–40mm	*tegula*
2.28	British Museum	1909,1109.2	curved roof tile	*imbrex*
2.29	Controlled dredge	MW	curved roof tile	*imbrex*
2.30	Fisherman C	SG	triangular shaped stone with hole	one hole stone anchor

Appendix 3 Concordance of Plain Samian Typologies

As a number of different samian typologies have been created over many years this concordance provides a simple comparison of the various classifications that have been used.

Common plain samian forms recovered from the Kentish Flats

Bet and Delor (2000)	Dragendorff	Walters	Curle	Ludowici	Smith's PPR no.	Phase	Approximate dates (AD)	Type	Set
014	35				6	4–7	*c.* 69–*c.* 230	cup	A
015A	36				5	4–7	*c.* 69–*c.* 230	plate	A
015P	36				4	4–7	*c.* 69–*c.* 230	dish	A
029				Tg	-	5–7	*c.* 100–*c.* 230	cup	
030A				Tg	-	5–7	*c.* 100–*c.* 230	plate	
030P				Tg	-	5–7	*c.* 100–*c.* 230	dish	
031		80			3	5–7	*c.* 100–*c.* 230	cup	a
032A		79			2	5–7	*c.* 100–*c.* 230	plate	a
032P		79r			1	5–7	*c.* 100–*c.* 230	dish	a
036	33				12/13	3–8	*c.* 50–*c.* 275	cup	
042	46				8	4–8	*c.* 69–*c.* 275	cup	F
043A			23		15	4–8	*c.* 69–*c.* 275	plate	F
043P			23		15	4–8	*c.* 69–*c.* 275	dish	F
044	46				-	5–7	*c.* 100–*c.* 230	cup	C
045A			15		7	5–7	*c.* 100–*c.* 230	plate	C
045P			15		7	5–7	*c.* 100–*c.* 230	dish	C
054	31				10	5–7	*c.* 100–*c.* 230	plate	b
055	31				11	5–7	*c.* 100–*c.* 230	plate	b
056	31r				9	5–7	*c.* 100–*c.* 230	dish	b
058	18							dish	
088	38				14	4–7	*c.* 69–*c.* 230	dish	

The suffixes 'A' and 'P' differentiate between plates (A=Assiete) and dishes (P=Plat)

Bet and Delor (2000: 462; after Smith 1909) have considered the production of sets of dishes where the morphological type has been developed in at least three different 'modules'. The sets A and C were previously identified as such by Smith (1909) as were sets 'a' and 'b', which have not been designated by Bet and Delor (2000). Bet and Delor (2000: 467) suggest that form 036 (Dragendorff form 33) creates a set with forms 054, 055 and 056 (Dragendorff forms 31/31r). It is also obvious from the new typology that the form Oswald and Pryce (O&P) LV 13 is actually a form 042.

Chronology

Phase 1: phase not recognized; hypothetically placed at the time of Augustus
Phase 2: end of Augustus' reign and the start of Tiberius' reign possibly continuing under Claudius
Phase 3: middle of 1st century AD until the Flavians
Phase 4: Flavian period to the beginning of the 2nd century AD
Phase 5: first half of the 2nd century AD
Phase 6: middle of the 2nd century AD
Phase 7: second half of the 2nd century and first third of 3rd century AD
Phase 8: second and third quarters of 3rd century AD
Phase 9: end of the 3rd century AD until the middle of the 4th century AD
Phase 10: second half of 4th century and beginning of the 5th century (after Bet and Delor 2000: 463)

Appendix 4 List of Museums Contacted

One of the aims of this research was to establish the range and extent of the recovered assemblage. As it was known that the assemblage had been widely dispersed, a broad geographical spread of museums, both nationally and internationally, were contacted. The first list includes all the museums and collectors that are known to hold collections of recovered artefacts, while the second lists all the other museums contacted during this study.

