UNIVERSITY OF SOUTHAMPTON

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Pudding Pan:
A Roman shipwreck and its cargo in context

by

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Abstract

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For at least 300 years Roman artefacts have been dredged from an unknown site off the north Kent coast. Although the assemblage has been central for the dating of later second century samian assemblages, the true extent and nature of the assemblage has been obscured as a result of the wide distribution both nationally and internationally of the recovered artefacts. The assemblage is unusual not only as it comprises a consignment of largely intact plain Gaulish samian vessels, but also because no similar assemblage has been recovered from a maritime context. A reassessment of the site and its unique assemblage is long overdue as, other than a recent undergraduate dissertation, the site was last seriously investigated in the early twentieth century.

This study has doubled the known assemblage and analysis has confirmed the existence of at least three discrete sources of material dating from c AD65-85, c AD175-195, and from the early third century. Detailed analysis of the wear, damage, and artefact recovery rates suggests that the main second century source represents a significant and cohesive buried deposit of plain samian wares. This undermines the notion that pottery was of too low value to transport in its own right, and was therefore carried as a parasitic, piggy-back trade. Seemingly supporting evidence from Mediterranean shipwrecks more probably reflects a heavy detection bias in favour of amphora-laden wrecks; pottery cargoes do exist but have only been found on multiple wreck sites during the investigation of other more visible wrecks.

The Pudding Pan cargo is compared with other sites closely associated with the samian trade such as shops, warehouses and dockside dumps and with probable destination sites in Britain, which suggests that decorated wares were deliberately excluded in favour of large plain bowls. Thus the combination of plain and decorated samian wares common on most terrestrial sites seems to reflect the mixing of consignments at the quayside. The close comparison between the potters' stamps from Pudding Pan and those from New Fresh Wharf suggests that London was the intended destination of this consignment.

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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)

Dedicated to the memory of my late father, Johnny

Acknowledgements

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I am grateful to 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, John Peyton, but especially Phil and Julie Edwards for putting up with me both on and off the water. I must also thank Martin Crowther and Manda Gifford of the Canterbury Museums Service for allowing me access to their collections.

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Chapter 1

Introduction

> 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 role of trade in the development and maintenance of ancient urban communities with access to the sea has long been recognised (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, that are either archaeologically undetectable or fleetingly cited in literary sources, pottery has been used as a proxy (Fulford 1987: 60; 1984; Middleton 1979). 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 that pottery usually accompanied a more substantial trade, but the commonality of this practice is unclear. Although a considerable body of maritime evidence directly related to trade exists, it is disproportionately represented geographically, temporally and typologically. This has largely resulted from the serendipitous discovery of sites by non-archaeologists, hence the emphasis on the most visible wrecks in areas of greatest underwater activity. However, the advantages of shipwreck investigation have long been recognised (see Adams 2003: 3ff; Muckelroy 1978, 1980; Gianfrotta & Pomey 1981; Parker 1973, 1980).

As a result of this undirected approach, there is a heavy bias towards the discovery of amphorae-laden wrecks in the Mediterranean from the late republican and early imperial periods (Parker 1980: 50-1), with far fewer wrecks from other periods and a distinct scarcity of evidence for other cargoes, 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, by the discovery of a very limited number of these most elusive sites, which

serves to emphasize the extent of this bias. More serious is the paucity of maritime evidence of any kind from north-west Europe (cf Fulford 1987: 59), with considerable periods for which there is no evidence whatsoever. In this light, the site of Pudding Pan, which is the focus of this thesis is very important and worthy of full investigation as it redresses these imbalances on all three counts. Firstly, situated off the north Kent coast of England it is the first Roman assemblage from a maritime context ever discovered in British waters. Secondly, it dates from the later second century, a period when relatively few other wrecks have been discovered. Thirdly, it seems to represent a shipwreck on which the bulk consignment was plain samian wares rather than an amphorae-borne product.

Moreover, few wrecks have avoided the attention of looters prior to serious investigation; the loss of artefactual and contextual evidence, often to the extent that the nature of the main consignment is obscured, has had a significant and detrimental impact on the range and quality of subsequent publications. Thus, attempts to contextualise consignments in terms of larger trading networks, by relating the shipments to production, mercantile, transition and consumer sites, are rare. This thesis will show that as a result of these factors a significant body of evidence, namely 'pottery' cargoes, has been completely overlooked, which has skewed our understanding of the nature of ancient trade. This approach is different and important not only because it considers an elusive north-west European wreck and its apparent primary cargo of plain samian wares in the context of a wider trading network, but also because it adopts a proactive approach to locating and investigating a site that has avoided the attention of looters and, for that matter, archaeologists.

The significance of Pudding Pan

The unique and important site of Pudding Pan in Herne Bay has intrigued investigators for at least the last 250 years and has foiled all attempts to locate it. The imperative to locate this site is pressing as no comparable wreck has ever been discovered in north-west European waters while similar wrecks in the Mediterranean are extremely rare; hence the cachet bestowed on this as yet unidentified site. The site is known only through the recovery of Roman artefacts, predominantly samian ware, in the fishing nets and oyster dredges of the commercial fishermen of Whitstable. Many theories have been proposed to explain the presence of these central Gaulish imports off the Kentish coast, although a shipwreck or jettisoned cargo seems most likely. Prior to the current study and a recent

undergraduate dissertation (Watson 1987) the site was last seriously investigated in the early twentieth century (Smith 1907; 1909).

Figure 1 Near pristine Drag 36 samian vessel recovered from Pudding Pan

The current study emerged from the success of a pilot study that I conducted in 1997 that revealed the tremendous potential of this site. One aim of the pilot study was to establish the extent and nature of the recovered assemblage through liaison with private individuals and public institutions, such as local and national museums, that had Pudding Pan artefacts in their collections. These investigations doubled the number of samian vessels known to have come from the site as well as identifying a wide range of other Roman and medieval artefacts that had not been previously recorded. Analysis of the recovered assemblage provided information regarding the nature of the deposit and suggested a model for the recovery of the samian vessels.

The second aim of the pilot study was to establish the nature and approximate location of the source 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 recovered but also provided up-to-date locational information. The pilot study included geophysical and diver surveys to the south of Pan Sand as the area favoured by previous investigators as the source of the Roman artefacts (see Walsh 1998). Subsequent analysis has revealed that Pudding Pan is the most probable location of the later second

century source so succeeding surveys have been conducted in that area. These surveys were generously funded at various times by the maritime section of the NMR at the RCHM(E), the Roman Research Trust, the Townley Group at the British Museum, and the British Museum. Details of these surveys are presented in Chapter 6.

Potentially, Pudding Pan could radically alter our perception of the trade and distribution of samian wares, but is its significance diminished, as we have been unable to locate the source? There has been a tendency to dismiss maritime evidence like this, as the finds are frequently unprovenanced and uncontextualized. This study has adopted new approaches to this assemblage in an effort to highlight the potential of these uncontextualized artefacts. To some extent these finds are contextualized, not in the conventional sense but, rather than a completely random deposit 'of so much bric-à-brac' (Cool & Baxter 2002: 365), there is identifiable patterning and the various deposits appear synchronic. It seems likely that this consignment was manufactured shortly before its loss and it is therefore of great significance. Analysis of the artefacts recovered to date can inform us about the range of contemporary samian forms fashionable at a particular moment in time as well as providing information on contemporary potters, their styles, techniques and manufacturing processes as well as details of cargo composition and stowage.

The true extent and nature of the recovered assemblage had not been fully established and a reassessment of the site is long overdue. This is particularly important in the light of the significant numbers of complete and near-complete samian vessels that are now known to have come from the site, which have been recorded in considerable detail during this study. Although the site assemblage now numbers some 500 vessels it is rarely mentioned in samian studies despite being a statistically significant sample. This assemblage could make a considerable contribution to our understanding of the transportation and marketing of these ubiquitous wares, coming as it does from a primary trade context. Moreover, previous investigations have largely focused on the nature and location of the deposit and the intended destination of the consignment with little consideration of the significance of the assemblage in terms of the trade in samian wares.

This thesis will redress this oversight by reassessing the evidence from Pudding Pan, considering the impact of recent enhancements to the recovered assemblage. Besides reassessing the nature and location of the site and the destination of the original consignment, this study will also consider 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 the shipment's likely destination, such as shop and warehouse assemblages and dockside dumps and through analysis of evidence from the source/production area. This will position the assemblage in its context as part of the supply chain of samian ware and other goods across the Channel in the later second century. The assemblage will also be compared with assemblages from the few similar wreck sites that have been investigated in the Mediterranean.

So much prominence has been placed on the use of pottery as a proxy for the trade in other more valuable, but archaeologically invisible, goods that if it can be shown that pottery was traded in its own right then it forces us to re-evaluate the relationship between pottery and these other goods and therefore our whole understanding of the nature of trade and the ways in which it is studied. If, 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. If so, it has skewed our understanding of trade and must raise questions regarding the way in which maritime research into the Roman Empire is conducted.

If it can be shown that Pudding Pan does represent a bulk consignment of plain samian wares it not only calls into question 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 of 'lesser value'. Ships laden solely with tablewares rather than an incidental trade filling gaps on ships would appreciably alter our view of the frequency of cross-Channel exchanges and the nature of north-west European trade. Analysis of the range of shipwrecks from the Mediterranean containing sufficient quantities of pottery to be interpreted as cargo rather than ship's equipment clearly illustrates the limitations of this evidence for demonstrating a parasitic trade (Chapter 2).

Although the site of Pudding Pan has been investigated for almost 300 years (Chapter 3), the extent of the recovered assemblage has come to light only relatively recently as it has been widely dispersed (Chapter 4). The close contemporaneity of this assemblage, most of which appears to have been lost in a single event, provides a unique opportunity to study forms that may well have been manufactured shortly before their loss and thus provide insights into the fashionability of a variety of forms as well as providing data on contemporary potters (Chapter 5). Moreover, the absence of decorated wares amongst the

Pudding Pan assemblage is highly unusual when compared with terrestrial assemblages (Chapter 7). Is this an anomalous cargo destined for a specific purpose or a trading norm that has eluded archaeologists until now?

Full analysis of this important assemblage will place it in its context as one link in the supply of samian ware through comparison with assemblages from the source kilns and possible destination sites such as shops, warehouses and dockside dumps as well as the only other comprehensively published Mediterranean wreck site containing significant quantities of samian/terra sigillata (TS), known as Culip IV (Chapter 8). The potential of Pudding Pan to completely alter our views of the supply and distribution of samian ware in north-west Europe are tremendous.

Besides detailed analysis of the recovered assemblage this thesis will attempt to determine the nature of the deposits and will report the results of geophysical, diver and dredging surveys conducted in the area from which the material was retrieved in order to locate the source that has eluded discovery (Chapter 6). This would be the first Roman maritime site ever discovered in north-west Europe using proactive research methods and would highlight the potential of this approach. The investigation of a newly discovered maritime site to which new techniques and indeed new paradigms, that have been developed since the last Romano-British wreck investigation in the 1980s, could be applied, is long overdue. The discovery of Pudding Pan would be an endorsement of this new methodology and would provide renewed impetus and interest in Romano-British maritime archaeology.

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 & Baxter 2002: 365).

This chapter will highlight the importance of Pudding Pan by reassessing the evidence for the maritime transportation of pottery both in north-west Europe and in the Mediterranean by examining the geographical, temporal, and typological array of wrecks that have been discovered from the Roman era. The scope of this evidence is limited, as most wrecks discovered in north-west Europe have been found in terrestrial contexts, many having been abandoned and stripped of their contents in antiquity. Setting aside the question of whether Mediterranean evidence from the core of the Empire is relevant or applicable in north-west Europe on the periphery of the Empire, relatively few wrecks containing significant quantities of pottery in general, and TS in particular, have been discovered and even fewer have been well preserved, well investigated and published in detail (see Parker 1984: 100).

Does this rarity stem from the fact that significant quantities of pottery were rarely transported by sea, thus supporting the notion of a parasitic, 'piggy-back' trade, (discussed below)? The wide dispersal and ubiquity of certain pottery types so evident in the archaeological record seems to challenge this notion. It is possible that the paucity of evidence for the maritime transportation of pottery 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 wrecks sites. Are there common factors that make pottery cargoes more difficult to detect? If so, these factors will be given due consideration and mitigated in the search for further sites. Are there similarities between the Pudding Pan assemblage and those from Mediterranean maritime sites? Are any similar in date?

Roman maritime finds from north-west Europe

Setting aside etymological distinctions, five ships, thirty boats, thirteen logboats/dugouts and seven barges dating from the Roman era have been found in north-west Europe (see Table 1 & Figure 3). In addition, deposits from Richborough (Lyne 1999), Nournour on the Isles of Scilly (Fulford 1989), and Herd Sand at South Shields (Bidwell 2001) have been interpreted as remains of either ships or cargoes.

Figure 2 Roman shield boss recovered from the Herd Sand at South Shields

However, 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 evidence for these most complex and most obvious, largest maritime artefacts (Arnold 1978: 32). This lacuna in maritime evidence from around the British Isles spans several hundred years, from the pre-historic Humber boats to the mid-second century AD Blackfriars I ship (Walsh 1998: 25; Adams 2001: 307; henceforth, unless otherwise stated all dates are AD). Consequently, we know more about the minutiae of the so-called 'Romano-celtic' or 'Gallo-Roman' boat-building traditions (see Ellmers 1969; Marsden 1965; 1977; Arnold 1978; Weerd 1978; 1988) than we do about the transition in maritime transport from the Bronze Age through the Iron Age to the Roman era (Adams 2001: 307; see also Johnson 1999: 21).

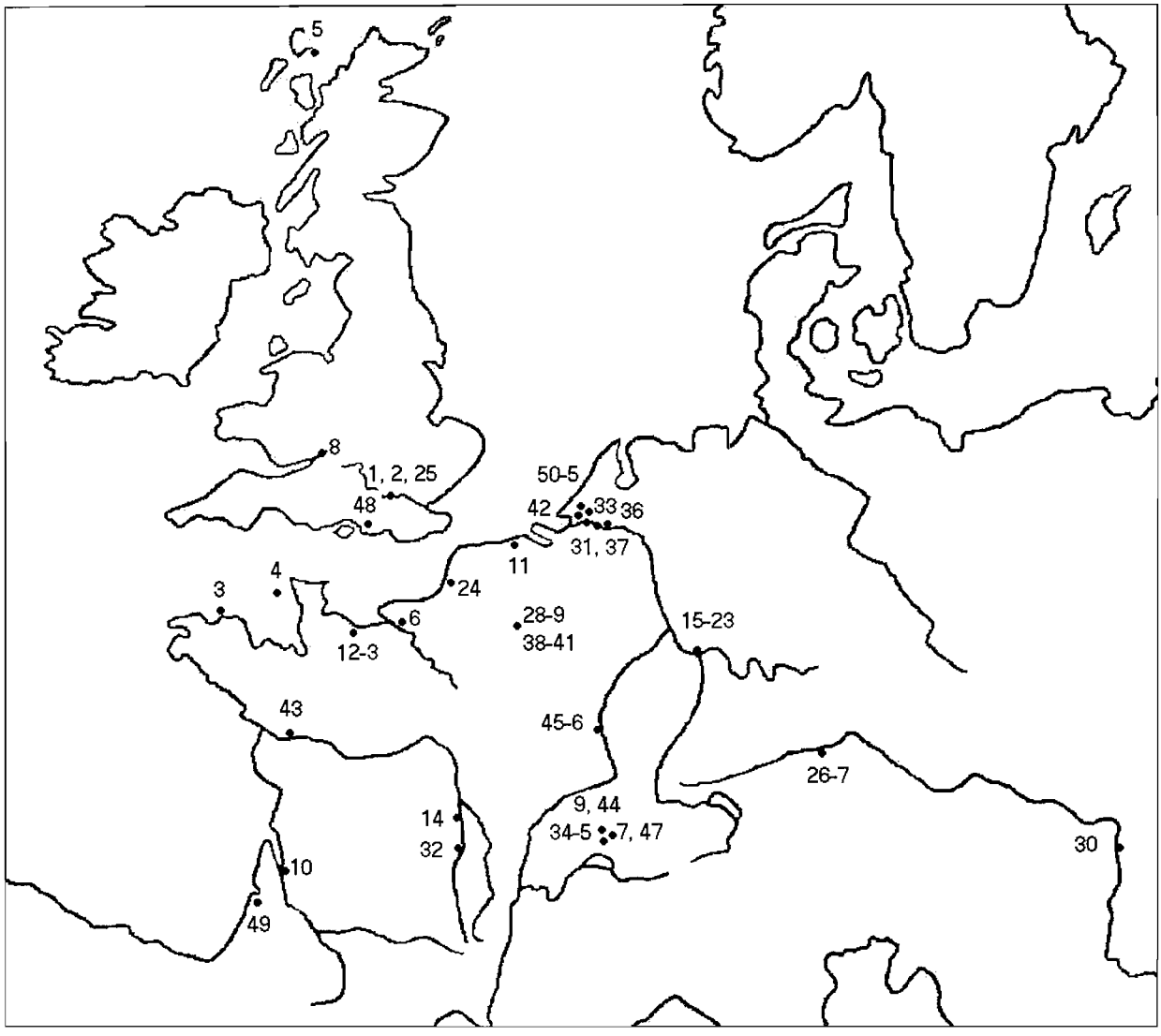


Figure 3 Finds locations of watercraft from the Roman era found in north-west Europe (Numbers relate to Table 1)

Of the fifty-five Roman vessels discovered in north-west Europe, only fourteen (25 per cent) have been published in any significant detail. Only constructional details have been published of twenty-five vessels (45 per cent), while sixteen others (29 per cent) have been only sketchily published. Two of the latter are amongst seven vessels discovered containing cargo; the Caen A boat, included a consignment of animal horns (Ellmers 1972: 282-3), while the Chanteney boat contained pottery (Gregoire 1895) which may not even have been Roman. 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).

No	Site	Location	Date	Contents
1	Blackfriars I ship	London	L 2nd-E 3rd C	Kentish ragstone, millstone, sherds
2	County Hall ship	London	293-300	None
3	Ploumanac'h ship	France	3rd-4th C	200 lead ingots
4	St Peter Port ship	Guernsey	*c* 280-290	Resin, coins, ceramics, tiles, wheat
5	Shiant Islands ship	Scotland	Roman?	None?
6	Abbeville boat	France	Roman?	None?
7	Avenches boats	Switzerland	2nd C	None
8	Barlands Farm boat	Wales	3rd C	None
9	Bevaix boat	Switzerland	*c* 182-190	None
10	Bordeaux boat	France	161	SG & Spanish TS, c/ws, amph necks
11	Bruges boat	Belgium	2nd-M 3rd C	None
12	Caen A boat	France	Roman?	None
13	Caen B boat	France	Roman?	Animal horns
14	Chantenay boat	France	Roman?	Pottery
15	Mainz A boat	Germany	E Roman?	None
16-20	Mainz type A boats	Germany	4th C	None
21	Mainz Type B boat	Germany	4th C	None
22-3	Mainz type C boats	Germany	E 1st C	None
24	Maresquel boat	France	2nd C	None
25	New Guys House boat	London	*c* 200	None
26	Oberstimm A boat	Germany	E 2nd C	None
27	Oberstimm B boat	Germany	E 2nd C	None
28	Pommeroeul A boat	Belgium	*c* 50-150	None
29	Pommeroeul C boat	Belgium	*c* 50-150	None
30	Szazhalombatta boat	Hungary	1st-2nd C	35 bronze vessels, cook utensils, pot
31	Vechten boat	Netherlands	1st C	None
32	Vichy boat	France	*c* 100-150	Decorated CG samian
33	Woerden boat	Netherlands	*c* 170-175	None; grain remains
34	Yverdon A boat	Switzerland	L 1st C	None
35	Yverdon B boat	Switzerland	4th C	None
36	Druten barge	Netherlands	*c* 200	Traces of slate; red-gloss & cc pot
37	Kapel Avazaath barge	Netherlands	*c* 100-160	None
38	Pommeroeul D barge	Belgium	*c* 50-150	None
39	Pommeroeul E barge	Belgium	*c* 150-225	None
40	Pommeroeul B logboat	Belgium	*c* 50-150	None
41	Pommeroeul F dugout	Belgium	Roman?	Filled with pottery
42	Alblasserdam dugout	Netherlands	*c* 100-250?	Pottery
43	Ancenis dugout	France	2nd-3rd C	None
44	Bevaix dugout	Switzerland	L 1st C BC	None
45	Chaudeney-sur-Moselle A	France	Roman?	None
46	Chaudeney-sur-Moselle B	France	Roman?	None
47	Cudrefin dugout	Switzerland	*c* 50BC-AD150	None
48	Hardham dugout	England	*c* 245-345	None
49	Sanguinet dugout	France	M 2nd C AD	None
50	Zwammerdam barge 2	Germany	M 1st-M 3rd C	None
51	Zwammerdam barge 4	Germany	M 1st-M 3rd C	None
22	Zwammerdam barge 6	Germany	M 1st-M 3rd C	None
53	Zwammerdam logboat 1	Germany	M 1st-M 3rd C	None
54	Zwammerdam logboat 3	Germany	M 1st-M 3rd C	None
55	Zwammerdam logboat 5	Germany	M 1st-M 3rd C	None

Table 1 Watercraft from the Roman era found in north-west Europe

Fragments of the Vichy boat, laden with second century decorated central Gaulish TS, 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).

The three remaining cargoes include Kentish ragstone on the Blackfriars I ship (Marsden 1966; 1967; 1972; 1990; 1994: 33-91); lead ingots on the Ploumanac'h ship (Pollino 1984: 13-21; DRASM 1985: 75-6; Kainic 1986; L'Hour 1987); and pitch on the St Peter Port ship (Keen 1986; Rule & Monaghan 1993). All three of these most coherent and best published north-west European maritime sites were sea-going vessels that carried raw materials for building, 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 & van Nijf 1992: 116; cf Rickman 1985: 110).

The assertion that the Blackfriars I ship included sherds from at least seventy-four Roman pots dating from the first, second, and third centuries (Marsden 1972) seems highly implausible 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 thirty years after Drag form 29 is commonly believed to have gone out of production is considered noteworthy elsewhere (Willis 1997a: 19).

Moreover, given its fragility and cheapness, 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 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 recovered assemblage from Pudding Pan reflects a similar range of dates but has led to quite different conclusions that will be discussed in detail below.

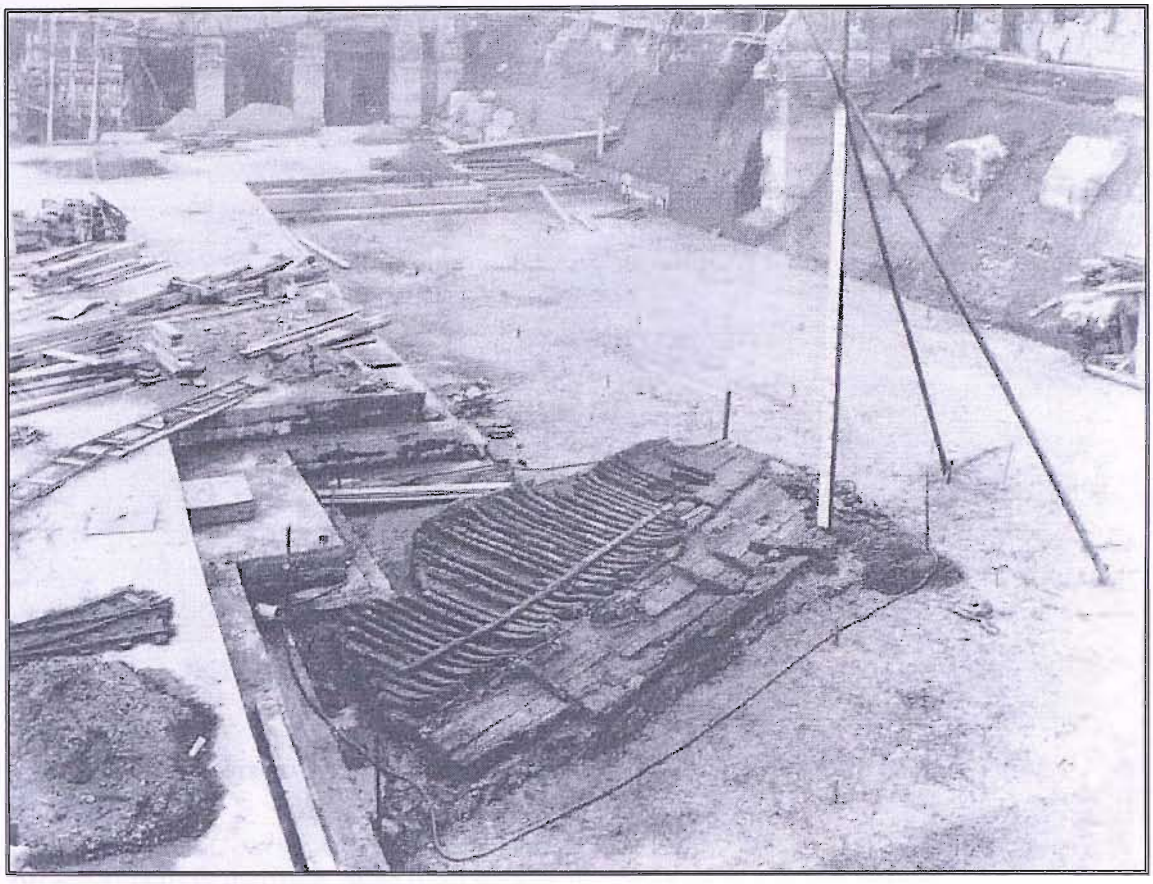


Figure 4 The County Hall ship

The great majority of watercraftfound in north-west 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. North-west European vessels built in the Mediterranean or shell-first tradition include the County Hall ship (Marsden 1974; 1994: 109-28), the Oberstimm boats (Höckmann 1988: 395; Schönberger *et al* 1988), and the Vechten boat (Muller 1895; Marsden 1976: 51; Höckmann 1991: 98). All of these vessels had been abandoned in antiquity and excavation and publication has been variable. Rather than representing direct trading links with the Mediterranean all these vessels seem to have been built in north-west Europe. The discovery of Roman artefacts, particularly *amphorae*, along the Iberian and Gallic Atlantic coasts (Galliou 1982; Tchernia 1983: 96) is more likely to represent local cabotage, as indicated by the St Peter Port ship, than long-distance, inter-regional trade (Rule & Monaghan 1993).

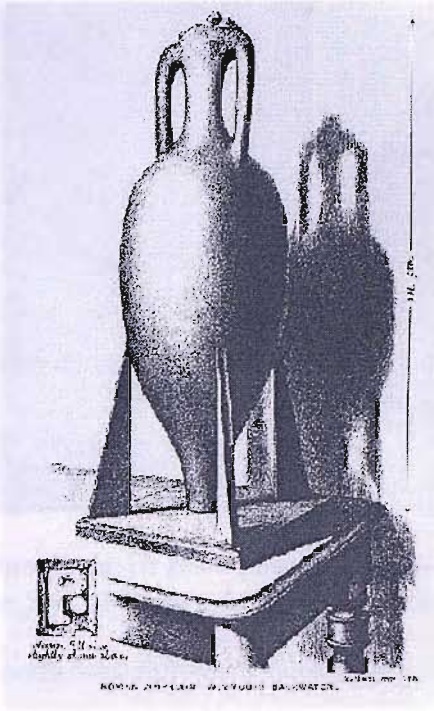


Figure 5 Amphora recovered from Weymouth Bay in the nineteenth century (after Damon 1890)

An assortment of maritime finds from around the British Isles provide further tantalizing hints of other possible sites; 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; 218-9; 295; McCann & Freed 1994). However, 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 nineteenth century from the West Caistor marshes near Caister-by-Norwich came from a Roman boat (Fryer 1973: 269).

For centuries, a whole variety of Roman artefacts have been, and continue to be, recovered from maritime contexts in north-west European coastal waters including *amphorae* (Galliou 1982; Sealey and Tyers 1989; Harmand 1966; McDonald 1970: 24; see Fig. 8), pottery (eg Pownall 1779), coins (Dean 1984: 79), ingots (Craddock & Hook 1987; L'Hour 1987), anchors (Boon 1977a & b; Cook 1971; Dean 1984: 79; Marsden 1990: 71; Markey 1991; 1997), military equipment (Bidwell 2001), roof tiles (Spurrell 1885: 281-4), and brickwork (Pownall 1779: 282). 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).

Figure 6 Recent maritime finds: Dr 20 amphora recently recovered off the coast of Worthing, West Sussex, and a Roman coin recovered from Lulworth Cove, Dorset

The complete absence in north-west 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. 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 north-west Europe. This appears to confirm that long-distance trade was conducted via the inland waterways of Gaul (Strabo IV 1.2; 1.14), which were navigable along all the main axes of communication (Middleton 1979: 82), rather than open-sea voyaging around the Atlantic coast.

Avoidance of long-distance sea voyaging is further supported by claims that Gaius carted 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 Claudius marched with elephants through Gaul to Boulogne *en route* to Britain following 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 *mare nostrum*, 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 solely comprised tablewares, which were usually complementary to consignments of *amphorae* (Parker 1992a: 7, 16). Of the ninety-eight best preserved and best investigated sites, fifty (51 per cent) carried only one category of cargo, of which forty-five (90 per cent) comprised *amphorae* although only 30 per cent carried a single class of cargo object (ie *amphorae* of just one type). The remaining forty-eight vessels contained mixed cargoes.

Pottery or tiles were each present exclusively on only two of the ninety-eight sites, while one cargo comprised stone (Parker 1992a: 20-1). The two sites exclusively containing pottery are the Punta Scaletta wreck off the Italian coast (Lamboglia 1964) and the Viganj wreck off the Croatian coast (Parker 1992a: 447, no. 1216). The former contained Campanian A black-gloss tablewares stacked in piles and dating from 140-130BC. The latter cargo consisted of an estimated 50,000 pieces of coarse ware pottery of probable Aegean origin dating from the second century, which had been much looted.

There are a number of other notable pottery wrecks that were either poorly preserved, poorly investigated or briefly published. For example, the Spargi wreck, near Sardinia dated *c* 120-100BC was only partly excavated before it was looted. The main cargo consisted of Dr 1A and Dr 1B as well as various other *amphorae*, and thousands of pieces of stacked Campanian B-type black-gloss tablewares. The 400-450 *amphorae* recovered from the site represent only about 12 per cent of the cargo, 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).

Site	Date	Pottery	*Amphorae*
Congloue A	*c* 210-180BC	7,000 Campanian A	400 Graeco-Italic, 30 Rhod.
Planier III	*c* 60-40BC	Campanian black gloss	Dr 1B, Pan. 2, Lam. 2
Punta Scaletta	*c* 140-130BC	Campanian black gloss	
Riou I	*c* 200-190BC	Etr. or Lat. black-gloss	
Spargi	120-100BC	1,000's black gloss	400-450 Dr 1A, Dr 1B, Rhod.
Viganj	2nd C AD	50,000 pieces	

Table 2 Wrecks containing significant cargoes of pottery

At Grand Congloué, an islet south of Marseilles, two shipwrecks that occurred a century apart were originally excavated and published as a single site (see Benoit 1961). The earlier site contained over 400 Graeco-Italic *amphorae*, and thirty Rhodian *amphorae* dated

c 200BC as well as 7,000 pieces of Campanian A pottery dated *c* 190BC. The later site dated from *c* 110-80BC and contained *c* 1,500 Dr 1A *amphorae* (Long 1987a&b). The Planier III site included considerable quantities of black-gloss ware similar to Campanian B as well as a cargo comprising Dr 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 is an unusual and potentially important site, which appears to have contained pottery as the main cargo, unless the primary cargo was low volume and high value. It seemingly comprised only black gloss tablewares dating from the early second century BC but has been only briefly published (Benoit 1956: 29; Lequément & Liou 1975). The Pakleni wreck off the Croatian coast comprised a probably newly manufactured consignment of *c* 30,000 second century coarse wares possibly from Asia Minor, which has only been published in Croatian (Parker 1992a: 298, no. 773).

It is clear from this sample that although the vast majority of known shipwrecks contain *amphorae* there are a number of sites on which the substantial quantities of both tablewares and coarse wares suggest that it was being conveyed as a primary or significant secondary cargo. Unfortunately, the actions of looters and poor publication have resulted in the under-utilization of this vital primary evidence for trade. However, the assumption that samian and other tablewares were only transported as secondary cargoes is challenged by these shipwrecks where the main cargo, apart from *amphorae*, was common ware (ie neither samian nor glazed ware). The more humble the commodity, the more important this symptom (Pucci 1983: 111).

Shipwrecks containing terra sigillata

Parker's (1992a) catalogue of c 1,200 wreck sites included only forty sites that recorded TS in its multifarious manifestations (including Arretine, samian, and African red-slipped (ARS)) amongst their assemblages (see Tables 3-6). Thirty-three of these sites contained limited quantities of TS that clearly comprised ship's equipment or crew's possessions rather than cargo. Thirteen of these sites are early Roman in date, ranging from the first century BC to the mid-first century AD, and included a few pieces of Arretine ware (see Table 3). Amphorae comprised the primary cargo 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.

Site	Date	*Amphorae*	Arretine	Other
Cabrera 4	*c* AD 1-15	700 Dr. 7	1 plate	Ingots
Dramont D	*c* AD 40-50	Dr. 2-4 & Rhodian	Some	*Mortaria*
Grand Ribaud D	*c* 10-1 BC	230 Dr 2-4, Pasc. 1, Coan, Dr 9	NC	11 dolia
Grand Rouveau	M 1st C. AD	Dr 2-4 Tarraconensis	2 plates	
Ladispoli A	*c* AD 1-15	40 Dr 2-4 & Haltern 70	NC	19 dolia
Nicotera	L 1st C BC		1 plate	Stone
Plane A	*c* 50BC	Dr 1B, Lam.2	Some	Lamps
Planier I	*c* AD1-15	Dr 2-4 Tarraconensis	NC	
Planier III	*c* 60-40BC	Dr 1B, Lam.2 & Pan 2	2 pots	Black pot.
Pointe Lequin C	*c* AD 50-70	Dr 2-4 Tarr., Dr 7-11 & Gaul.	Some	
Punta Patedda	15BC-AD20	*Amphorae*	Some	Beakers
Sud Lavezzi B	AD 10-30	Halt. 70, Dr 7-11, Dr 20	NC	Ingots
Torre Valdaliga	*c* AD 1-20	Dr 2-4 & Dr 7-11	Some	

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

Thirteen sites containing Gaulish TS are recorded, ranging from the early first century to the late fourth century. Again, *amphorae* comprised the primary cargo on the majority of these sites although the main cargo on one site comprised iron ore, one comprised roof tiles and one comprised lamps. The TS on seven of these sites was definitely not cargo and the remaining six sites each contained only one or two TS vessels, which again must represent shipboard equipment.

Site	Date	*Amphorae*	TS	Other
Cavallo A	AD 40-60	*Amphorae*	1 bowl	Glass
Chiessi	AD 60-85	*Amphorae*	Bowls	Ingots
Diana Marina	AD 50	1,000 Dr 2-4 Tarracon.	NC	16 dolia
Dramont F	*c* AD 400	120 filled with pine resin	NC	4 anchors
Fuenterrabia	*c* AD 100-150		1 cup	Iron ore
Guardis B	AD 1-25	Ebusitan, Dr 2-4, & Pasc. 1	NC	Oysters
Lavezzi II	AD 40-70	Dr. 7-11, Cam. 186A & Dr 9	NC	
La Luque A	M. 2nd C AD		1 bowl	Tiles
La Luque B	300-325 AD	Tunisian	1 bowl	Lamps
Panarea (Alberti)	AD 50-100	77 Dr 2-4, 69 horn-handled	1 bowl	
Port-Vendres II	AD 42-48	80 Dr 20, 15 Halt. 70, Dr 28	NC	Ingots, glass
Port-Vendres III	M. 2nd C AD	Gauloise 4	NC	Iron blades
Porto Cristo A	*c* AD 50-70		NC	Lamps

Table 4 Wrecks containing terra sigillata (NC - non cargo)

Seven sites contained limited quantities of ARS wares, ranging in date from the later second century to the early fifth century. Once again the primary cargo on all these sites

was amphorae. The ARS on four of the sites was specified as not constituting cargo while the remaining sites contained too few vessels to represent cargo.

Site	Date	*Amphorae*	Sigillata	Other
Femm. Morta	E 4th C AD	Afr 2B-D, Keay 3A & 81, Alm 51C, Dr 23	ARS	
Laurons B	*c* AD175-200	Gaulish	NC	Corn
Mateille A	*c* AD400-425	Almagro 51A & Tunisian	ARS	Metal
Monaco A	*c* AD200-250	Mauretanian & Afr. 2A	NC	C/ware
Punta Ala	*c* AD250	Dr 20, Afr. 2B-D & pear shaped	ARS	Dolia
Sobra	*c* AD320-340	1,000 Tunisian	NC	
Yassi Ada B	L 4th-E 5th C	1,100 Tunisian	NC	

Table 5 Late wrecks containing ARS and Eastern sigillata (NC - non cargo)

Besides Pudding Pan, only six wrecks have been discovered that contained sufficient quantities of TS to be interpreted as cargo rather than shipboard equipment, none of which date from the same period so the assemblages are very different. The Cape Gelidonya B wreck dated *c* 50-25BC was heavily looted, so only a selection of the 300 or so Eastern Sigillata A vessels removed by divers have 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 must have been considerable unreported looting (Bass 1974; Mitsopoulos-Leon 1975).

Site	Date	Main contents
Gelidonya B	50-25BC	300 eastern sigillata vessels
Plavac A	L 1st BC-E 1st AD	Dr 2-4 *amphorae*; decorated TS
Dramont G	*c* 60-70 AD	Roof tiles; 40 SG TS; 200 c/w vessels
Culip IV	61-79AD	76 Dr 20 *amphorae*; 2,750 SG TS
Pudding Pan	*c* 175-195AD	450 CG plain samian
Port Miou	*c* 400-425AD	*Amphorae*; 50 ARS wares; 17 lamps
Dramont E	*c* 420-425AD	*Amphorae*; ARS

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

In contrast, the Plavac A site, dating from the late first century BC to early first century AD, was well preserved, but has not been extensively published, and then primarily in Croatian. This seemingly large ship, *c* 25-30m long, contained a cargo of Dr 2-4 *amphorae*, a consignment of moulded TS, possibly from Puteoli, and a range of shipboard equipment (Gunjača 1976/7). It is unclear how large the amphora or TS consignments were, or whether plain wares were included. However it appears that the TS 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 first century pottery is only very briefly reported (Parker 1992a: 318).

The Dramont G wreck, dated *c* 60-70, 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 official indolence. 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 forty stamped south Gaulish samian cups, 100-200 coarse ware vessels, and a range of shipboard equipment (Joncherey 1976: 259). The presence of a locally produced, low-value cargo of tiles and pottery on a small vessel must point to a coaster engaged in local trade or a transhipment consignment.

In addition, there are two late Roman wrecks off the southern French coast, Dramont E and Port Miou both dating from the early fifth century, that included consignments of ARS wares amidst primarily *amphorae* cargoes. Unfortunately, both sites were destroyed by looters but were important for the dating of ARS (Hayes 1980: 482). The well preserved Dramont E site included a large consignment of ARS and other late Roman sigillata fore and aft of three upright layers of late Roman Tunisian *amphorae* (Joncherey 1975).

The Port Miou site included over fifty pieces of ARS and seventeen 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 first century containing 2,750 south Gaulish TS vessels, avoided the attention of looters, was fully excavated and well published, although 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 TS 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 *amphorae* laden to non-*amphorae* laden wrecks is so high that it is inconceivable that it in any way reflects the relative proportions of ancient traffic in samian and *amphorae* cargoes, reflecting instead some modern bias of chance discovery.

One must therefore ask why the most easily recognisable and most ubiquitous Roman pottery on terrestrial excavations, and one of the key indicators of Romanization that was 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 because these were the bulk carriers of the ancient world and were therefore carried most frequently but also that there is a modern bias towards the discovery of these sites over others because of the greater prominence and visibility of *amphorae*. This emphasizes the serendipitous nature of most discoveries; a research-led approach would focus attention away from the heavy bias of *amphorae* sites towards less well-represented sites, such as those containing TS.

There appears to be a pattern in the discovery of maritime TS sites as five of the six known wrecks containing significant quantities of TS were all discovered in areas in which other ancient wrecks have been discovered; only Port-Miou was discovered in isolation, but this site also contained *amphorae*. This must verify the notion that TS and other fine ware sites are far less visible underwater and therefore more difficult to detect using current technologies. At Cala Culip, off the northwest coast of Spain, six wrecks were discovered, five of which ranged in date from the mid-first century BC to the late first century AD, while the sixth was medieval. The first of these wrecks discovered in the 1950s (Culip I and Culip V) were very heavily looted, as were the later discoveries of Culip II and Culip III, which were destroyed.

Only Culip IV, the TS 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 may have been stimulated by siltation of the sites and subsequently afforded some protection to both sites from natural and human depredation. Perhaps TS 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.

In a similar scenario to Cala Culip, four wrecks have been discovered near Cape Gelidonya off the Turkish coast, including the famous Bronze Age site (A), the TS 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 TS) had been severely looted to the extent that it is unclear whether the TS was a sole cargo, a component of a larger cargo or some other deposit.

Like Cala Culip and Cape Gelidonya, Cap Dramont has been the site of multiple events with at least nine shipwrecks spanning the entire Roman era, with all but one, eighteenth century wreck, ranging in date from the late second century BC to the early fifth century AD. Six of these sites contained *amphorae*, some in large quantities, like Dramont A that contained about 1,000 *amphorae*. At Cape Plavac, off the Croatian coast two Roman wrecks have been discovered although the well-preserved Plavac A wreck was discovered first containing a consignment of moulded TS. However this site also included a consignment of Dr 2-4 *amphorae* that are likely to have been discovered first so the hypothesis that samian wrecks have not been discovered in isolation holds true for Plavac A.

The Pudding Pan material, like that from Cape Gelidonya, had been widely dispersed during its 300-year history, possibly 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 only known 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-first to the mid-third centuries with the bulk of material dating from the mid-second century. The dearth of TS wreck sites and the scarcity of sea-going ships in north-west Europe, elevates 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 empire-wide and it is also only the third Roman shipwreck from a maritime context ever investigated in north-west Europe.

The invisibility of TS sites is problematic for the detection of new sites but is beneficial in the protection of these elusive and crucial sites from what Parker (1992a) calls 'the predatory nature of most divers'. These sites are incredibly important as they represent the missing link in the samian supply chain providing the only primary information regarding the undoubtedly massive trade in samian and other tablewares. Were

tablewares only transported as part of a mixed consignment that usually comprised *amphorae* or does this view result from the discovery bias that is so heavily skewed towards the discovery of wrecks containing *amphorae*? Has anyone specifically looked for non-*amphorae* wrecks previously? Obviously, by their very nature *amphorae* and *amphorae* mounds are much easier to spot underwater especially by the amateurs that have located by far the 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); 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 a commodity *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 second century 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 (see Whittaker 1983a: 176-7). 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). Similarly, 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).

Advocates of parasitic trade claim that this movement of low-value goods 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.

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 (see Willis 2005).

As the quotation above 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 comprised the most common consignment in antiquity but their domination of the maritime archaeological record is disproportionate and must reflect their greater visibility underwater over 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 a primary cargo. This and other wrecks on which pottery has comprised the main consignment therefore demonstrate that a primary trade in table and cooking wares existed.

Moreover, very few wrecks contain more than a few pieces of TS, which 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 over 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 Roman evidence between the Mediterranean and north-west 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, which seems to reflect varying 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 before serious academic research could be undertaken which has had dire consequences for our understanding of the mechanics and mechanisms of trade. Not only have artefacts 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 the pottery represented.

This pervasive predation must account for the poor publications record of many of these key sites. 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 thesis will reassess our current understanding of the nature of the maritime trade in pottery.

Having assessed the range and nature of pottery found on shipwreck sites from both the Mediterranean and from north-west Europe it is clear that the site of Pudding Pan is important and unique not only because of the general lack of substantial maritime

evidence from north-west Europe but also due to the general paucity across the Empire of shipwrecks containing tablewares, especially TS.

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. What does the recovered assemblage tell us? 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? If so, does this mean that a significant primary cargo remains to be discovered? In either case, the site has great potential and warrants much greater attention than it has hitherto received.

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).

> ...some 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 discovery of Roman pots at Pudding Pan but contrary to Keate's (1782: 127) prediction 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. This chapter will clarify the distinction between Pudding Pan and Pan Sand as well as considering the ancient sea level and coastline in the area, which are essential to the understanding of the nature and location of the site[s]. It will also consider the role that Pudding Pan played in the designation of the name 'samian', the historiography of the site, and the various theories regarding the nature of the deposit.