Museums and collectors who confirmed they had samian ware from the Kentish Flats in their collections

	Institution	Contact	Replied	Vessels	Fragment	Visited
1	Ashmolean Museum, Oxford	2002	y	16	0	2005
2	Birmingham City Museum	2015	y	1	0	N/a
3	British Museum	2000	y	105	5	2000
4	Dartford Museum	1997	y	1	0	1998
5	Exeter Maritime Museum	1997	n	1	0	No
6	Folkestone Museum	1997	y	6	0	1998
7	Guildhall Museum, Rochester	1997	y	9	0	1998
8	Herne Bay Museum	1997	y	19	0	1998
9	Institute of Archaeology, London	2002	y	1	0	No
10	Jewry Wall Museum, Leicester	2002	y	10	0	2003
11	Kelvingrove Museum, Glasgow	2002	y	3	0	2002
12	Liverpool Museum	2002	y	25	0	2003
13	Maidstone Museum	1997	y	38	2	2003
14	Manchester Museum	2002	y	9	0	2003
15	Museum of London	2002	y	9	0	2004
16	National Museum Wales	2002	y	1	0	No
17	National Maritime Museum, London	1997	y	4	0	No
18	National Museums Scotland	2002	y	6	0	2002
19	Pitt Rivers Museum, Oxford	2002	y	2	0	2005
20	Plymouth Museum	2004	y	2	0	No
21	Powell-Cotton Museum	2014	y	44	0	2015
22	Saffron Walden Museum	2014	y	3	0	2015
23	Skipton Museum	2015	y	1	0	No
24	Society of Antiquaries, London	2004	y	5	0	2004
25	Swansea Museum	2002	y	39	0	2003
26	Canterbury Museum	1997	y	10	0	1998
27	Whitby Museum	2003	y	12	0	No
28	Whitstable Gallery and Museum	1997	y	106	7	1998
	Collector A (LH)			1	0	
	Collector B (PS)			2	0	
	Controlled dredge			3	1	
	Drift dive			0	1	
	Fisherman A (AR)			2	2	
	Fisherman B (JM)			3	0	
	Fisherman C (SG)			11	12	
	Billy Graham			1	0	
	Prof. D. Peacock			1	0	
	Dr M Redknap			0	2	
	Whitstable collector (RA)			14	0	
	Total vessels			**526**	**32**	

Institutions that either confirmed that they had no samian from the Kentish Flats in their collections or failed to reply

	Institution	Contact	Replied	Vessels
1	Alnwick Castle Museum	2004	n	?
2	Bristol City Museum and Art Gallery	2002	y	0
3	Cambridge University Museum of Archaeology and Anthropology	2002	y	0
4	Cantor Arts Centre, Stanford, California, USA	2002	y	0
5	Cheltenham Museum and Art Gallery	2002	y	0
6	Chichester District Museum	1997	n	?
7	Christ Church Library, Oxford	2004	y	0
8	Classics and Ancient History, UW Swansea	2002	y	0
9	Corporation of London Records Office	2004	y	0
10	Dept of Classics, University of Leeds	2002	n	?
11	Dorset County Museum	2004	n	?
12	Eton College	2004	y	0
13	Fishbourne Roman Palace and Museum	1997	y	0
14	Getty Museum, Los Angeles, California, USA	2002	y	0
15	Glenbow Museum, Calgary, Canada	2004	y	0
16	Gold Coast Museum, Queensland, Australia	2014	y	0
17	Gold Coast Museum, Florida, USA	2014	y	0
18	Grosvenor Museum, Chester	2002	n	?
19	Haffenreffer Museum, Bristol, Rhode Island, USA	2002	n	?
20	Harrow School	2004	y	0
21	Hastings Museum and Art Gallery	1997	y	0
22	Horniman Museum	2002	y	0
23	Hunterian Museum, University of Glasgow	2002	y	0
24	Kelsey Museum, University of Michigan	2002	n	?
25	Kingston-upon-Thames Museum	2004	n	?
26	Littlehampton Museum	1997	y	0
27	Llandudno Museum	1997	y	0
28	Leicester City Museums	2002	y	0
29	Margate Museum	1997	y	0
30	Marischal Museum, University of Aberdeen	2002	y	0
31	Maritime Museum, Vancouver, Canada	2004	y	0
32	Michael Carlos Museum, Atlanta, Georgia, USA	2002	n	?
33	Mill Hill School	2004	n	0
34	Museum of Art and Arch, Columbia, Missouri, USA	2002	n	?
35	Museum of Antiquities, Newcastle on Tyne	2002	y	0
36	National Museum of Ghana	2004	n	?
37	Natural History Museum, London	2004	y	0
38	Old Fulling Mill Museum, Durham	2002	y	0
39	Peabody Museum, Harvard, Massachusetts, USA	2002	n	?
40	Phoebe Hearst Museum, Berkeley, California, USA	2002	n	?
41	Poole Museum	1997	y	0
42	Portland Museum	1997	y	0
43	Portsmouth City Museum	1997	y	0
44	Powell-Cotton (Quex Park) Museum	2015	y	44
45	Provincial Museum of Alberta, Canada	2004	y	0
46	Ramsgate Museum	1997	y	0
47	Royal Ontario Museum, Toronto, Canada	2002	y	0
48	Royal Albert Museum, Exeter	2002	y	0
49	Rugby School	2004	y	0
50	Sackler Museum, Cambridge, Massachusetts, USA	2002	n	?
51	Saffron Walden Museum	2015	y	3
52	School of Classics, University of Bristol	2002	n	?