Throughout its history this site has been known variously as Pudding Pan Sand, Pudding Pan Rock (PPR), 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 that are several kilometres apart are inappropriate as they are too specific for this, as yet unidentified, site. I therefore propose henceforth to use

the term 'Pudding Pan' when referring to the 'site'; the probability that there is more than one site is discussed below.

This research stems from the small-scale pilot study begun during my Master's degree (Walsh 1998; 1999; 2002) that has illustrated the tremendous potential of Pudding Pan by considerably enhancing the known assemblage from this site. The site was originally chosen as the focus for this research for several reasons. Firstly, 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 three centuries. Secondly, although material from Pudding Pan has been recorded since at least the eighteenth century its source has eluded detection despite numerous attempts to locate it. Thirdly, at the time that I began my Master's degree research, the Oceanography Department at the University of Southampton, in conjunction with the then Royal Commission on the Historic Monuments England (RCHME), were about to conduct a prospective geophysical survey in search of the source of the material.

Finally, besides one unpublished undergraduate dissertation (Watson 1987) the site has been virtually ignored since the start of the twentieth century (Smith 1907; 1909) at which time 282 samian vessels were recorded, 216 of which were stamped. Consequently although many major samian studies refer briefly to the site (Hartley 1972; Willis 1997a & b) 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 second century samian groups and, crucially, thereby sites in Britain and abroad throughout the past one-hundred years (eg Tyers 1996; Dickinson and Hartley 2000).

Given this background a number of questions arise. What has happened to the site in the intervening years 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 assemblage from Pudding Pan currently numbers some 500 complete or near-complete vessels, but is still increasing as more private collectors come forward. There have been a variety of theories 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 probably manufactured shortly before their loss. This can provide insights into the fashionability of particular forms and important typological details as well as providing information on the contemporaneity of potters working and transporting their products together at a particular time. The nature of the Pudding Pan assemblage, largely comprising 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. What do variations in form size tell us about the number and variety of moulds, templates and guidelines used by particular potters and the methods by which the pots and 'standards' are produced? The rarity of a seemingly primary consignment of tablewares is enhanced by the absence of decorated samian wares amongst the assemblage which 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 north-west European cargo with the concomitant benefits that this brings to our understanding of trade in the provinces of the Empire.

Evans (1981: 527) suggests that the information that can be derived from the Pudding Pan cargo is restricted as a consequence of it being recovered piecemeal in the eighteenth century. This trite and widely held assumption has never been challenged and may explain why this assemblage has received such little attention from samian specialists. It is true that the artefacts have been recovered piecemeal, but since the eighteenth 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 was an ideal site in need of reassessment and contextualization in the light of recent work particularly in the field of samian research.

This thesis 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 north-west Europe. This assemblage is enhanced by its maritime context as it provides primary evidence of samian *en route* to the end user and thus from the point 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 north-west European waters as illustrated in the previous chapter but also by the quantities of complete or near complete vessels that have been recovered. Only one other maritime site in the whole of the empire has yielded larger numbers of samian vessels, but the bulk of the consignment from Cala Culip was crushed by the heavier items of cargo, the Dressel (Dr) 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).

Having established the scarcity of similar sites 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 contact with museums locally, nationally and internationally. It is also being extended through contact with the commercial fishermen of Whitstable who still dredge artefacts from the site on a regular basis. The following chapter will explore the biographies of individual pots and collections to determine as closely as possible exactly how many artefacts have been recovered from the site. By establishing through how many collections the artefacts have passed before they reached their current locations it should be possible to ascertain the rate at which samian has been recovered from the site. This 'biographic' aspect can itself be understood as a part of the taphonomy and archaeology of the assemblage.

Has the recovery of samian been regular or episodic over the last 300 years, or has it declined from an earlier peak? What do varying rates of recovery tell us about the nature, extent and condition of the deposit? Succeeding chapters will consider the nature and location of the sources in the light of fresh evidence primarily from the commercial fishermen of Whitstable and other local groups. Efforts to locate the source of the material, using geophysical and diver survey, and controlled dredging will also be reported. The assemblage will also be compared with those of similar sites, primarily

Culip IV, as well as assemblages from the source kilns of central Gaul and similar assemblages from the likely destination of the shipment such as shops, warehouses and dockside dumps thus placing Pudding Pan in its context as one link in the chain of supply of samian wares.

Firstly, however, it is necessary to define precisely what the two terms Pudding Pan and Pan Sand refer to, as there has been so 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, which question whether these areas were dry at the time of the original deposition of the Roman artefacts. Obviously whether the site was terrestrial or maritime at the point of deposition is crucial to the site's interpretation. Therefore it is necessary to ascertain the approximate location of the north Kent coastline at the time 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; when did these terms come into common parlance?

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. Pudding Pan is approximately 6km due north of the clock tower at Herne Bay, marked on Admiralty 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 crescent-shaped sand bank with an east-west alignment, approximately 5.5km north-east of Pudding Pan, measuring some 2km by 300m and 0.3m below chart datum, marked by the Pan Sand beacon (Hall 1973).

Currently, Pudding Pan is approximately 7.5km north-west, and Pan Sand approximately 10.5km north-north-west of the Roman shore fort of Reculver (*Portus Regulbium*) that '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). The southeastern end of the Wantsum channel was guarded by the Roman fort of Richborough (*Portus Rutupiae*) that is now stranded some 3.2km

inland from the sea. The site of the Roman harbour at Richborough, which is believed by many to have played a key role in the Claudian invasion of 43, has still not been identified for certain.

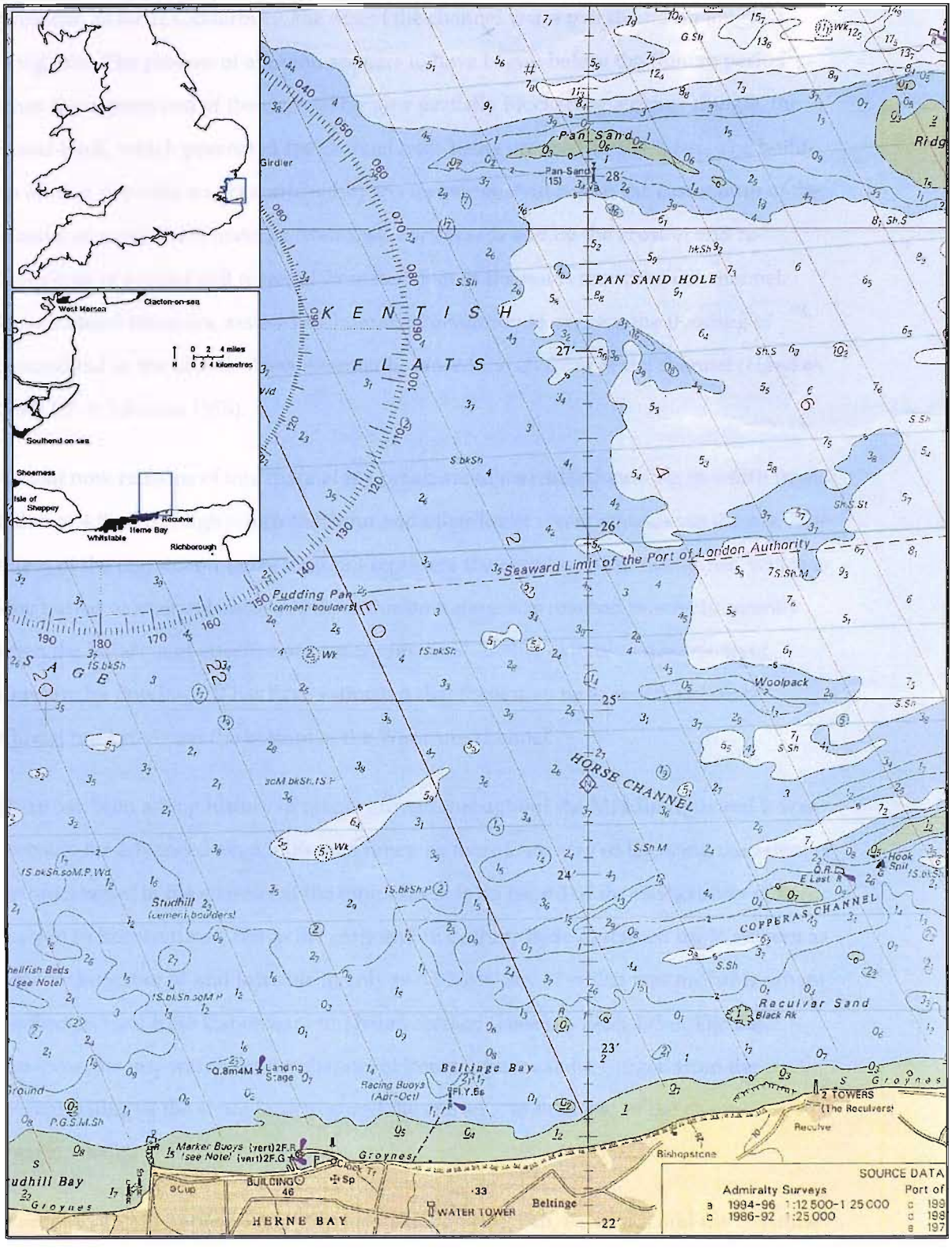


Figure 7 Site location map. Pan Sand is the sandbank at the top right of this chart and Pudding Pan is left of centre, directly north of Herne Bay

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. However, by the 15th century, 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 alluvion 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 east mouth of the channel of eroded cliff material from Deal northwards and by the erosion and re-deposition of eroded cliff material from Reculver in the north mouth of the channel. 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; Johnson 1976).

All that now remains of this channel 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 eighth 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). However, the importance of the channel in Roman times can be gauged from the strategic siting of the shore forts to guard the entrance to each end of the channel (Pearson 2002).

In order to ascertain the relationship between Pudding Pan, Pan Sand and the coastline at the time of the sinking, to provide an ancient geographical context, it is necessary to examine the evidence for fluctuations in sea level, land subsidence and rates of coastal erosion. Evidence for variations in sea level in this area comes from various sites

between central London and the Isle of Grain in the Lower Thames estuary, with Tilbury forming the type-site. A series of intercalated layers of clay and peat have been identified representing five marine transgressions (Thames I-V) resulting in phases of inorganic deposition interspersed with five regressive phases (Tilbury I-V) resulting in biogenic deposition. These layers were deposited as the sea repeatedly flooded the land and then receded as sea level rose and fell.

These indicate a sequence of oscillations of relative sea levels to land mass as the sea has advanced and regressed from –25.5m ordnance datum (OD) *c* 8,500/300 yr bp to +0.4m above present OD (Newlyn) *c* 1750 yr bp (Devoy 1977; D'Olier 1972: 127). The mean relative sea level curve shows an overall trend of a steadily rising sea level with time (see Devoy 1977: 714 fig 2). This trend has continued with a rapid rise during the Thames V phase over the last 1,000 years that might reflect increased building and embankment in the estuary. The Thames IV transgression phase, when sea levels at Tilbury were approximately +0.4m above present OD (Newlyn), ends approximately one hundred years after the deposition of the Pudding Pan material so it seems likely that sea levels were not dissimilar to today's levels in the late second century.

Figure 8 The towers of St Mary's Church that were originally built in the centre of the Roman fort at Reculver but which are now perched on the cliff edge. Note the remains of the Roman walls in the foreground.

Sea level change alone would therefore have had a marginal effect on the shape and location of the north Kentish coastline since the Pudding Pan deposition. The rate of land subsidence in the area is more difficult to determine as it is complicated by the eustatic and isostatic re-adjustment that has continued since the last ice age (D'Olier 1972: 122). However, within the Thames a possible differential downwarping of 1.5m for the Flandrian period has been posited (Devoy 1977: 714). The extent of coastal erosion since the early third century 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).

The rate of coastal erosion at Reculver can be roughly gauged from a number of references; John Leland recorded that the fort was about a quarter of a mile or a little more from the sea *c* 1530. By *c* 1600 a map shows that this distance had reduced to about 165m while another of 1685 shows the distance reduced to less than 10m. The north wall of the fort collapsed onto the beach *c* 1700 and the sea was within 5m of the church by 1809. The erosion has now been checked by the construction of massive sea defences with the church, that was built in the centre of the fort, just 2m 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 in this area in Roman times and its subsequent metamorphosis.

Various rates of erosion have been expounded for the northern Kentish coast; if modern erosion rates are assumed constant since the Roman period then a southward coastal recession of some 3km is produced. However, since measurements began, erosion rates of between 0.3m and 9.4m per year have been recorded highlighting the spasmodic nature of cliff recession. Consequently, consistent rates of erosion from the later medieval period to the present day produce a southward coastal recession of only 1km (see Pearson 2002: 113). D'Olier (1972: 129) suggests an average subsidence and/or sea-level rise of close to 127mm per century over the last 9,000 years. Even if we accept the maximum regression of the coastline of 3km this still places Pudding Pan approximately 3km and Pan Sand approximately 7km out to sea in Roman times, which is relevant to the discussion below regarding the nature of the deposit.

It is highly probable that the variety of chart features that include the designation 'pan' derive from the pots recovered in the vicinity. As a precedent, Albion Knowl is marked on William Heather's early nineteenth century chart (Fig. 10) in a position that

corresponds with the wreck site of the Albion, an English East Indiaman (Redknap 1990). Tyers (1996: 2; Keate 1782: 125) states that the sandbar known as 'Pudding Pan Sand' is the only place in Britain named after a Roman pottery type. Pan Sand is marked and buoyed on the 'Coasting Pilot' of 1693 by Greenwill Collins but is unnamed (Singer 1972: 9), Morden's map of Kent dated 1695 also shows the Pan Sand (Porter 1978). Nor is it named on the later 'Pilots' of 1740 or 1785.

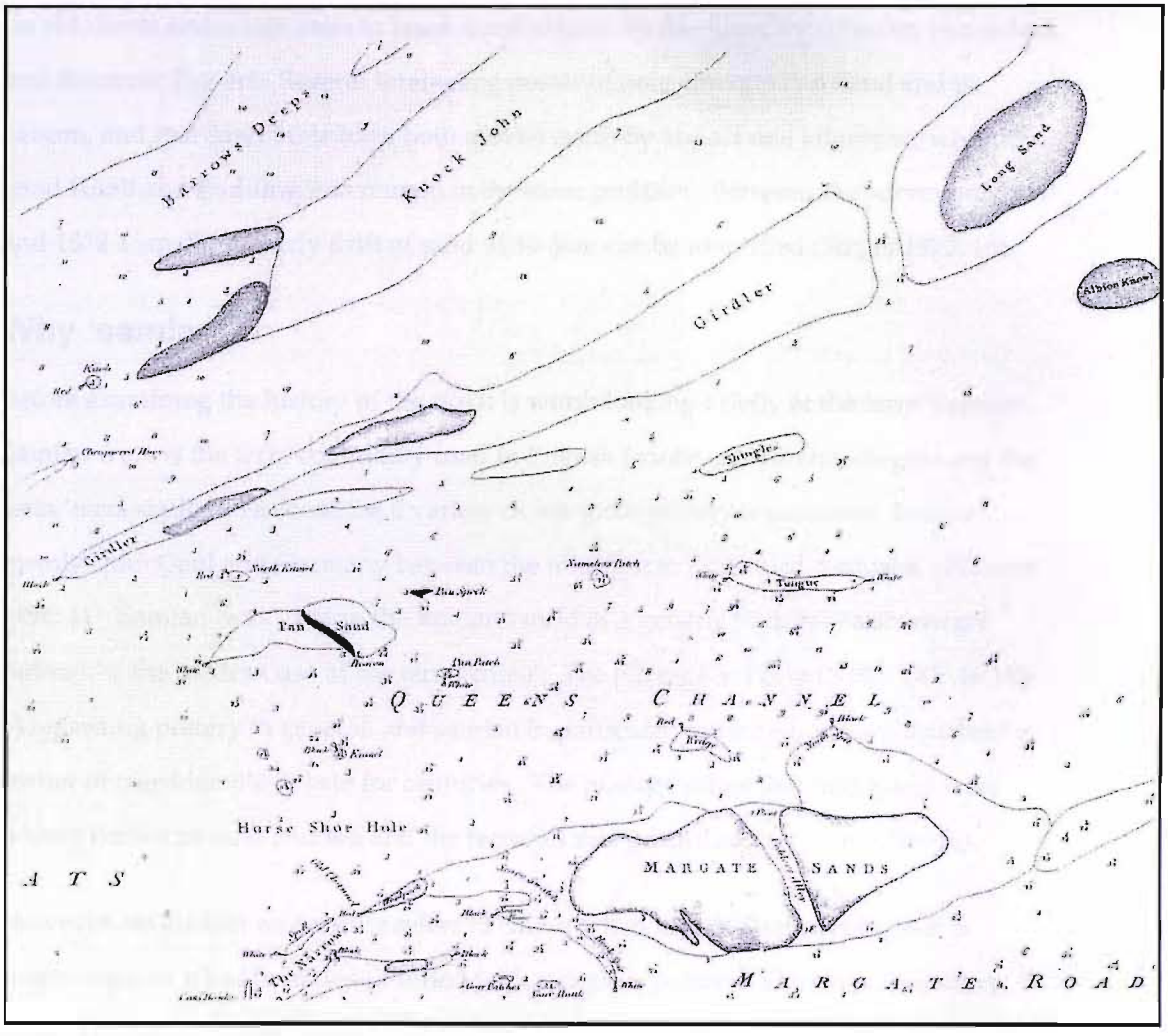


Figure 9 William Heather's nineteenth century chart showing Albion Knowl near the top right hand corner. Pan Sand and Pan Speck are highlighted in black. Pan Sand is shown on a different orientation from current charts rotated clockwise by approximately 40 degrees.

It is not until 1790 that Pan Sand is named on Harris' Chart of the Thames. Is it coincidence that this is only thirteen years after Governor Pownall published the first article on the finds? This must lend credence to the notion that the name derives from the discoveries. Pan Sand is named in all subsequent editions unlike Pudding Pan, which is marked as a shoal in 1842 but not named, and again on the charts of 1844 or

1861, marked but unnamed. The name 'Pudding Pan' is only associated with the shoal from 1862 and subsequently (Singer 1972: 9).

The location, shape and orientation of Pan Sand has changed considerably over the centuries since the area was first charted, thus illustrating the high mobility of the sand banks in this area (see Figure 9). By chance, the charts of 1844 (Bullocks Survey) and 1862 are of the same scale as the current chart, so it is possible to trace various features on old charts and relate them to fixed shore objects: Herne Bay Clock Tower, Herne Mill, and Reculver Towers. Several interesting points of note emerge: Pan Sand and its beacon, and Pan Sand Hole have both moved north by almost one kilometre, while Pan Sand Knoll and Pudding Pan remain in the same position. Between the surveys of 1844 and 1872 a small northerly drift of sand of 30-60m can be identified (Singer 1972: 16).

Why 'samian'?

Before examining the history of the site it is worth looking briefly at the term 'samian'. Samian ware is the term commonly used in English (continental archaeologists use the term 'terra sigillata') to describe a variety of red-gloss pottery imported to Britain mainly from Gaul and Germany between the mid-first to mid-third centuries (Webster 1996: 1). '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 (NH XXXV.46.160-1) regarding pottery in general, and samian in particular, is ambiguous and has been a matter of considerable debate for centuries. The passage states that fine wares were widely traded by land and sea and the factories that produced them were famous.

However, no ancient writer ever refers to colour when mentioning samian so it is surprising that it has become identified with red-gloss pottery. The seventh century writer Isidore of Seville claimed that pottery vessels were first invented on the island of Samos, hence the name Samian but he does 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 (Evans 1981: 522; Hayes 1972: 9; Hartley 1969: 235; King 1980). Others have claimed 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 only be applied 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-gloss pottery. Probably the earliest English reference to samian was by Governor (of Massachusetts) Thomas Pownall in 1779 referring to the Roman red pottery fished up from the Thames that he called 'Ionian or Samian'. He cited the eighteenth 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-gloss pottery found in Britain was generally known as samian largely due to this misinterpretation (Tyers 1996: 2; see Evans 1981: 522-3, 531 fn.12; see also Hayes 1972: 4). Like the small 'c' in china, a small 's' is used in samian to denote a distinctive class of tableware rather than a geographical location (Stanfield & Simpson 1958: xxx).

Figure 10 Samian from Pudding Pan

The first and most extensive classification of samian was made by the German archaeologist Hans Dragendorff in 1895, and remains the standard classification (Johns 1971:18). This classification was not universally accepted until c 1911 (see Evans 1981:

518); indeed Smith attempted a classification based upon the Pudding Pan assemblage in 1907-9 (designated PPR forms 1-16) which 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 and Walters (1908) published a catalogue of Roman pottery in the British Museum adding 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 subsequently collated this work in a single comprehensive volume (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 & Delor 2000). This new classification, although 'arbitraire comme tout classement' (Bet & Delor 2000: 461), has renumbered the entire known output of the Lezoux pottery workshops grouping pottery sets consecutively thus regularising and harmonising the catalogue in a more orderly and logical fashion. In addition, 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 & Delor (2000: 461) advocate, 'cette typologie doit être employée en complément des typologies existantes: les typologies de Dragendorff et Déchelette entre autres, restent incontourables'. It would be preferable to utilize this new classification system in this study for three very good reasons; firstly, 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. Secondly, this system corrects and clarifies errors made in previous classifications, and thirdly 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 comprise sets (ie 036 and 054-6) are not consecutively numbered. Although this re-ordering 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 as 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 Drag 46 and Curle forms 15 and 23, which are represented in the Pudding Pan assemblage. Indeed, Bet and Delor (2000: 469; c.f. Webster 1996: 57-67) are unequivocal in their criticism stating that the name Drag form 46, that comprises three definitely different forms (types 042, 044, and 048), 'doit être aujourd'hui totalement proscrite'. In addition, there has been considerable confusion between Drag form 31 and form 18/31; Bet & Delor (2000: 470; contra Willis pers comm) believe that only Drag form 31 bowls were produced at Lezoux of which 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 down-turned.

Moreover, the old typology has been amended and updated so many times that it is impossible to utilise without the use of numerous prefixes that designate the amendment being referred to. 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 thesis will use the new numbering system; the equivalent classifications of specific forms of Dragendorff, Déchelette et al that are relevant to the Pudding Pan assemblage can be found in a concordance presented here (Appendix 3).

The historiography of Pudding Pan

The first published references to this site occur in 1779 (Pownall 1779), at which time the historian Hasted also mentioned it (Porter 1978), although there is 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 suggests 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 recognised. In 1773, John Pownall 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* [*sic*], or rock (Pownall 1779: 283; Keate 1782: 126; Jeffris & McDonald 1966: 172).

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) recounts how his brother was taken to the spot where the pots were found. John Pownall describes the location of his dredging survey that 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. Pownall's contemporaries are dubious of this account to the point of incredulity; for example, Jacob (1782: 122) writes,

> 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 Pownall's claims it should be recorded that the current study replicated Pownall's experiment with similar results (see below). If it is to be believed then Pownall, rather than his brother, identifies the spot as Pan Speck (see Figure 9). Jacob's (1782: 122) attempt to replicate the dredging survey in the same year failed to recovery any artefacts.

Date	Author
1779	Thomas Pownall
1782	Edward Jacob
1782	George Keate
1861	John Brent
1877	Charles Roach Smith
1885	FCJ Spurrell
1887	George Payne
1907	Reginald Smith
1909	Reginald Smith
1932	William Page
1972	Hugh Singer
1978	TE Porter
1989	PR Sealey & PA Tyers
1999	Michael Walsh
2002	Michael Walsh

Table 7 Chronology of publications of Pudding Pan

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*] as, he claimed, this was the only name that he had seen on all the stamps which was contradicted by the editor's note appended to Pownall's paper (see Pownall 1779: 290; *contra* Jacob 1782; Keate 1782; Smith 1907: 271). Moreover, he accounts 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 suggests that the name Speck derives 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 to be seen. Pownall's (1779) 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).

Figure 11 Stamp of Atilianus (ATILIANI.M)

As both Jacob FSA (1782: 121) and Smith (1907: 269) point 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 fishermen. On the contrary the Pudding-Pan Rock is never dry.

Jacob (1782: 122) locates Pudding-Pan Rock, '...right in the passage from the Narrows 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) supports the suggestion of a submerged pottery, while Spurrell (1885: 281 n.2; 284; *contra* Smith 1907: 275; Watson 1987: 35) suggests that one wreck could not account for the quantity of pottery that has been found. He develops the idea of a pottery, into a town or village of potters from the abundance of bricks, mortar, stones and tiles! He offers 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 445mm by 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) fails to provide any indication of where this spot might have been although he is the first author to cite both Pan Rock and Pan Sand as the finds locations, and that black pots were recovered but ignored as the red pots sold for a 'shilling'. These pots are 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' (Pownall 1779: 287). The nature of these black-glazed pots will be discussed in the following chapter.

In contrast to the other theories, Reginald Smith (1907) considers the wreck of a cargo-boat freighted with Gallo-Roman pottery some time in the second century an historical event. Smith was the keeper of Romano-British collections at the British Museum and was 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 conducted the first underwater investigation of the site. Smith also attempted one of the first classifications of samian ware and published drawings of the main forms recovered from Pudding Pan. In addition, Smith 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.

Smith (1907-09) offers three explanations, besides naturally concreted gravel or masonry, for the 'brickwork' recovered by Pownall's brother; navigation marks on a brick or stone foundation, a small lighthouse or the ballast of stranded ships. Smith later concludes that the 'Roman brickwork' was probably cement-stone covered with seaweed and marine growths and reports that the roof tiles show no signs of usage suggesting that they comprised part (Smith 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 & Monaghan 1993: 130).

By 1909, Smith had investigated 282 vessels from the site (216 of which were stamped) but had not seen a single waster or vessel spoilt in firing, nor any other paraphernalia normally associated with kiln sites. Smith suggests that all the pieces were once perfect,

finding no signs of usage (*contra* Watson 1987), but the scour of pebbles had destroyed the foot-rings of large numbers that had been resting on the 'Rock' in an inverted position. Smith suggests that the recurrence of forms supports a common origin; only one form (no 15) was represented by a single specimen. Smith (1909: 400; 412) concludes 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 A.D. 160 and 190.

Smith (1907: 278) 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 potter's names from Pudding Pan also occurred in London finds (Smith 1907: 279). It is not unusual to find a name in three or four different forms, a peculiarity accounted for in the number of stamps required and in the workmen often engraving them by ear (Smith 1877: 119).

Smith accounts 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 1909-11: 117). Smith (1909: 412) concludes that the production of figured vases ceased at Lezoux many years before the factory was destroyed in 259 and that plain ware only was produced over a certain period.

He accepts that applied designs began in the early years of the third century so as neither has yet been recovered from Pudding Pan he places the wrecking between 160 and 190. Although Smith's dating of the assemblage is broadly accurate his notion of a period of transition when only plain wares were available has not been observed on terrestrial sites. Moreover, 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 insurmountable bears testament to the rigour of his investigations.

Date	Investigator	Operation	Outcome/Source
1773	John Pownall	Dredger survey	Brickwork 3 pans and frags
1779	Edward Jacob	Dredger survey	No artefacts
1908	R Smith/Hugh Pollard	Dredger & diver survey	3 pottery frags recovered
1955	P Stiles/Sheffield BSAC	Diver survey	Whitstable Times 17.9.55
1961	BSAC divers	Geophys. & diver survey	Whitstable Times 6.5.61
1979	P Mensikov/H Singer	Diver survey	
1985	MAS/Mark Redknap	Geophysical survey	Whitstable Times 8.8.85
1988	Kit Watson	Geophysical survey	The Independent 30.4.88
1997-2002	RSP/M Walsh	Geophysical surveys	Anomalies identified
1998-2002	RSP/M Walsh	Dredger & diver surveys	1 dish and several frags
1999-2001	ADU/Martin Dean	Geophysical survey	Anomalies identified

Table 8 Chronology of site investigations at Pudding Pan

Many of the early reports discuss '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). Many investigators spent much time looking for this rock as an indication of where the wreck might lie. It was not until Smith's (1909: 397) diver visited the site that this notion was quashed when it was confirmed that the rock referred to an area of 'cement boulders'. Smith (1909: 398) postulates the existence of two wrecks from evidence of pots recovered near Pan Sand that bear potters' names not included in the 'Rock' series, such as ACCIVS, CONGI, and MVXTVL (see Payne 1887: 155).

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 recorded in Oswald's (1931) corpus but their Pudding Pan provenance has been called into question (Atkinson 1942: 143; cf Eph. Epig. Ix, l.c: 678); their significance will be discussed below. Smith speculates that this second 'wreck' dates to the middle of the first century, which is 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). The discovery of this amphora seems to have been the catalyst that sparked renewed interest in the site after a prolonged period of inactivity.

Figure 12 London 555 amphora and olive pits during analysis at the National Maritime Museum

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

Watson (1987) examined 128 plain samian vessels and reported a further 120, of which eight were not Antonine/central Gaulish. Watson (1987: 25) postulates that some of this material might be earlier in date, possibly pre-Flavian ie mid first century, supporting

the notion of an earlier wreck to the north of Pan Sand. In addition, Watson located one amphora, four *tegulae*, one *imbrex*, one ARS vessel (Form 3B), and rather surprisingly one decorated Dragendorff (Drag) 37 bowl. Watson (1987: 30) reported that 45 per cent of his sample showed signs of tilt in the wear patterns, often at an angle of 30 degrees, while 6 per cent (or eight examples) displayed even wear. Watson 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 my analysis.

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 actual 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 may be at least two wrecks, one from the first century, and one from the second century, from which the majority of finds have come. The recently discovered third century material offers the tantalising 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, twenty years ago, the following chapter attempts 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 Pudding Pan. 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* (TAQs) for the collection of pots, again providing 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 it is the only reliable data we have. Is it possible with the available evidence to discern a cyclical recovery of pots as suggested

by some (Dean 1994)? 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 nineteenth century and especially since the Second World War (WW2) as some accounts suggest (Jeffris & McDonald 1966: 172; Singer 1972)?

Chapter 4

The biography of Pudding Pan collections

> From the sale of Kemp's collection [1717] till the close of the eighteenth 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 wilder 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 perpetuated in recent years largely as a result of a lack of serious academic interest and of numerous unsuccessful attempts to locate the site[s]. 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. At the time of his investigations the majority of the vessels recorded by Smith (1907; 1909) were privately owned.

The most often repeated and potentially dangerous 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 explains academic indifference. Offhand comments such as, 'the Pudding Pan cargo was recovered piecemeal in the eighteenth 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 assemblage now comprises *c* 500 samian vessels, which makes the

consignment one of the most significant deposits of Lezoux samian in this country and certainly one of the largest assemblages of unused pottery. In addition, this assemblage is the second most sizeable from a maritime context empire-wide while its north-west European location significantly increases its importance, owing to the absence of similar evidence.

This chapter will show that, 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 nineteenth century. This suggests that a considerable, cohesive deposit remains buried under the sands of the Kentish Flats. Later chapters will report the progress to date in endeavouring to narrow the area in which to search for the deposit. The assumption that this 'uncontextualised' assemblage has little to contribute to our understanding of the cross-Channel trade in samian will also be challenged.

This chapter will assess the rate at which the pottery has been recovered from the area 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 it is not usually recorded when a particular vessel was acquired. However, it is generally known when a collector was actively collecting so perceived cycles in the recovery of vessels can be identified and can then be compared to the economic cycles of the oyster fishing industry. Has the recovery of pots been in terminal decline since WW2 or are there other factors that have yet to be fully considered?

This chapter will investigate the biographies of the known assemblage in order to establish the routes through which samian wares have arrived in their current locations. In so doing it will reveal the collections through which particular artefacts have passed and may provide some indication of the dates when the material was originally found. By tracing the biographies of various collections it will also become apparent what proportion of vessels originally held in private collections were eventually acquired by public institutions.

The corollary is that it will also provide some indication of the proportion of the assemblage still held in private collections, thus enabling a more accurate estimation of the recovered assemblage. In addition, 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. 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 the last three hundred or more years. The majority of the surviving Pudding Pan vessels were originally collected by private individuals and may have passed between numerous private collectors prior to museum accession.

The problem is compounded by the scarcity of detailed accession records; 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 record 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. Little significant work has been done to locate the site or to research the recovered assemblage other than the work of Smith (1907; 1909) and Watson (1987). Is it possible to reconstruct the biographies of Pudding Pan vessels (original collectors, sales or bequests to other collections etc) prior to their acquisition by the museum in which they are currently housed? This is particularly important in identifying the vessels that were recorded in previous studies of the material, especially Smith's (1907; 1909).

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. It has also been difficult to ascertain through how many private collections a particular vessel has passed. It is therefore impossible with complete certainty to ascertain 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 surviving artefacts as possible that had reputedly come from Pudding Pan all the museums possessing Pudding Pan samian, identified by Smith (1907; 1909) and Watson (1987), 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 large number of local museums across the UK that might have acquired Pudding Pan material (see Appendix 4). While the number of enquiries made to institutions both here and abroad have been extensive they have not been exhaustive and it may well be that some public institutions that were not contacted as part of this study 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). The National Museum of Ghana (formerly Gold Coast) and Billy Graham's organisation were 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 recent public lecture about the site and the project, held at Whitstable museum brought forth more previously unrecorded pottery.

This research has now identified 497 complete or near-complete samian vessels from Pudding Pan in twenty-four museums and other public institutions, and eleven 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 recognised 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 4 summarises 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 providing accession data for the majority of its sizeable collection. 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 eighteenth century. It is possible that the 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 come from the compiler of the register some forty years later rather than the prevailing views of the time (JD Hill pers comm) but implies that some confusion existed in the late eighteenth century regarding the origin of these artefacts.

Accession Date	No. of vessels	Vendor/Donor	Notes
6 Dec. 1776	2	Mr D Rhudde	Dredged off Reculver, 1773
1814	37	Charles Townley	Possibly bought from G Keate
10 Dec. 1810	1	No details	No details
2 May 1853	2	William Chaffers FSA	Previously owned by E B Price
1 July 1856	?	C. Roach Smith	Mr Teanby's collection
1870	2	Victoria & Albert Museum	William Gibbs bequest
1901	5	Victoria & Albert Museum	From Mus. of Practical Geology
15 Nov. 1903	1	Francis Brent Bequest	No further details
27 Jul. 1908	10	Mr Sibert Saunders	Pudding Pan Rock
25 Oct. 1910	3	Library Comm. Corp. of London	Pudding Pan Rock
23 Nov. 1920	28	Librarian, Guildhall, London E.C.	Pudding Pan Rock
2 May 1925	1	Society of Antiquaries	Possibly donated by J E Price
16 Mar. 1937	8	W. Holden Esq.	Pudding Pan Rock
10 Dec. 1937	3 frags	R A Smith PPR Exploration Fund	Pudding Pan Rock
2 May 1950	2	Dr K B Clarke	No further details
1 May 1977	1	Geological Museum	Donated by Henry Dewey
12 Sept. 1997	1	Mus of London/Guildhall Mus	Collected 1865
Total	107		

Table 9 Accession data from the British Museum

At that time and throughout the nineteenth century the majority of Pudding Pan vessels were privately owned. For example, Gustavus Brander FRS 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 it entering museum collections despite the fact that he was a trustee and benefactor of the British Museum. Smith (1907: 271) provides 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 eighteenth century 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 thirty-seven samian vessels from Pudding Pan was subsequently acquired by the Museum in 1814 (Hill 2002; see Smith 1907: 271). Another notable eighteenth century collector was the Reverend Bryan Faussett (1720-1776), a fellow of the Society of Antiquaries (FSA) who lived in Kent and collected seventeen vessels. His 'unsurpassed' collection was offered for sale to the British Museum who declined it, but it was subsequently 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-nineteenth century.

Charles Roach Smith (1807-1890) published a paper on 'Mr Teanby's collection' (Smith 1877) that subsequently formed part of his own collection of samian assembled in the 1840's. This collection passed to the British Museum in 1856, (the year in which Roach Smith became a trustee of the Museum) despite the alleged prevarications quoted above, following an appeal by Smith's friends to parliament (Anon. 1855: 358) where the collection still remains (see Smith 1877; Marsh 1981: 174). Details of 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 106 vessels recorded during the current study it would seem that the British Museum had a total of *c* 114 vessels in its collections. Given that 107 vessels are accounted for in the accession records, assuming

that no other vessels have been transferred from the British Museum, then it would seem that the Roach Smith collection included seven Pudding Pan vessels.

The Victoria and Albert Museum (V&A) twice transferred Pudding Pan artefacts to the British Museum; in 1870 William Gibbs bequeathed two vessels and five further vessels came from the Museum of Practical Geology, presumably sometime before that museum was incorporated with 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 of these vessels. The V&A also transferred two samian vessels to the Pitt Rivers Museum, Oxford *c* 1884. In 1908, Mr Sibert Saunders moved from Whitstable to London and disposed of his entire collection of fifty-six specimens; ten vessels were bought by the British Museum for £16 16s 0d, seven vessels were bought by Guildhall Museum, London for £11 5s 0d (Lib. Comm. 1908b), and thirty-nine vessels went to the Royal Institution of South Wales, later Swansea Museum where twenty-nine vessels still remain (Smith 1909). The fate of the remaining ten vessels that originally went to Swansea 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).

The seven vessels from Saunders' collection that went to the Guildhall Museum were subsequently donated to the British Museum in November 1920 together with twenty-one others; one of which is inscribed, 'Pan Rock, Whitstable 1865'. These were in addition to three donated to the British Museum in October 1910. 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 fifty-three 'Roman and other archaeological objects' that were duplicates of other museum exhibits (Lib. Comm. 1903b). The Museum had, with a few exceptions, endeavoured to maintain a strictly local character (Welch 1901: 4); the transfer of the twenty-eight Pudding Pan artefacts to the British Museum formed part of a group 'not relating to London' (Lib. Comm. 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 (Lib. Comm. 1904).

It is also recorded that duplicates were offered to London Museum while others were donated to the Mill Hill School Museum in 1911 (Lib. Comm. 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' (Lib. Comm. 1897) and Roman (Lib. Comm. 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 complete samian vessels that collectors prefered. Besides these thirty-seven 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 a total of at least forty-one vessels were redistributed by the Guildhall Museum (see Table 10).

Other than the Saunders' collection, the routes through which the Guildhall Museum acquired its samian are somewhat obscure as 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 then 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, they 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 (Lib. Comm. 1903a: 97-100). The 1908 catalogue records twenty-two 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 suggests 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 eleven vessels and acquired an additional twenty-two between 1903 and 1908 totalling thirty-three pieces. Given that Guildhall gave away at least forty-one vessels the

museum must have acquired another eight vessels some time after 1908. Although the donation books have not been located, some accession notes have been found that record that in April 1865 Guildhall Museum paid Thomas Gunston £200 for his collection of antiquities and in May 1868 John Edward Price was paid £50 for his small collection. Gunston's collection included one pot from Pudding Pan while Price sold ten from his collection to Guildhall.

Excluding the Saunders collection, the source of the other twenty-three vessels remains unknown. Three vessels cited above are inscribed with recovery dates (1861, '62 and '65), as are others in the National Museum of Wales (1864), in the Ashmolean Museum (1882), and in Northampton Museum (1884). The inscriptions, close contemporaneity and association with Guildhall of some if not all of these vessels suggests that they may have come from one collection (Gunston's or Price's?) and may be the five recorded by Smith at Guildhall in 1907. Apart from Rhudde's donations (cited above, 1773) and the modern discoveries these are the only vessels for which the recovery dates are known (see Fig 16).

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 ten of the twenty-two vessels listed in the 1908 Museum catalogue and the eighteen 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 Saunder's seven vessels so the difference may be explained 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 twenty-eight 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.

Date	Donor/recipient/recorder	Acquired	Given away	Recorded	Residual
1865	Thomas Gunston	1			
1868	John Edward Price	10			11
1903	Kelvingrove Mus. Glasgow		3		8
1903	Corporation of Devonport		2		6
1903	Guildhall catalogue			6	
1904	Kingston Lib. & 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

Incidentally, Haverfield (1909-11: 117) claimed that the Guildhall Museum had a type 27 bowl labelled Pan Rock and suggested that on this basis 'Pudding Pan Rock' should be dated pre 160 as this form went out of use *c* 150. However, this bowl is not included in any of the previous catalogues of Pudding Pan material (Smith 1907, 1909; Watson 1987; Walsh 1998) and was not identified during the present study.

It is reported that in 1930 William Holden had a collection of some one hundred and thirty or so examples of 'Pan Rock' ware (Singer 1972: 8) although Holden's nephew claims he had only eighty-four vessels (pers. comm.). 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 records Holden as possessing only eight vessels in his collection which would imply that the remaining seventy-six were acquired sometime between 1907 and 1937. Holden was a Whitstable jeweller 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.

Figure 13 The private collection of William Holden's nephew

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, Hants 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 one hundred and thirteen vessels in its collection which appears to confirm that Holden's collection comprised eighty-four rather than one hundred and thirty vessels.

Holden's nephew recently offered his collection of fourteen complete vessels for recording. He is the last surviving member of the Whitstable shipbuilding firm, Anderson, Rigden & Perkins and started collecting after his uncle's death in the late 1930's. He paid one pound per pot and claims that he was offered plenty of broken and incomplete pots which he rejected as he was only interested in complete vessels. He unwittingly replicated Brander's dinner party, serving the meal on samian ware. The

Whitstable Museum collection was augmented by donations by Wallace Harvey (a local historian and president of the Museum Trustees) and his family after his death in 2001, of some twenty-one vessels (see fig 14). 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 twenty-three vessels in Whitstable Museum's collection is unknown but they are likely to have come from local fishermen.

Figure 14 Wallace Harvey pictured with his collection

Mr F G Hilton-Price was a director of the Society of Antiquaries and had twelve 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, the Mayor of Canterbury in 1909 (Smith 1909: 395-6). Goldney's collection of nine vessels is now in Manchester Museum having been acquired from a Mr. Sharp-Ogden in 1926.

Professor Haverfield FSA was another contributor to the exploration fund who had one Drag 79 plate (Smith 1909), which he bought in Whitstable in 1908, 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 which are still in the Society's possession donated by Mr J E Price, the same collector who sold ten 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 sixteen samian vessels and two Roman roof tiles from Pudding Pan. Three of the artefacts including the roof tiles were not located 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, Mrs Smith had also donated to the British Museum one *tegulae*, one *imbrex* and two *amphorae* sherds that had been dredged from Pudding Pan. It is not recorded whether these were also purchased by Mrs Smith from William Holden but it would seem likely. The Ashmolean purchased another samian vessel from H J Nicholls of 17 High St., Whitstable in 1912 for 15 shillings. In 1925, Prof F W Griffith presented a Drag 36 bowl to the Museum, which came from the collection of Sir Erasmus Wilson and had been recovered in 1882. In 1938, Prof R G Collingwood presented a Drag 80 dish to the Asholean, and in 1948 the Museum bought a Drag 35 dish at a Sotheby's sale (Catalogue 20/21 Dec 1948 Lot 48) from the collection of Revd E A Sydenham.

The 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 that 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 a sometime 'Inspector of Excavations' and antiquities dealer, G F Lawrence. He was appointed temporary assistant at the Guildhall Museum in 1901 (Lib. Comm. 1901), primarily to catalogue the collections (Lib. Comm. 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 reported 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 Drag 27 cup from Pudding Pan on loan to the National Museum of the Gold Coast (now Ghana) in 1956. The fate of this cup remains unclear, as no response has been received from that institution. Finally, thirty of the vessels recorded here are in the possession of current fishermen and were recovered by them in the last twenty-five 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 1. Obviously this alone does not exclude these vessels from the Pudding Pan assemblage but given the dubious provenance, the association with Pudding Pan is extremely dubious.

Thus the original collectors of 347 (69 per cent) of the 497 samian vessels recorded in this study have now been traced. The corollary is that the biographies of 156 vessels or (31 per cent) of the known assemblage remains obscure, as the information was either never recorded or is now missing. This may be a consequence of the circuitous route through which many museums have acquired their Pudding Pan collections, having previously passed through numerous private 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 (1907; 1909) catalogues

Without complete and accurate records of individual vessels it is difficult to establish with total accuracy the exact size of the assemblage recovered to date. Are the vessels recorded by the current study 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, but given the incomplete records is it possible, to ascertain with any degree of certainty those vessels previously recorded by Smith? Of the 282 vessels inspected by Smith 143 (51 per cent) were in private collections in 1907-9, although by 1909 Saunders collection of fifty-four vessels had been sold to museums, so only eighty-nine (or 31 per cent) of this sample remained in private collections. By tracing the biographies of the vessels recorded for the current project it has been possible to locate all but between forty-eight (17 per cent) and fifty-one (18 per cent) of the vessels recorded by Smith in 1907-9. The discrepancy results from a lack of response from two public institutions that have not confirmed whether they still have any artefacts in their collections (see 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 Messrs G M Arnold (seven vessels), Sebastian Evans (eight vessels), F J Sparshott (nine vessels) and Dr J W Hayward (eight vessels) – account for thirty-two (67 per cent) of these missing vessels. It may well be that at least some of these vessels have ended up in museum collections but the accession records are lacking. However, given that Smith suggests there were a lot 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 recovered assemblage. For example if we use the above figure and assume that 31 per cent of the assemblage remains in unknown private collections then the recovered assemblage could feasibly amount to some 659 or more vessels.