	Institution	Contact	Replied	Vessels
53	Southend Museum	1997	y	0
54	Southampton Museum of Archaeology	1997	y	0
55	Sunderland Museum	2004	y	0
56	The Art Institute of Chicago, Illinois, USA	2002	n	?
57	The Red House Museum, Christchurch	1997	y	0
58	UCL, Institute of Archaeology	2002	n	?
59	University of Liverpool Archaeology Museum	2002	n	?
60	University of Pennsylvania Museum, Philadelphia, USA	2002	n	?
61	Winchester School	2004	y	0
62	York Museum	2004	y	0

Appendix 5 Summary of Collection History

This section details all the locations in which Pudding Pan samian is currently held or at which it was most recently recorded. It includes details of their current holdings, the number of vessels for which some collection history is known including when they were collected, when they were acquired by the current holder and details of previous owners.

Location	No. of complete vessels	Known source	Collected	Acquired	Collection details
Ashmolean Museum, Oxford	16	12	1882		7 presented by Mrs E. Smith in 1909; 1 each from H.J. Nicholls 1912; Prof. Haverfield 1920; Sir E. Wilson via Prof. F.W. Griffith 1925; Prof. R.G. Collingwood 1938; Revd E.A. Sydenham 1948
Birmingham City Museum	1				
British Museum	105	82	1773, 1802, 1865, 1870, 1937		2 from D. Rhudde 1773; 37 Townley Collection *c.*1814; 28 ex Guildhall Museum (1 inscribed 'Pan Rock, Whitstable 1865'); 2 Gibbs bequest 1870; 5 ex Museum of Practical Geology; 8 purchased from W. Holden 1937
Canterbury Museum	10	0			No data
Dartford Museum	1	0			No data
Exeter Maritime Museum	1				No data
Folkestone Museum	6	6		1920s	Donated by Sebastian Evans
Guildhall Museum, Rochester	9	9			From the collection of G.M. Arnold
Herne Bay Museum	19	3	1884, 1948		1 acquired from Northampton Museum, 2001 inscribed 'dredged off the Reculvers 1884'; 2 donated by Dr T.A. Bowes; 1 donated by W.J. Tester 1948; 1 'cleaned Maidstone Museum 1958'
Institute of Archaeology, London	1	0			No data
Jewry Wall Museum, Leicester	10	6			3 Crowther-Benyon collection; 3 Fernie collection – ex Hilton Price collection
Kelvingrove Museum	3	3	1861, 1862	1903	Presented by City of London Guildhall library; 1 found in 1861, 1 in 1862
Liverpool Museum	25	17	1750–76		2 formerly in Rolfe collection; 17 formerly in collection of Revd B Faussett (collected between 1750 and 1776) purchased by Joseph Mayer in 1853
Maidstone Museum	38	22	1906, 1921		3 donated by Sir G. Donaldson July 1906; 8 purchased in 1921; 18 Arnold collection; 1 from S. Well
Manchester Museum	9	9		1926	Donated by W. Sharp Ogden *c.* 1926; formerly in Goldney collection (F. Bennet-Goldney was Mayor of Canterbury in 1909)
Museum of London	9	0	1934,1960	1938–81	1 registered 1934; 1 registered 1960; 1 in 1981