However by tracing all but forty-eight of the 282 vessels recorded by Smith in 1909 indicates the probable size of the recovered assemblage. If these vessels have entered museum collections without record then they are likely to have been recorded by the present project and we can say with justifiable certainty that the known assemblage numbers at least 497 samian vessels. If, however, these artefacts remain in private

collections then the assemblage numbers at least 545 vessels. Given the numbers of vessels in private collections that have been revealed following recent appeals it seems highly likely that there remains a considerable but unquantifiable number of samian vessels in private collections. The important point is that we can now be confident that without double counting the assemblage has now reached a statistically significant quantity.

Location	1907	1909	Total	Current	Identified	Missing
British Museum	36		36	106	Yes	0
Bethnal Green Mus.	5		5	10	Now in Museum of London	0
Guildhall Mus. London	5	18	23	0	28 to British Museum 3 to Kelvingrove Mus. Glasgow	0
Free Pub. Mus. Liverpool	29		29	27	2 unaccounted for	2
Royal Mus., Canterbury	19		19	10	Probably to Whitstable Mus.	0
Municipal Mus., Maidstone	8		8	41	Yes	0
Soc. of Antiquaries, London	7		7	5	1 to British Museum	1
Mr G M Arnold FSA	25		25	?	18 to Maidstone Museum	7
Mr Sebastian Evans	14		14	?	6 to Folkestone Museum	8
Dr J W Hayward	4	4	8	?	No	8
Mr W Holden	8		8	0	Bought by British Museum	0
Mr F G Hilton Price Dir. SA	12		12	?	3 to Jewry Wall Mus., Leicester 6 to Nat. Museum of Scotland	3
Mr Sibert Saunders	54		54	0	7 to Guildhall Museum 10 to British Museum 39 to Swansea Museum	0
Mr Crowther-Benyon FSA	3		3	0	3 to Jewry Wall Mus., Leicester	0
Christ Church Lib. 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 Arch. Mus.		2	2	3	Yes	0
Kingston Lib. & Mus.		1	1	0	1 to BM via Museum of London	0
Lady Armytage		5	5	?	No	5
Major Brocklehurst		1	1	?	No	1
Prof Haverfield FSA		1	1	0	1 to Ashmolean	0
F J Sparshott Esq		9	9	?	No	9
John Sutherland Esq		1	1	?	No	1
C Warner Esq		2	2	?	No	2
Totals	238	44	282			48-51

Table 11 Reginald Smith's corpus compiled between 1907 and 1909

Alternatively, the following table compares potter's stamps against samian forms as recorded by Smith (S) with those recorded by the current project (W). By taking the greatest number 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 (see 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 this number represents an absolute minimum from the site. The disparity between the forms/stamps recorded by Smith and by the current project now numbers only twenty-four 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; previously the total number of artefacts recorded from the site amounted to 327 pots whereas now the total amounts to some 524 vessels. If we add the forty-eight to fifty-one vessels recorded by Smith that we have been unable to trace then the total figure stands at 572-575 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 naturally this is highly speculative.

These figures assume that the material has been properly recorded and that stamps that are illegible now were also illegible to Smith although they may well have deteriorated in the intervening period of almost one hundred years. The table can also be used to identify some of the currently illegible stamps. A number of discrepancies have been noted in Smith's (1909) figures although the overall effect is marginal with details of 281 vessels rather than the 282 reported by Smith. According to Smith (1909), the asterisks denote examples not found on the Rock. However the recent surveys have disproved this theory in one case, as four examples of Drag 33 (PPR form 12) stamped NAMILIANI have now been recorded. This is the most notable of several examples of forms/stamps recorded by the present study that were not recorded by Smith. This might indicate that the nature of the recoveries from the site is changing which will be explored in greater depth below.

Table 12 (Over page) Comparison of samian forms/stamps recorded by Smith (S) (1907; 1909) with those recorded during the present study (W)

Dragendorff form no. (Bet & Delor 2000 no.)				79r (032P)			79 (032A)			80 (031)			36 (015P)			36 (015A)			35 (014)			C15 (045)			46 (042/4)			31r (056)			31r (054)			31 (055)			33 (036)			33 (036)			38 (088)			C23 (043)			Tg (029)			Others		
No.	Potters Stamp	Origin	Date	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	S	W	T	Total
1	AESTIVI. M	Lezoux	Had.-Ant.																															14	18	18	*						*												18
2	ALBVCIANI	Lezoux	Antonine																															10	13	13	*			*			*												13
3	ARICI. MA	Lez-Lub	Had.-Ant.																																3	3	8	11	11	*																14
4	ASIATICI. M	Lezoux	Had.-Ant.																																																											1	1			1
5	ATILIANI. M	Lezoux	Traj.-Ant.				12	17	17																							*			2	1	2	3	4	4	*			1	1	1												24
6	ATRVCIANI	Lezoux	Antonine																															1	4	4																								4
7	BELSA.ARVI	Lezoux	Antonine	2	3	3																										*																												3
8	OF. CAI	Montans	Claud-Ves				1	2	2																																																				2
9	CARETI. M	Lez-Lub	Had.-Ant.																															3	13	13	*			5	14	14																27
10	CAMPANI. O	Lezoux	Had.-Ant.				2	4	4																																																			4
11	CARATILLI. M	Lezoux	Antonine				4	11	11																										*			*			*																		11
12	CASVRIVS. F	Lubie	Had.-Ant.																															1		1																						1
13	CATIANVS	Lezoux	Dom.-Had.				2	1	2	6	7	7																																														1	2	2			11
14	CINTVS. M	St Bonnet	Traj.-Ant.																													2	3	3	*						10	12	12	3	2	3												18
15	CRACINA. F	Lezoux	Had.-Ant.				1	1	1																																																			1
16	CPISPINI	Lezoux	Had.-Ant.																														2	2																								2
17	DATTI. FEC	Rheinz.	Antonine													1	1																																										1
18	DECMI. MA	Lezoux	Antonine																															2	3	3	*			3	19	19																22
19	DOVIICCVS	Lez-Lub	Had.-Ant.																			1	1	1																																					1
20	FIRMIN. ARVI	Rheinz.?	Antonine?							1	1																																																	1
21	GENITOR	Lezoux	Dom.-Traj																											1		1	*			*	1	1																						2
22	GIPPI. M	Lezoux	Antonine																															1		1	*																						1
23	IVLLINI. M	Lezoux	Flav.-Ant.																															*			*									1	2	2												2
24	IVSTI. MA	Lezoux	Had.-Ant.																											1	2	2	2	2	2				*																						4
25	MACCALI. M	Lezoux	Had.-Ant.																															1	1		4	4				*			1		1												6
26	MACRIANI	Lezoux	Traj.-Ant.																													1	1	1				*						*												1
27	MAINACNI	Lubie	Antonine				*																							3	3	3	5	8	8				1		1		1	1												13
28	MAIORIS. M	Lezoux	Traj.-Ant.																													7	5	7	1	1	1				*																		8
29	MARCI	Lezoux	Had.-Ant.				*																							*			2	1	2																						2
30	MARTINI. M	Lubie	Dom.-Ant.				2	3	3																									*																								3
31	MASCELLIO	Lezoux	Had.-Ant.																																						1	1	1																1
32	MATERNI	Lezoux	Dom.-Ant.																															1		1				7	6	7																8
33	MATERNNI. M	Lezoux	Antonine																											2	1	2				1	1	1	1		1	15	20	20															24
34	MERCATOR	Lezoux?	Traj.-Had?					1	1																																																		1
35	NAMILIANI	Lezoux	Antonine																																				*	4	4	1	2	2		1	1												7
36	PATTO. F	Lezoux	Antonine																															3	6	6				2	3	3																9
37	PAVLLI. M	Lez.-Lub	Had.-Ant.				5	8	8																									1	1	*							*												1	1			10
38	PRIMANI	Lezoux	Traj.-Ant.								1	1																				3	2	3	*			*			*																		4
39	QVINTI. M	Lezoux	Had.-Ant.					1	1																									1	2	2	5	2	5	2	4	4																12
40	SACRILLI. M	Lezoux	Antonine				3	4	4																																*																		4
41	SATURIO	Rheinz?	Had.-Ant?																														1	1																								1
42	SATVRNINI	Lezoux	Had.-Ant.		1	1		1	1																					5	11	11	10	10	10	11	18	18	*			3	4	4														45
43	SEVERIANI. C	Lezoux	Antonine	1	1	1																												*			2	7	7				*																8
44	SEXTI. MA	Lezoux	Traj.-Ant.				*																														*			*			2	3	3														3
45	OF. VITALIS	La Grauf	Claud-Dom																																	1	1																						1
	Rosette																					4	4	4	11	9	11																											3	3				3	3	21
	Illegible stamp			1	1	1	3	3	3		2	2										3	1	3	1	1	1	2	5	5	1	15	15	1	24	24				6	2	6		2	2	1	1	1				10	10	73
	No stamp				2	2							5	14	14	15	31	31	10	19	19	1	1	1					1	1													1	1		1	1						1	1	71
	Total			4	8	8	35	57	58	6	11	11	5	14	14	15	32	32	10	19	19	9	7	9	12	10	12	14	23	25	33	52	56	53	113	117	20	28	33	55	88	93	8	12	14	1	5	5	1	4	4	14	14	524

Table 13 summarises 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 524 which is achieved by adding the 497 vessels physically inspected and recorded for this study to the twenty-seven vessels uniquely recorded by Smith (1909), as identified above (see Table 12). It is important to stress that 524 vessels represents an absolute minimum; the true figure could of course be considerably higher as it is not known how many vessels remain either in public collections that have not been contacted or have not responded, or that remain in private collections. If we include the forty-eight vessels recorded by Smith that remained in private collections in 1909 and which remain untraced then this figure rises to 572 vessels, or 575 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 651 vessels is produced. Of course this figure is highly conjectural but could still be considerably lower than the actual number of vessels that have been recovered.

Source	Date	Total	Adjustments	Amended Total
Smith	1909	282	– 1 vessel error in figures	281
Watson	1987	182	+ 62 reported but unseen	244
Walsh	1998	327	None	327
Current	2005	497	+ 27 recorded uniquely by Smith (1909)	524
Current	2005	524	+ 48/51 recorded by Smith but currently untraced	572-75
Current	2005	497	+ 31 per cent in private collections in 1909	651

Table 13 Summary of minimum numbers of vessels from Pudding Pan

Recovery rates

The rate at which samian has been recovered from Pudding Pan is crucial as it informs us about the nature, extent and condition of the source/deposit. Given the vagaries of museum accession records it is difficult to identify specific variations in the rate at which pots have been recovered from the sea although general trends are apparent. Has samian been recovered at a regular rate over the last 300 years, or has recovery been more sporadic? Has there been a peak period for the recovery of samian as suggested by Spurrell (1885: 282), from which there has been a slow, if not terminal, decline as some suggest (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 sixty vessels in the forty years that he had been searching. What might varying rates of recovery tell us about the nature of the deposit? If the general perception that fewer

pots are recovered nowadays is accurate, does it imply that the source has been exhausted? If so, are we chasing a chimera by continuing to search for the source? Or might there be other explanations for the perceived decline, such as less fishing activity, a change of fishing techniques or fishing areas, or simply a lack of academic interest? Might natural phenomena such as shifting sands (Dean 1984), stormy weather (Jacob 1782: 123) or both (Keate 1782: 127) explain any variation in recovery rates?

Figure 15 represents the dates at which 576 vessels known to have come from the site were first recorded and reveals a number of interesting features. There may be an element of double counting although the graph is accurate enough 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 occurs in the late eighteenth century to mid nineteenth century relating to the initial interest in the site, the second and by far the largest in the first half of the twentieth century correlates with renewed interest in the site stemming from Smith's (1907-9) investigations, while the third occurs in the late twentieth century relating to 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 spike of 1909 result directly from Smith's (1907; 1909) 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 had been 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 Faussett's in 1853; Sibert Saunders' in 1908; 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 so evident as the artefacts have been presented by date of accession rather than the date at which they have been catalogued.

The other interesting feature of this graph (Figure 15) is the two distinct periods when relatively few pots were recorded, the first spans the second half of the nineteenth century while the second period spans the mid to late twentieth century. The latter period appears superficially to confirm the belief that far fewer vessels were recovered after WW2 although this has been challenged by the present study, which has recorded significant quantities of samian recently recovered from the sea.

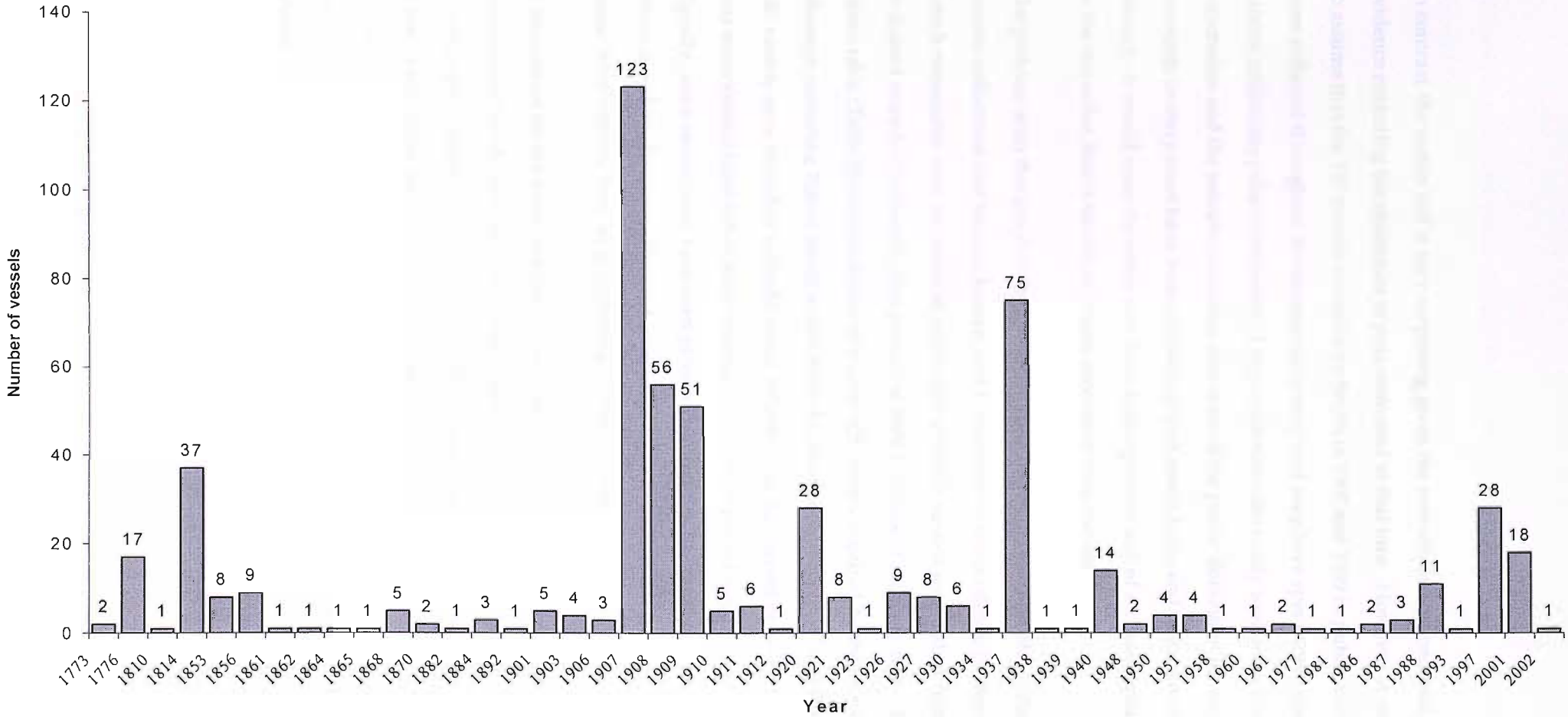


Figure 15 Dates at which pots were first recorded

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 by Smith in 1907 and 1909 in public institutions were collected throughout the nineteenth 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 twentieth 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: a) dates when private collections first became known, and b) museum accession dates, neither of which necessarily bear any relation to the date at which vessels were fished from the sea or indeed were first collected, thus providing little evidence of recovery rates. The above table (Table 9) records details of at least 105 vessels acquired by the British Museum excluding Roach Smith's collection of at least seven vessels. Given that only 106 vessels were recorded in the 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 from other sites. Despite this it is clear that we know from where a very large percentage 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, from 1771 to 1774, and from 1776 to 1777. The earliest recorded vessels were those of Rhudde recovered in 1773, although the Revd. Faussett had accumulated seventeen 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 Townley 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 (1782) who published a paper on Pudding Pan and had collected at least ten or twelve pieces from Pudding Pan in 1776 (see Hill 2002; Smith 1907: 274). In

addition, it is recorded that Roach Smith amassed his collection between 1840 and 1850 (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, included the Guildhall donations, following Smith's publications. Had the British Museum purchased all the vessels offered to it (Saunders remaining thirty-nine and Holden's remaining seventy-six) 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 an impetus for museums to acquire Pudding Pan material from existing private collections. It also challenges any suggestion that most vessels were recovered in the late eighteenth and early nineteenth centuries.

The fact that 40 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 (WW1), although it is fair to say that the Guildhall collection that comprises the bulk of this later material was collected prior to the war. This seems to support Smith's (1909) claim that there was a good deal more samian about in the early twentieth century. Spurrell's (1885: 282) claim, 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 WW2, although anecdotal evidence suggests that even then a recovery rate of one pot per year was not uncommon (Jeffris & 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 three hundred years despite anecdotal evidence to the contrary. The belief that there was a peak period for samian recovery in the eighteenth and early nineteenth 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 Jeffris & McDonald 1966: 172). This research 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 propounded a forty-year time-cycle theory which suggests that the shifting sands uncover and recover the wreck every forty 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 site. Although historic charts show that the sands have shifted considerably over the centuries (see Figure 9), this perceived cycle is challenged by the evidence presented here.

However, rather than reflecting variations in recovery, publications appear to reflect variations in academic interest in the site. For example, the apparent nineteenth century lull is reflected in the publication of only one paper between the late eighteenth and late nineteenth centuries (Brent 1861). Either this undermines the belief that large quantities

of pottery were recovered throughout the nineteenth 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 in 1983 (Watson 1987; Sealey & Tyers 1989) thus reflecting the post-WW2 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 1977; 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 Jeffris & McDonald 1966: 170ff).

Figure 16 combines the dates of the most significant publications with the dates when the vessels became known which 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 between the two but an examination of the economic cycles of the oyster industry may shed further light on the matter.

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 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). The increase in urban populations in the nineteenth century 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 England the number of dredger men 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

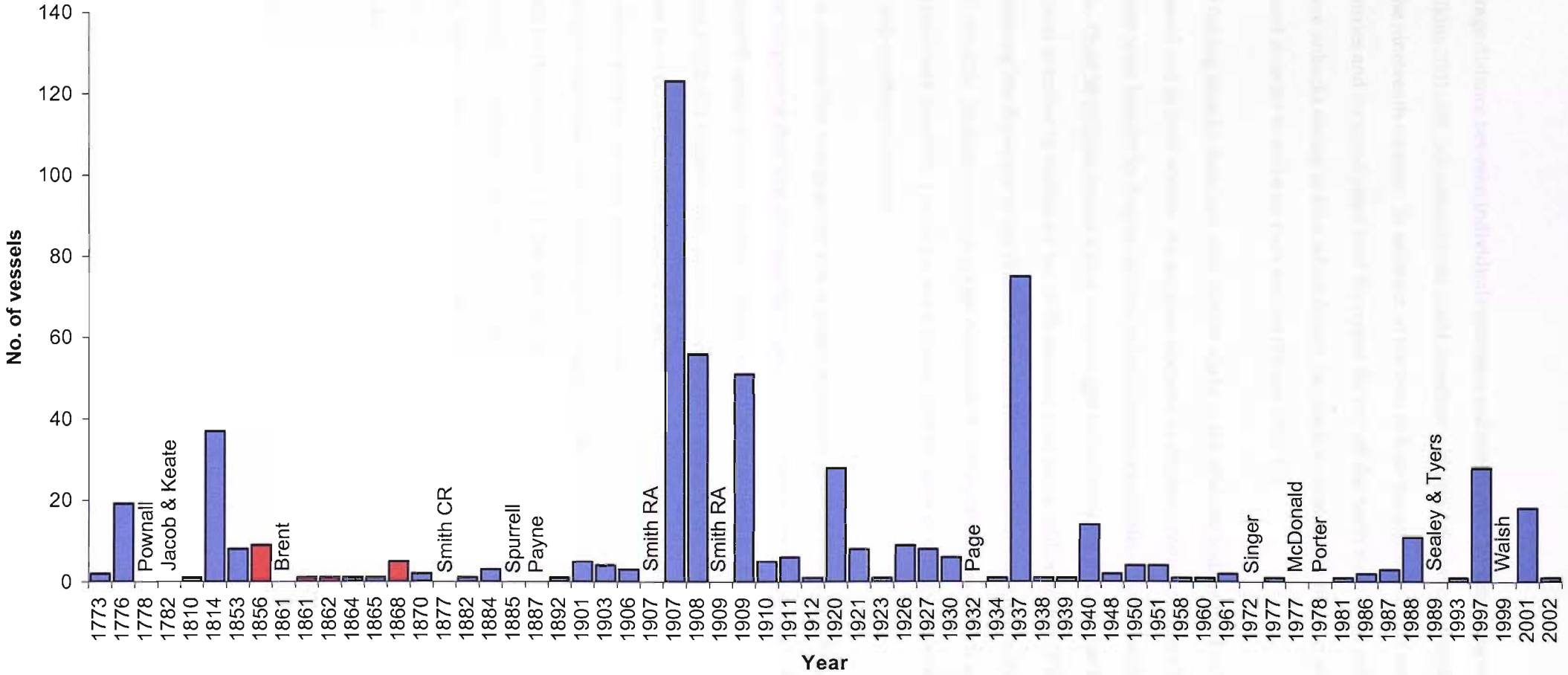


Figure 16 First recorded dates of individual samian vessels with dates of published papers. The red columns indicate vessels whose recovery date is known

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 nineteenth century. In addition, at the turn of both the eighteenth and nineteenth centuries and for some years later 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 Wicklow oysters 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 less than half a million by the 1890s amply illustrating the depletion of the Wicklow beds in little more than thirty years (Wilkins 2001: 99-100). 30 million oysters a year equates to 82,200 oysters a day, which is an extraordinary quantity, providing some insight into the scale of dredging operations in the mid-nineteenth 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 nineteenth century when dredging off the north Kent coast was at its most intensive. Singer (1972: 17) suggests that the over-exploitation which forced boats to seek out new oyster beds accounts for the supposed decline in the number of pots recovered since a perceived peak in the early nineteenth century, claiming 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 which is contradicted by this study. In addition, 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 *circa* eighty vessels worked the Flats compared to the handful that now work the area (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 motorised vessels with winch-operated dredges that resulted in fewer boats covering a wider area using larger dredges thus perhaps having little bearing on the quantity of samian recovered from the site. It is possible but to my mind improbable given the sheer scale of the operation in

the late nineteenth century. The difference in the volume of oysters landed at its peak compared with now is completely incomparable.

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 eighteenth 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 thirty-three ships totalling 701 tons burden. Records also indicate thirty-one ships registered at Whitstable in the later eighteenth century (Harvey 1993: 50).

The number of recorded vessels in the nineteenth century is of a completely different order of magnitude with 484 ships owned and traded from Whitstable. In addition, twenty-eight 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 brought coal from Sunderland and the Tyne for the gas works, the railways and for domestic use in winter 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 nineteenth 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. Given the difference in the scale and volume of dredging between then and now, it is surprising that pots are still recovered which must provide some indication 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 economic 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.

Given the different levels of intensity it is equally surprising that the difference between the numbers of pots recovered in the early nineteenth century and now is not far greater. This may confirm the notion that far larger numbers of vessels have been recovered then we currently know about 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 generated by the discovery of the London 555 amphora full of amphora pits from which the present study derives has clearly illustrated that, given 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 significant body of material still remaining buried on the Kentish Flats.

This most recent study of the Pudding Pan site has been the most prolonged ever undertaken which 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 the following chapter will 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).

Having established the history of the site and the historiography of the collection, this chapter will present a detailed catalogue of the known artefacts that have been recovered from the environs of Pudding Pan. This chapter will concentrate on a description of the artefacts and the locations from which they have been recovered, with some general comments regarding the aspect of the vessels 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 this data in terms of the nature and location of the deposit. Exactly what material has been recovered and to what extent is it homogenous in terms of type, form, date and provenance? Is it likely that the material came from one source or from many? The form and manufacturing stamps have been recorded and identified in order to ascertain the date and provenance of each artefact to determine whether material has been recovered from one source or from a variety of sources.

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). However it is now clear 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 also 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 samian the findspots for some of the *amphorae* and the *mortaria* are 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]. This 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 (Walsh 1998) work has continued to establish the full extent of the site assemblage (see Watson 1987; 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 300 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 proportions 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. Any variation within a particular maker's stamp was also recorded as it is not unusual to find a name in three or four different forms, possibly as a result of template production by illiterate workmen (Smith 1877: 119).

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 potter's 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 three hundred years in order to highlight any variation in the forms and potters found

over time 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. Does the work of individual potters 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 (Rhodes 1989: 50; Singer 1972). This is supposedly supported by inconsistencies in the wear and growth patterns (Watson 1987: 56-7), but which hypothesis is more accurate? Might there be other explanations for the seemingly broad distribution of vessels such as multiple sites? Do particular types of marine growth on the vessels indicate particular marine habitats that would help to focus the area in which to search for the sources? Are there any variations between different forms in terms of wear patterns and marine growths? If so, why? Are there any differences over time in terms of wear, damage and marine growth, between vessels collected in the eighteenth century and those collected in the twentieth century? If so, why?

Ultimately this analysis should enable far more accurate interpretation of the material and should 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. Are the cargoes homogenous or heterogeneous? If the latter, what else were the ships carrying? What can the main samian assemblage tell us about the production of samian? Can we ascertain the likely destination of the cargo from the forms/stamps represented in the assemblage? Where else have these samian forms and potter's stamps been found? Succeeding chapters will explore the significance of any variations between this material and similar deposits of unused samian from terrestrial sites, and with similar maritime sites in the Mediterranean.

The 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 (Walsh 1998) revealed considerable confusion over the precise number of samian vessels recovered from Pudding Pan owing to possible double counting of artefacts previously 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 some 497 complete or near-complete samian vessels (441 estimated vessel equivalents (EVEs)), 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 twenty-four vessels, which were uniquely recorded by Smith (1909) that it has not been possible to trace; thus the minimum number of vessels recorded from the site totals at least 524 vessels (465 EVEs). This represents an increase of some 197 vessels (60 per cent) in the size of the known assemblage since the completion of the pilot study seven years ago.

The homogeneity of the group is remarkable and many of the conclusions drawn by Smith almost 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 Fig 17, 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.

Fig 18 illustrates a similar comparison by potter's stamp between this study and Smith's (1909), displaying a similar pattern with greater numbers of most stamps recorded by the present study then by Smith. One of the most notable differences is in the far greater number of illegible stamps recorded recently. This seems primarily due to the greater numbers of Drag forms 31 and 31r that have been recorded recently which seem more susceptible to damage in the area of the stamp owing to its location on a raised point in the centre of the bowl. Moreover, some stamps may have been damaged through poor handling and storage, as very few vessels appear to have received any form of curation since their recovery. Alternatively, earlier investigators may have concentrated on the

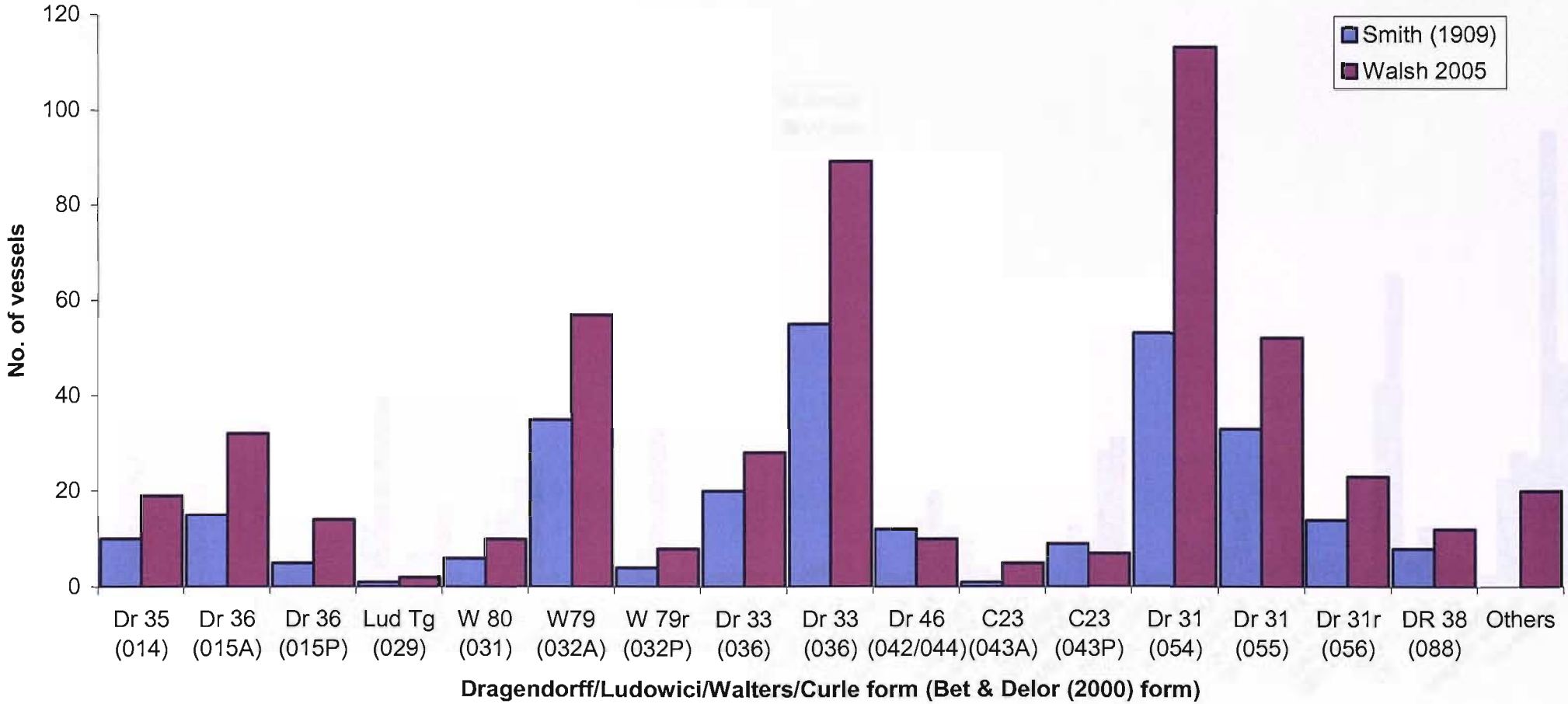


Figure 17 Comparison of forms recorded by Smith (1909) with those recorded during the current study

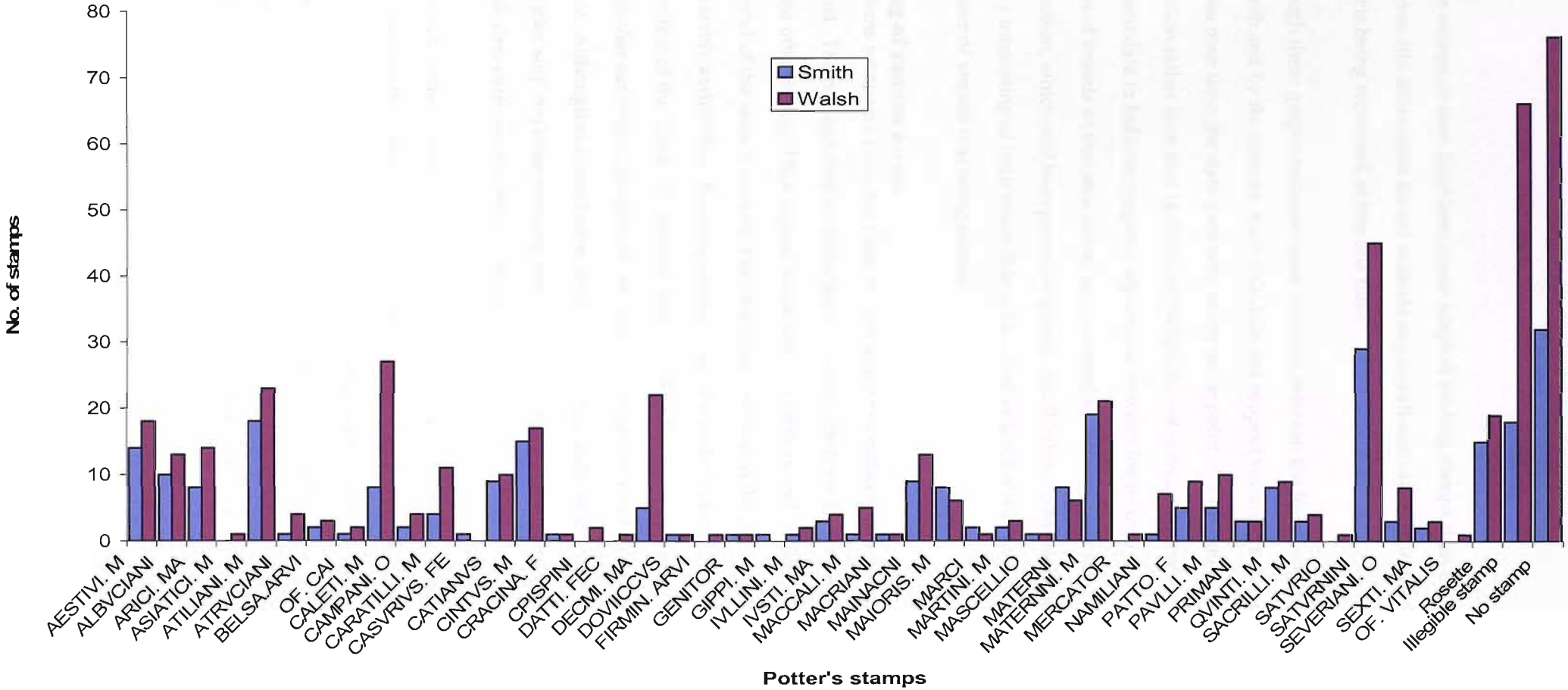


Figure 18 Comparison of stamps recorded by Smith (1909) with those recorded during the current study

legible stamps or may have been more adept at reading stamps than the present writer. However, the differences do not indicate any significant variation in the range of artefacts 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 refers to the point of accession by a public institution rather than that of discovery which do not correlate. However there is 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. Any such variations would be very interesting as indications 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. The cup and dish set Drag form 46 and Curle form 15 are considerably earlier than the other forms. They appear in the late first century and, although they continue to the end of the second century, they are most common in the pre-Antonine period, thus notably earlier than the dates derived from the potter's stamps. None of the 'Drag 46' and few of the 'Curle 15' samples from Pudding Pan were stamped. Curle form 23 was another early form, made from the late Flavian period until the end of the second 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 could be indicative of a late first-early second century source.

In contrast, forms 31 and 33 are especially characteristic of the later Antonine period in which they are the commonest samian form. Form 31 and form 38 appeared c 150, form 31r slightly later c 160, and all continued until exportation from central Gaul ceased at the end of the second century. The style of form 33 cup recovered from Pudding Pan dates specifically from the mid-late second century. Matching cup and dish forms 35 and 36 are difficult to date closely as they rarely bear potters' stamps but were in use throughout the Antonine period with form 36 more common in the late second century. Forms 79 and 80, a dish and cup set belonging exclusively to the second half of the second century, are another example of the manufacture of matching sets of vessels

(Hartley 1969: 245-6). These forms are unequivocally indicative of a mid to late second century source, fully compatible with the dates of the potters' stamps. Unfortunately, the locations from which individual samian vessels have been recovered is so vague and so confused that it is impossible from this evidence to distinguish between two sources or to hypothesize, beyond the Kentish Flats, on their precise location.

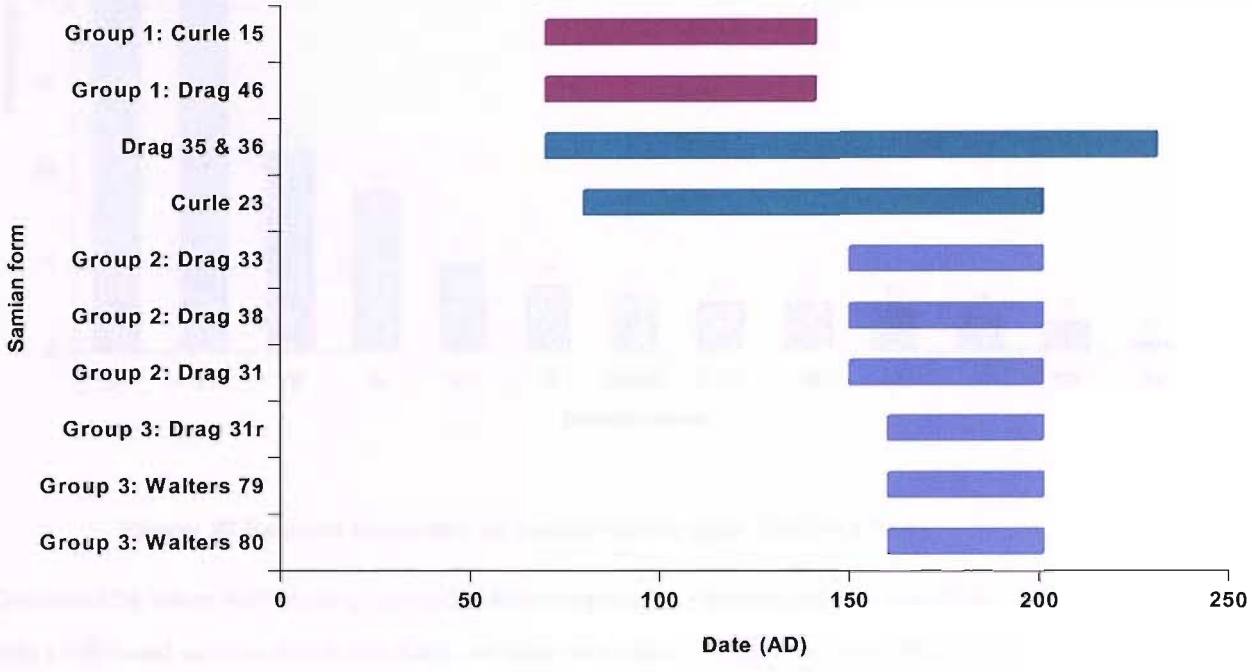


Figure 19 Comparison of basic form dates

The graph below (Figure 20) amply illustrates the predominance of forms 31 and 33 which respectively constitute one-third (33.1 per cent) and one-quarter (24.1 per cent) of the samian assemblage recovered from Pudding Pan thus supporting a later Antonine date for the main consignment. The early forms Drag 46 and Curle forms 15 and 23 constitute a small proportion of the assemblage representing less than 8 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 one hundred years old at the time of the sinking thus supporting the notion of an earlier source of material dating from the late first/early second century. The relative frequency of the different forms will be compared with similar deposits of unused samian from terrestrial sites in the next chapter.

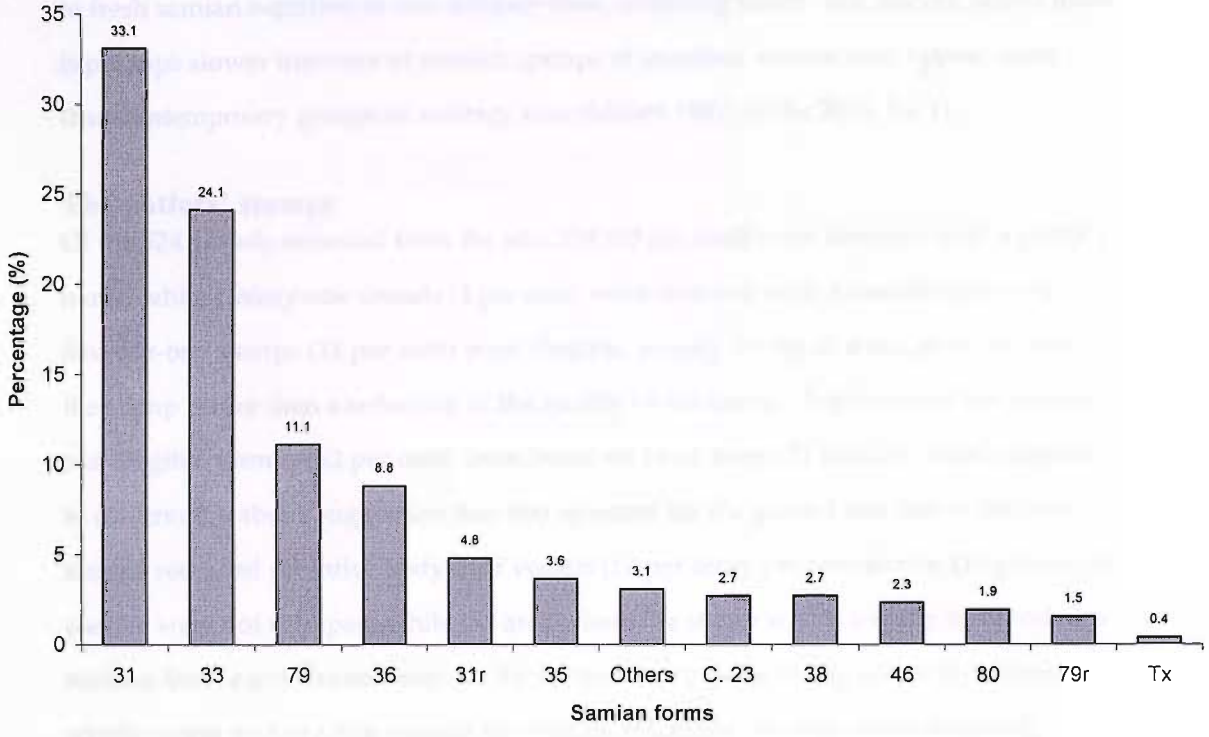


Figure 20 Relative frequency of samian forms from Pudding Pan

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 some unknown and unknowable period after the date of manufacture (Millett 1987: 103). So, like the Boudiccan 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 Boudiccan 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, forms 31 and 31r are usually indicative of a later second century deposit; generally the higher the proportions of form 31r the later the group, usually post-dating c 160, as at Pudding Pan. However, although the Flavian Culip IV wreck has a similar ratio of these forms a date before c 80 has been suggested (Millett 1993b). This is entirely consistent with the nature of shipwrecks and 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 slower turnover of samian, groups of stratified samian may appear older than contemporary groups at military sites (Millett 1987; Willis 2005: 5.4.1).

The potters' stamps

Of the 524 vessels recorded from the site, 359 (69 per cent) were stamped with a potter's name, while twenty-one vessels (4 per cent) were stamped with a rosette-type motif. Seventy-one stamps (14 per cent) were illegible, usually owing to damage in the area of the stamp rather than a reflection of the quality of the stamp. Forty-four of the seventy-one illegible stamps (62 per cent) were found on Drag forms 31 and 31r, which appears to confirm the above suggestion that this accounts for the greater number of illegible stamps recorded recently. Sixty-four vessels (12 per cent), predominantly Drag 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 which occurs on forty-five vessels; the stamps of Caletus (twenty-seven samples), Atilianus (twenty-four samples), Maternnus (twenty-three samples) and Decmus (twenty-two samples) are the next most frequent examples (Fig 21).

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, 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 (Hartley 1969: 249). Assemblages like those found at Inchtuthil legionary fortress, the Colchester pottery shops and the Pompeii 'hoard' have provided an accurate chronological framework enabling the dating of decorated sherds within ten or twenty years. However, plain ware styles changed less rapidly so cannot be dated so accurately. In the study of plain samian, therefore, it would be misleading to use dates that would convey an impression of close and accurate dating, so it is preferable instead to cite reigns of emperors (Oswald 1931: vii). The majority of stamps on the plain samian assemblage from Pudding Pan span the reigns of Hadrian (117-138) to the Antonines (138-192).