National Maritime Museum	4	0			On loan from British Museum
National Museums Scotland	6	6	pre-1911	1911	Formerly Hilton-Price collection, sold at Sotheby's 1911 – Lot 1484
National Museum Wales	1	0	1864	1902	Collected 1864
Pitt-Rivers Museum, Oxford	2	0	1884		Previously in Victoria & Albert Museum. Donated *c.*1884 Pitt-Rivers collection
Plymouth Museum	2	2			Brent collection Nov. 1903; donated by Guildhall Museum
Powell-Cotton (Quex Park) Museum	44	44		1928	Purchased by Major Powell-Cotton from Valentine Sinclair of Canterbury on 10 October 1928
Saffron Walden Museum	3	1		1909	1 donated by J.J. Green Esq. 182 Upper Grosvenor Rd, Tunbridge Wells
Skipton Museum	1			1934	No data. Not found
Society of Antiquaries	5	5			Donated by J.E. Price
Swansea Museum	39	29	1908	1908	39 vessels originally presented to Royal Institution of South Wales by Col. W. Ll Morgan on 8 Sept. 1908; formerly in Sibert Saunders collection, Springfield House, recorded by Smith 1909. Only 29 can now be traced
Whitby Museum	12				

Whitstable Museum	106	90			*c.* 69 donated by W. Holden; 9 donated by W. Harvey – local historian involved with Whitstable Historical Society (WHS); 12 donated by family of Harvey after his death in 2001. Artefacts donated by Harvey may have been donated to WHS by others
Collector A	1	0			Bought at Sotheby's sale in 1993; previously owned by H. Johnson, employee of Sotheby's
Collector B	2	3			2 and 1 fragment collected by collector's grandfather, Alf Whorlow who was oyster dredgerman 1920–50
Controlled dredges	3	4	2001	2001	4 vessels/fragments and 1 *imbrex* recovered by RSP in Dec. 2001; Dr 80 sent to BM handling collection
Drift dive	0	1	2001	2001	Fragment recovered during RSP drift dive June 2001
Fisherman A	2	4	1982–2002	1982-2002	Vessels and fragments dredged from Pudding Pan, 1 in 2001; 1 in 2002; 2 in last 20 years
Fisherman B	3	3	1977–2002	since 1977	Trawled from north of Pan Sand 1980–2000
Fisherman C	11	23	1982–2000	since 1982	Vessels and fragments dredged from Pudding Pan 1980–2000
Billy Graham, TV evangelist	1	1			Donated by Wallace Harvey (Dr B. Porter pers comm.)
Prof D Peacock (Uni of Soton)	1	0			No data
Dr Mark Redknap	0	2	1986	1986	Marine Archaeological Survey
Whitstable Collector	14	14	1930–40	1930–40	Sole survivor of last Whitstable shipbuilding firm Anderson, Rigden & Perkins. His uncle was William Holden the Whitstable jeweller who displayed Pudding Pan pots in his shop window as mentioned by Smith. This collector has subsequently passed away and one of the vessels appears to be the one that appeared recently on a Californian auction website
Total (as at January 2017)	**526**				

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