Most of the potters represented in the Pudding Pan assemblage are associated with workshops at Lezoux and the neighbouring areas. Caletus and Paullus also worked at Lubié, Mainacnus and Martinus at Lubié exclusively, and Cintusmus at St Bonnet. If the association of these potters with Lubié and St. Bonnet is correct, then activity at both must have continued beyond their respective ascribed terminal dates of *c* 160 and *c* 130

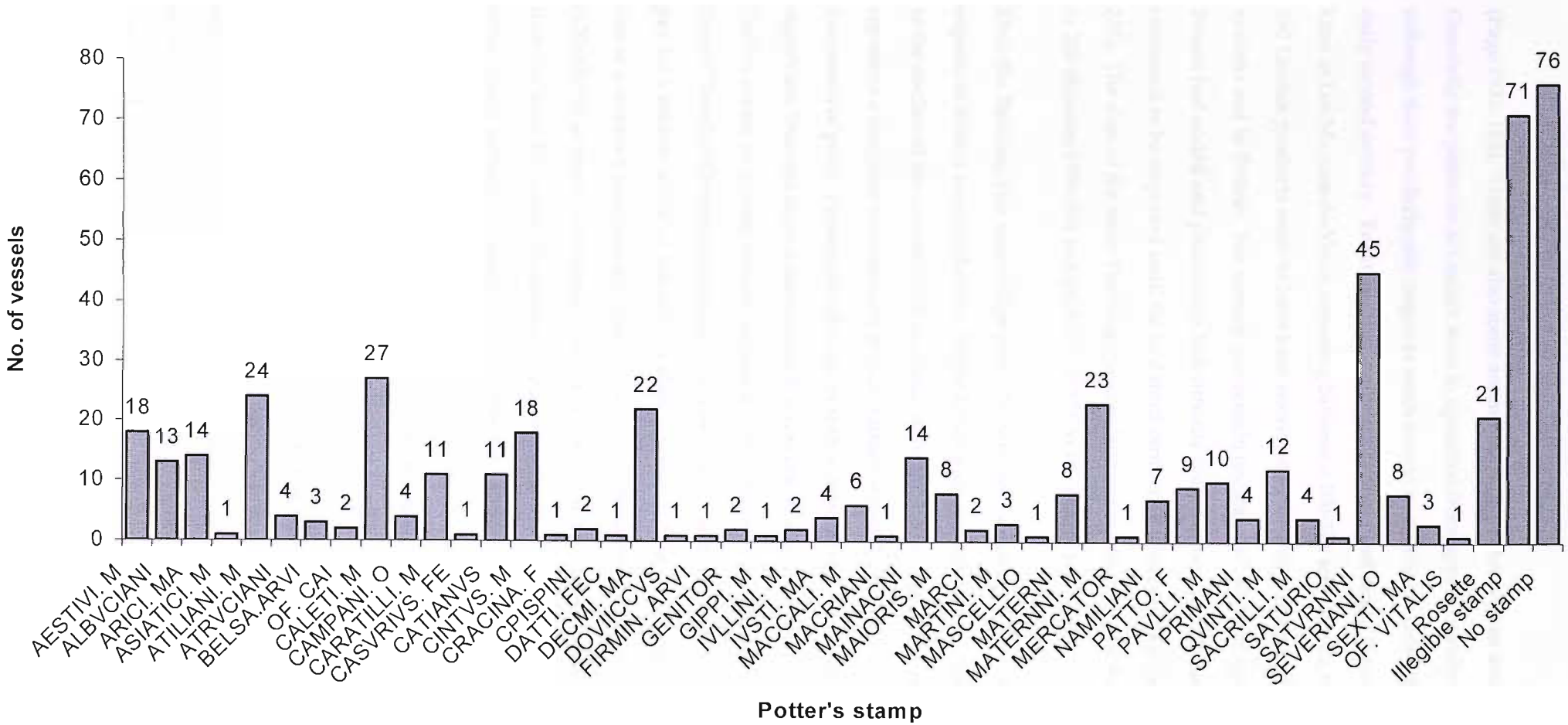


Figure 21 Total numbers of stamps per potter from Pudding Pan

(Page 1932: 165). There are also some anomalous stamps that will be discussed below. Generally the potteries at Lezoux were in operation from approximately 40 to 200 although their products only began to reach Britain in significant quantities from the early second century. From this time centres in central Gaul began to proliferate with kilns at Les Martres-de-Veyre exporting between *c* 100-120 and Lezoux from *c* 120. After 160 Lezoux products seem to have been restricted to the Loire, Seine and Danube river systems and to Britain. For reasons that remain unclear, by 190-200 large scale export to Britain had ended and production had virtually ceased although East Gaulish wares continued to be imported until the mid third century (see Marsh 1981: 212; Hartley 1969: 238). The date of the main Pudding Pan consignment can therefore be narrowed to *c* 170 to 200 (Rhodes 1989: 50) and probably to 175 to 195 (Hartley 1972: 36).

Thus the Pudding Pan assemblage coincides with the period at which central Gaulish exports to Britain seem to decline. Might losses such as Pudding Pan have contributed to the decline of the central Gaulish samian industry, particularly if the site does represent a complete consignment of plain samian wares that comprised 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. Graffiti found on samian vessels indicate that they were costly to purchase; a decorated Drag 37 bowl of Cinnamus is priced at 20 asses, equivalent approximately to one day's pay for a soldier, while a Ludowici Ta plate is priced at 12 asses (Darling 1998: 169). The loss of a shipload comprising *c* 10,000 vessels, the equivalent of 6,000 man-days (120,000/20) or more than sixteen years salary would have represented a significant financial loss. However, the annual output of the Gaulish samian industry must be estimated in millions of vessels (Rhodes 1989: 46). Although such losses may have impacted on individual potters or workshops it is unlikely to have had a significant detrimental effect on the central Gaulish samian industry in general, but subsequently the risks of exporting to Britain may have seemed too great.

The samian stamps may have been for quality control within a large workshop, or to distinguish between different potter or workshop's products 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) 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 types 15 and 23 and Drag form 46 which 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 unlike the more common forms (Johns 1997: 16).

For some time it has been possible to distinguish between the stamps and signatures of factory owners, mould-makers and bowl-finishers on decorated samian wares (Johns 1963: 288). It is more difficult with plain wares but various terminology used on the stamps contains implied information about the workshops involved (all of the following examples figure amongst the Pudding Pan assemblage). For example, 'OF', an abbreviation of *officina* may be translated as 'workshop' implying a large operation controlled by the named person, thus OF.GAI means the workshop of Gaius. 'F', 'FE', or 'FEC', short for *fecit* meaning 'made [this]', suggests that the person named made the pots himself. 'M' or 'MA' are abbreviations of *manu* meaning 'by the hand of' again implying personal production in a small operation although the evidence is not wholly consistent. Thus DECMI.MA could mean 'by the hand of Decmus' but the use of the potter's name in the genitive could mean '[the work] of Decmus' implying a larger operation. Use of the nominative form ie CATIANVS meaning 'Catianus [made this]' implies small-scale personal production (Webster 1997: 9; Oswald 1931: vii). Inaccuracy or illiteracy is implied by the use of the name in the nominative used with MANV, MA or M (Oswald 1931:vii). In addition, 'II' is often used to represent 'E' as in AIISTIVI.M, as is the use of 'AI' for 'AE', and sometimes 'C' is used for 'Q' (Oswald 1931: viii).

Potters were generally natives of Gaul but other provinces are occasionally represented i.e. Asiaticus. There is a Gaulish element in some prefixes and suffixes such as 'CIN-' in CINTVSMVS and a diminutive form of some names appears to have a Gaulish origin such as PATTO for PATER. A potter's tribe seems sometimes to be indicated by a suffix (Oswald 1931: viii) eg Arvenicus may be represented in the stamps of BELSO.ARVEI or FIRMIN.ARVEI. Despite the ubiquity of pottery in the archaeological record it is interesting to note that potters remain unrecorded by inscriptions, sculptures or tombstones (Marsh 1981: 206).

Fig 22 illustrates the dates of all the potters' stamps found at Pudding Pan. The dates can be grouped into four distinct but overlapping periods that all ceased to be imported at the end of the Antonine period when the importation of samian from central Gaul ended. The first group dates from the Domitianic period (*c* 81-192), the second from the

Trajanic period (*c* 98-192), the third from the Hadrianic period (*c* 117-192), while the fourth group spans the Antonine period (*c* 138-192). Another potter, Iullinius, spans the entire period from the time of Vespasian (*c* 69-192). Thus all of these potter's products could have been included in the main Pudding Pan consignment dating *c* 175-195.

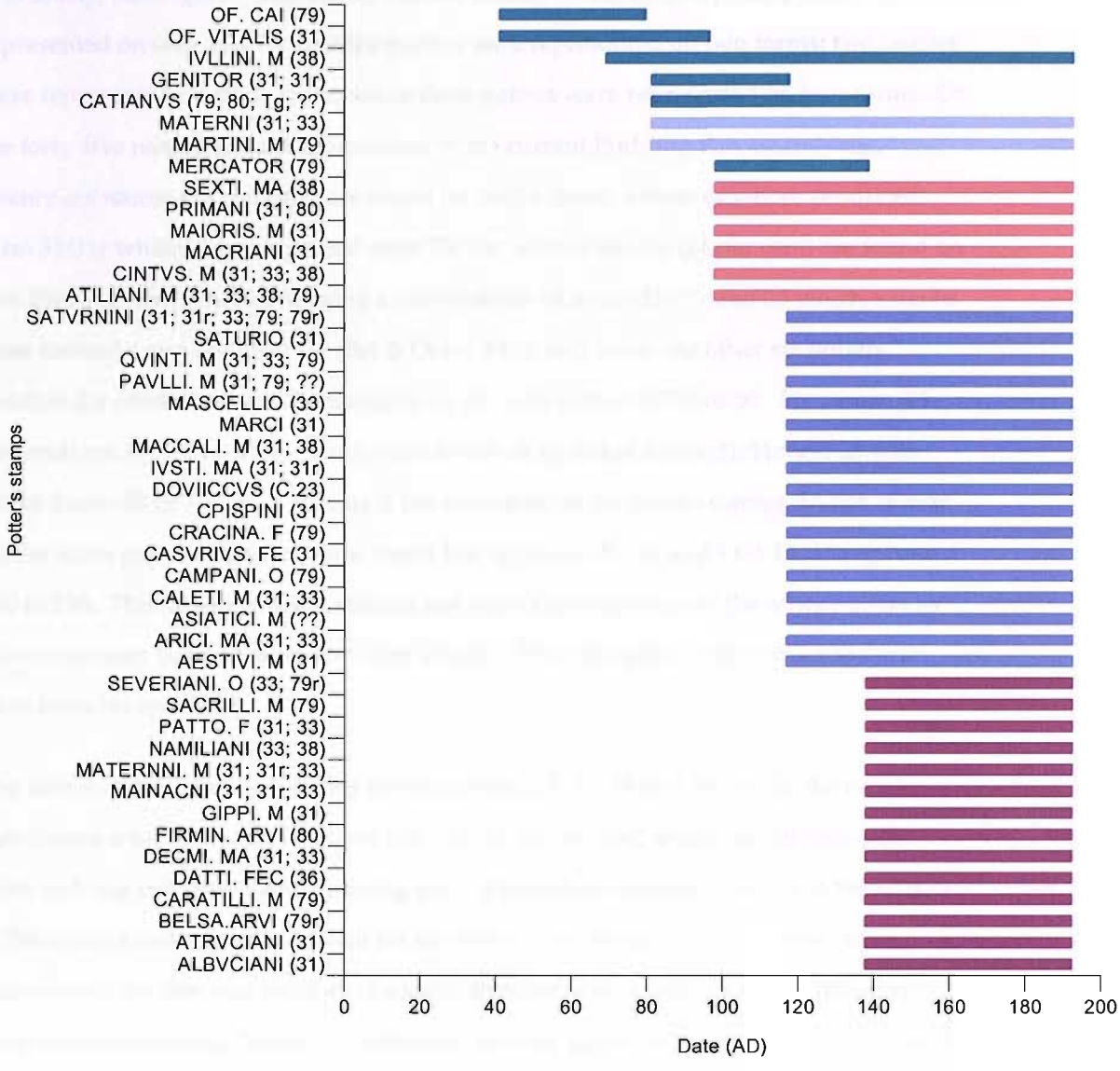


Figure 22 Comparison of potter's stamp dates

The remaining five potter's dates do not match with those of the forms that they made and are discussed below. It is possible that some of the earlier potter's 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

Previously, Smith (1907: 283) found that the names of twenty-one potters were represented on only one form; eight potters were represented on two forms; two potters were represented on three forms while three potters were represented on four forms. Of the forty-five named potters represented in the current Pudding Pan assemblage, twenty-six names (58 per cent) are found on single forms, eleven of whom produced form 31/31r while seven produced form 79/79r. Eleven names (24 per cent) are found on two forms, five of whom produced a combination of forms 31/31r and 33 which seem to have formed a cup and dish set (Bet & Delor 2000: 467) while the other six potters produced a combination of forms 31/31r or 33, with forms 79/79r or 80. Six names (13 per cent) are found on three forms, most of which included forms 31/31r and 33 with either forms 38 or 79/79r. Catianus is the exception, as his eleven stamps do not appear on the more popular late Antonine forms but on forms 79, 80, and Lud Tf, dating from *c* 160 to 230. This suggests that Catianus was not a contemporary of the other potters so his vessels may have come from a later source. These flat plate/dish forms appear to have been his speciality.

The stamp of Atilianus was found on four forms (31, 33, 38 and 79), while the name Saturninus was found on five forms (31, 31r, 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 third most prolific stamps from Pudding Pan. Of the other most common stamps, those of Caletus and Decmus appear on just two forms (forms 31 and 33) while those of Maternnus appear on three forms (31, 31r and 33). This suggests either 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.

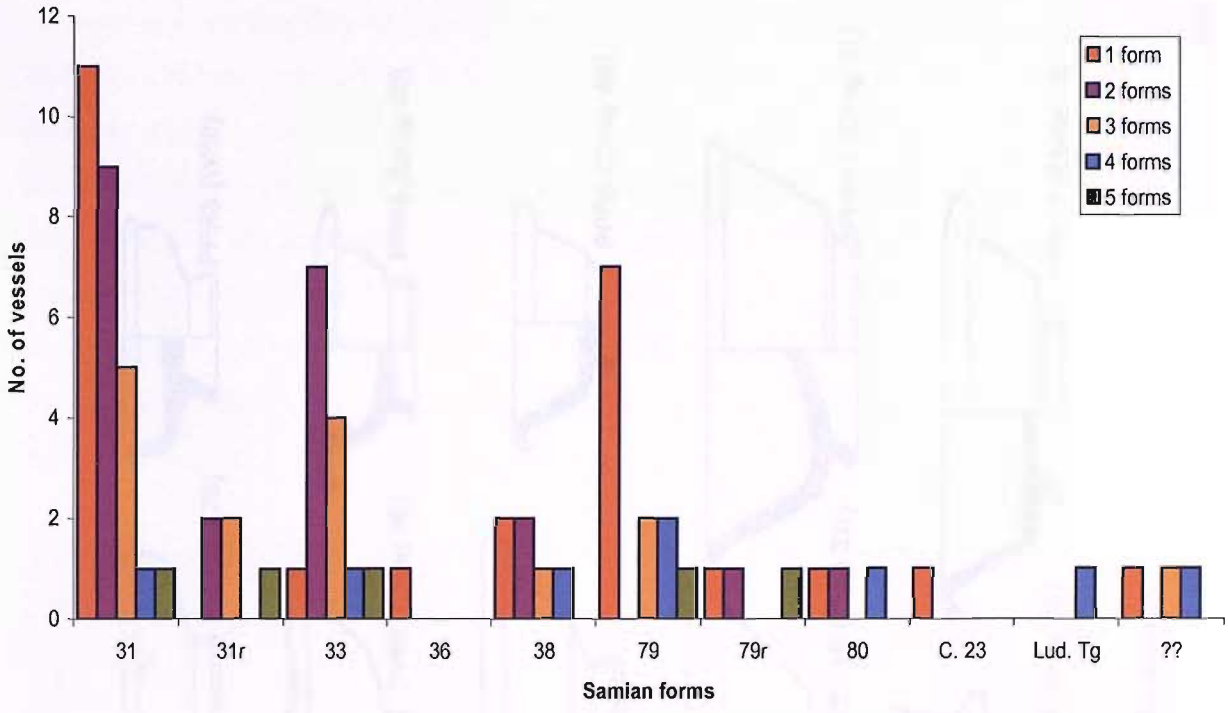


Figure 23 Combinations of forms produced by potters/workshops

Fig 23 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 form 31 followed by form 79. 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 & Delor 2000: 467). No form 79 vessels have been found stamped by potters producing two forms. Forms 31, 33 and 79 were the most common forms produced by potters producing three and four forms. The ubiquity of 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 Drag forms 79, 79r and 80, forms 35 and 36, forms 'Curle 15 and 46', and forms 31 and 31r (Smith's PPR forms 1, 2 and 3; 4, 5 and 6; 7, - and 8; 9, 10 and 11 respectively; see fig 24).

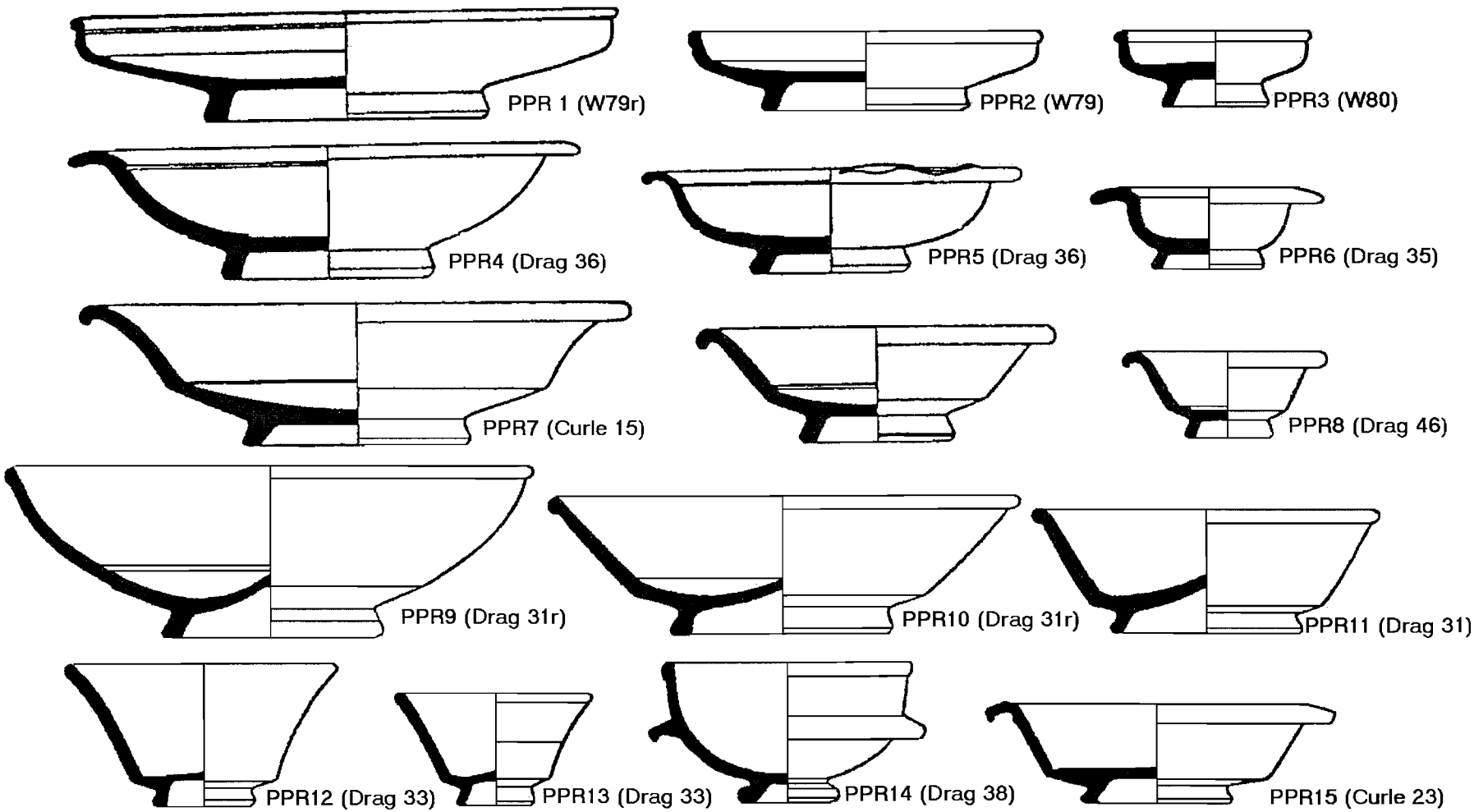


Figure 24 Smith's (1909) Pudding Pan Rock series

As noted in a previous chapter, there is a problem with Drag form 46 that comprises three distinctly different forms (types 042, 044, and 048; after Bet & Delor 2000), which form at least two different sets with Curle forms 15 and 23. One set comprises Curle form 23 with the Drag form 46 with a down-turned rim (types 042 and 043; Service F; after Bet & Delor 2000). The other set, which is completely missing from Smith's (1909) 'Rock series', comprises Curle form 15 with a variation of the Drag form 46 and possibly the Lud Tf dish all of which have an upturned rim (types 044 and 045; Service C; after Bet & Delor 2000). This is why the name Drag form 46 should be 'totally proscribed' (Bet & Delor 2000: 469). Both sets are found at Pudding Pan thus producing five identified sets in total.

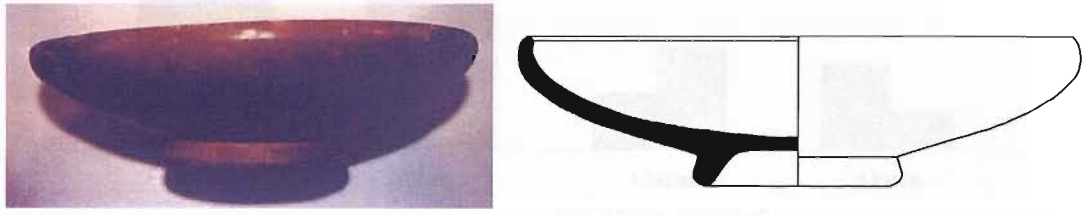


Figure 25 Drag form 32 bowl not included in Smith's series

As stated above, the 'Drag 46' and 'Curle 15' forms are early forms but the Lud Tf dish is dated post 160 so could only have been a late addition to this set. A solitary Drag form 32 bowl ascribed to Pudding Pan 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 second century (Webster 1996). These forms are interesting as only the Lud 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 potter's stamps.

Although the number of potters represented has increased since Smith's (1909) study, the relative frequency of potter's stamps found on one, two, three or four forms remains almost identical (see Fig 26) which again highlights the uniformity of the results obtained by Smith (1909) and by the current project. By far the largest proportion of potters is represented on only one form, which seems to confirm that there was some specialisation. 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).

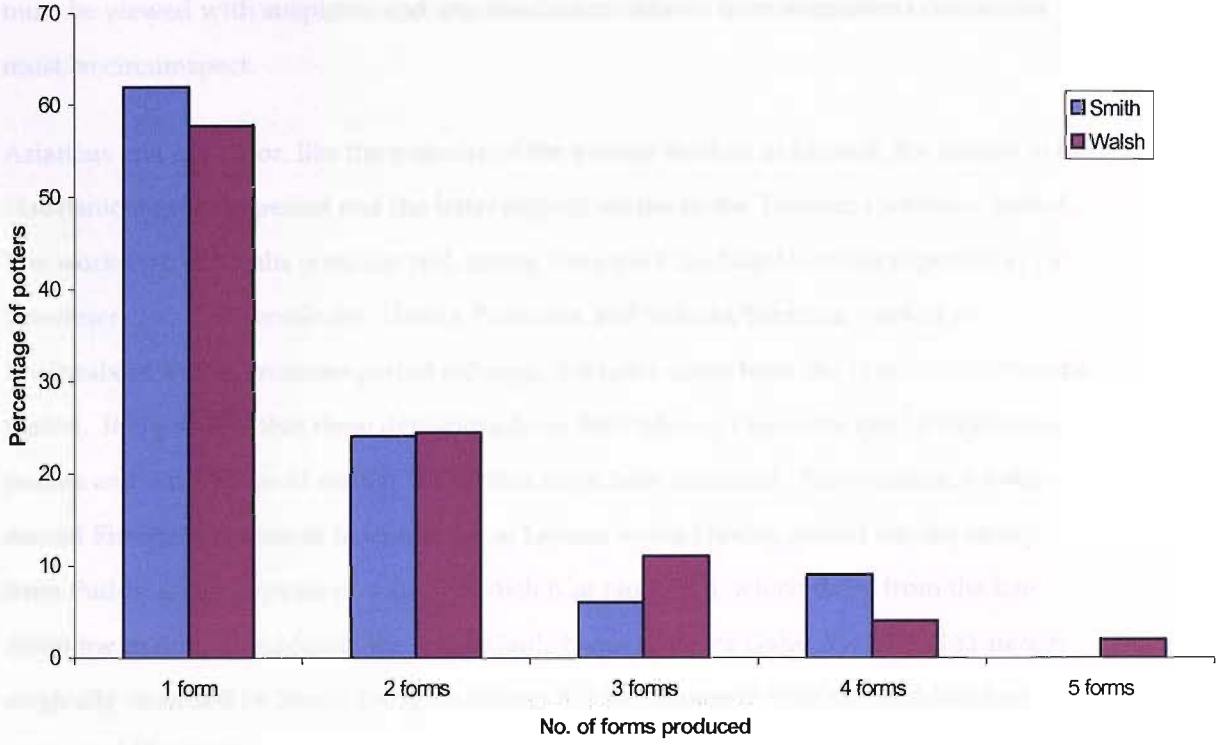


Figure 26 Relative frequency of range of forms produced by potters recorded by Smith (1909) and by Walsh

For example, no more than about twenty really common plain forms and only 'half-a-dozen' common decorated forms are found in Britain (Hartley 1969: 238-40). 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, their repertoires 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 a later chapter that compares 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 ASIATICI. M, DATTI.FEC, FIRMIN.ARVI, MERCATOR, SATVRIO and OF.VITALIS. Each of these stamps appear only once which increases the likelihood that they may have been incorrectly ascribed to Pudding Pan although at present this is impossible to determine as the recovered artefacts represent a broad range of dates and origins. This is not so problematic when the anomalous features conform to the broad Pudding Pan assemblage. Moreover, 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.

Asiaticus and Mercator, like the majority of the potters worked at Lezoux, the former in the Hadrianic-Antonine period and the latter slightly earlier in the Trajanic-Hadrianic period. The workshop of Vitalis is earlier still, dating from the Claudian-Domitianic period at La Graufesenque. The remainder, Datius, Firminus, and Saturio/Saturrus worked at Rheinzabern in the Antonine period although the latter dates from the Hadrianic-Antonine period. It is possible that these deviations from the Pudding Pan norm can be explained as potters and workshops of similar names that have been confused. For example, a potter named Firmus is known to have worked at Lezoux in the Flavian period but the stamp from Pudding Pan appears on a form 80 dish (Cat No 1.075), which dates from the late Antonine period. In addition, the south Gaulish workshop of Gaius (two OF.GAI stamps, originally recorded by Smith 1909) is believed to have operated from the mid-late first century at Montans.

If the attribution to 'Pudding Pan' of these potters and the aforementioned anomalous forms are accurate than they provide mounting evidence that cannot be easily dismissed as misallocation or contamination although these explanations remain a possibility as we are dealing with relatively few samples. The most likely explanation for the earlier forms (twenty-six specimens) and stamps (seventeen specimens), supported by a growing body of evidence, is that this material has come from an alternative earlier source buried elsewhere on the Kentish Flats dating from the late first-early second centuries. Indeed, Smith's (1909: 398) diver recovered a fragment of a mid first century bowl from La Graufesenque while dredging a mile away from the Pan Sands which led him to propose a second wreck. Alternatively, these samples might represent old stock or crew's possessions on a later trading vessel that carried predominantly late second century wares.

The east Gaulish stamps (three specimens) and form (one specimen) are contemporary with the bulk of the central Gaulish wares dating from the later second century 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. 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).

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 from 175-195 possibly because they have previously been dismissed because they do not fit the Pudding Pan norm. However, in any rigorous study of Pudding Pan these alleged additions must be given due consideration 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 noted above, there are many examples of several potters with the same name, who worked at widely different times, which might lead to confusion (Hartley 1969: 249). For example, the OF.VITALIS stamp seems to support the notion of a mid-late first century source of material, although there is some discrepancy as the solitary stamp appears on a form 31 bowl (Cat No 1.181), a form that is thought to have appeared only in the mid second century so could not have been stamped in a workshop operating in the mid first century. However, there is evidence that two homonymous potters might be involved (Polak 1998: 115). This is one of a number of stamps that are dated significantly earlier than the forms on which they appear as listed in the following table (Table 14). It would therefore seem more likely that potters or workshops of the same name were operating in the mid to late second century rather than mis-dating of these particular forms.

Stamp	Stamp date	Form	Form date	No. of PP examples
OF.GAI	41 - 79	79	160-200	2
GENITOR	81 - 117	31; 31r	150-200	2
CATIANVS	81 - 138	79; 80; Tx	160-200	11
MERCATOR	98 - 138	79	160-200	1
OF.VITALIS	41 - 96	31	150-200	1

Table 14 Comparison of incongruous stamp and form dates

There is also evidence that potters of the same name either worked or migrated between different potteries at different times and it is important to distinguish between them (Oswald 1931: vi), as the provenance given by Oswald is not always accurate (Dickinson & Hartley 1971: 127-8). Consequently, these anomalous stamps must be treated with caution until their association with Pudding Pan can be assured and the locations and dates at which they worked can be confirmed.

As previously stated, an anomalous 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' (see Watson 1987), which is somewhat ambiguous. This bowl, like many of the Pudding Pan samian vessels in the Liverpool Museum, was collected by Revd Faussett in the eighteenth century. Although the Antonine date and wear patterns are consistent with the other samian vessels from Pudding Pan it is still possible that this bowl has been attributed to Pudding Pan in error, as has been the case in several other plain examples. For example, another samian bowl in the Liverpool collection, a form 18/31 (Acc No 6436) is attributed to Pudding Pan, presumably due to its obvious maritime context, even though the museum's accession notes clearly state that it came from Sandwich.

Figure 27 Drag form 37 recovered from Sandwich, now in the British Museum

A 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. It would therefore seem probable that the form 18/31 ascribed to Pudding Pan came from the same site in Pegwell Bay as the form 37 bowl. If so, this points to another source of samian ware, possibly dating from the first half of the second century, lies buried in Pegwell Bay. If the 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, has also been recovered from the northern side of the outer Thames estuary which suggests that there are maritime deposits of decorated wares in the vicinity (see Parker 1992a: 275 no. 692).

Evidently 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 forms, either decorated or plain, or indeed potter's 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? However, my research 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 any combination of form, potter's stamp, fabric, wear or damage is inconsistent with those from Pudding Pan, although this again ascribes a consistency that may be misplaced.

Could the perceived absence of decorated wares from the recovered assemblage be the result of a collection or reporting bias (see Hodder 1974: 340)? For example, the fishermen may have discarded any recovered decorated wares, 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 plain forms 31 and 33 (Bird 1986), which would explain why fishermen might have discarded them. However, no decorated fragments have been identified even amongst the collections of fishermen that 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, decorated wares may not have been disclosed to antiquarians or archaeologists for fear of confiscation, although the finders of the aforementioned decorated wares from Pegwell Bay and Southend had no 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. This verifies that, rather than selective retrieval biasing the assemblage, the absence of decorated wares must be a genuine anomaly for which there might be a number of explanations, which will be explored below.

Summary

To summarize, this study has ascertained that a minimum of 524 samian vessels have now been recovered from the Kentish Flats. The similarity between the findings of this study and those of Smith almost a century ago are quite striking thus emphasizing the homogeneity of the deposit. The bulk of the samian assemblage dates from *c* 170-200 and probably from 175-195. Some forms and stamps are notably earlier dating from the pre-Antonine period indicating an earlier source of material dating to the late first-early second century. The range of products made by the potter Catianus do not include any of the more popular forms and appear to be later than the bulk of the assemblage possibly indicating that this potter was not a contemporary of the others and that there may be a later source of material.

Unfortunately the lack of detailed records identifying the location from which individual samian vessels had been recovered and the conflation of locations in subsequent publications renders it impossible to distinguish between sites 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 that 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 497 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 435 vessels for which this type of evidence was recorded, the external surface on thirteen vessels (3 per cent) was completely unworn, sixty-two vessels (14 per cent) had minimal wear eighty-two vessels (20 per cent) had medium wear while 273 vessels (63 per cent) had sustained heavy wear. In contrast, of the 437 vessels for which evidence was recorded, the internal surface on fifty-five vessels (13 per cent) was completely unworn, 300 vessels (69 per cent) had minimal internal wear, sixty vessels (14

per cent) had medium wear while only twenty-two vessels (5 per cent) were heavily worn internally.

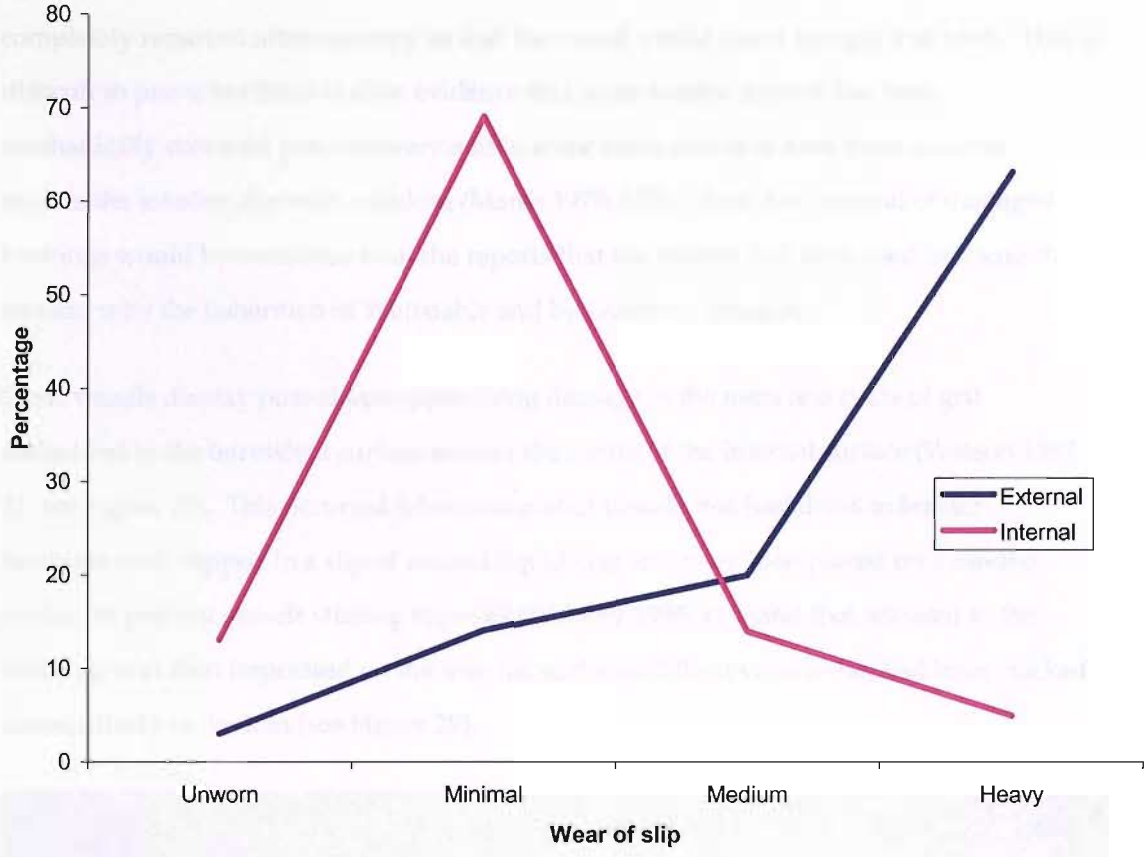


Figure 28 Comparison of worn surfaces on internal and external surfaces

The pattern of wear on many of the samian vessels, amply illustrated in figure 28, 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 (Figure 32) 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, that had protected the stack, had been removed so the lower vessels were therefore never exposed to the abrasive seabed silts.

Of the 410 vessels for which this evidence was recorded, the footrings on 141 vessels (34 per cent) were undamaged or slightly worn, twenty-one vessels (5 per cent) had chipped or

cracked footrings, 150 vessels (37 per cent) had broken footrings, while on ninety-eight vessels (24 per cent) the footrings were completely missing. Most of this damage must have occurred in situ on the seabed but it seems likely that some damaged footrings 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 footrings 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; see Figure 29). 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 to prevent vessels sticking together (Webster 1996: 4). Sand that adhered to the footrings was then impressed on the internal surfaces of fired vessels that had been stacked consecutively in the kiln (see Figure 29).

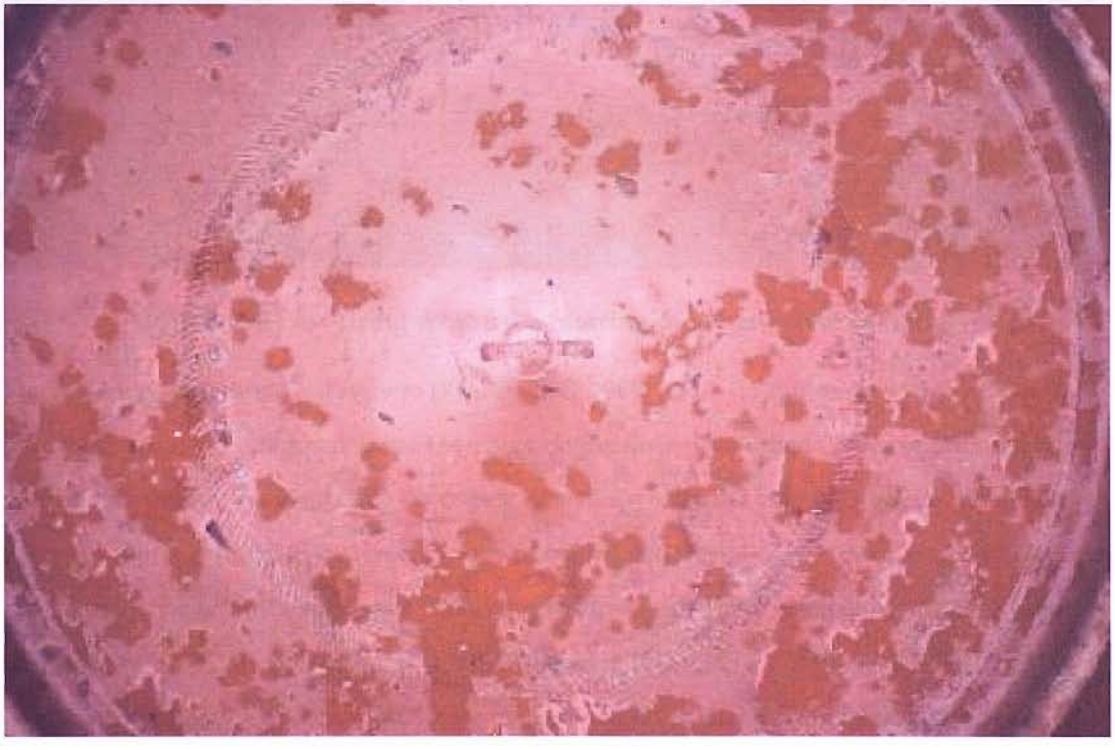


Figure 29 Grit embedded in surface of vessel during production process

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 footrings on similar

vessels. 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 internal surfaces, which seems to have been caused by scour around oyster anchorages that have subsequently become detached (Figure 31).

Figure 30 Post-firing wear from footring of lower vessel in stack

I have proposed a model elsewhere (Walsh 1998; 1999; 2002) for the recovery of the pots, which proposes that damage to the footrings 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 footrings on vessels that appear from wear patterns to have been lying on their sides thus protecting the footrings (see Figure 33). 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 sunk into it, so that the dredge needs only to rake the surface lightly in order to fish successfully (Wilkins 2001: 56).

Figure 31 Circular scour around oyster anchorages on sides of bowl. Note also circular wear on base of bowl from footring of next bowl in stack

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. Incredibly, the walls of one Drag form 33 cup (Cat No 1.397) have survived intact despite the near-complete absence of the base, which appears to have been removed in this manner. 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 Drag 33 cups that, rather than being broken, were spoiled by sawing a 'V' shaped notch in their rims (Willis 2005: 9.6).

If the oyster dredge only lightly rakes the surface of the seabed it raises some interesting questions regarding the nature of the deposit. It would seem that rather than ploughing through and destroying the deposit the dredges have so far only 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 had been raked out why are further vessels recovered? It would seem that the dredges are slowly shaving the uppermost surface of the deposit thus creating a slight depression in the seabed. Another factor that needs to be considered is that of sediment transportation as the

sandbanks in this area are highly mobile. It is feasible that sediment transportation may expose and recover the wreck at different times and in different areas, which may account for the variety of forms and stamps represented in the assemblage.

Aspect of vessels on the seabed

Of the 435 vessels for which this information was recorded the external surfaces of 153 vessels (35 per cent), and the internal surfaces of twenty-one vessels (5 per cent) displayed clear evidence of a tilted aspect on the seabed. Of the 153 vessels displaying clear external wear forty-five vessels displayed angular wear that was sufficiently defined to measure, if somewhat subjectively. Figure 33 shows two form 33 cups that illustrate the difficulty of measuring the wear; the wear on the vessel on the left is clearly defined while that on the right is clearly similar but not so well defined. Measurements in degrees were taken from the horizontal plane with the bowl lying in an inverted position, with the footring uppermost (Figure 32).

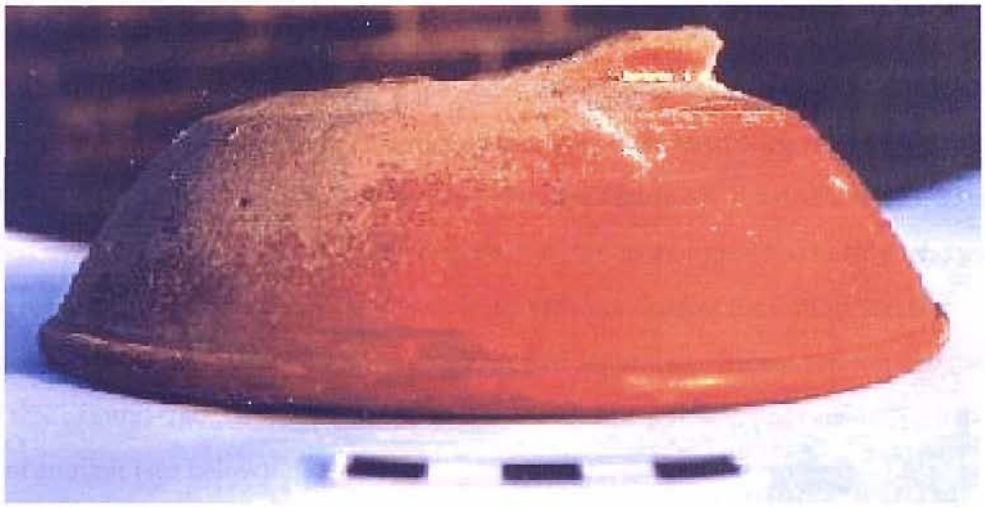


Figure 32 Form 31 bowl displaying characteristic angled wear on the lower external surface. Note the removal of the section of footring exposed above the seabed silts reflecting the angular wear

The form 31 bowls exhibit the most uniform wear, all of which occurs on the lower portion of the external surface varying from 5 degrees to 35 degrees from the horizontal. These eighteen form 31 bowls bear the stamps of at least ten different potters the most frequent of which is that of PATTO.F which occurs on five examples. Four of these vessels (Cat Nos 1.210, 1.415, 1.472 and 1.471) display remarkable concordance in the angle of wear measured which is identical at 20 degrees indicating that these vessels have been lying on the seabed in an identical situation. This supports the notion that the products of individual potters were packed and transported together.

Five form 31r bowls stamped by four different potters also exhibit angular wear ranging from 15 degrees to 60 degrees; the stamp MAINACNI occurs twice exhibiting 15 degrees and 20 degrees of wear which again displays some uniformity (Cat Nos 1.156 and 1.388). All four form 36 bowls (Cat Nos 1.168, 1.173, 1.214, 1.367), exhibit wear at an angle of between 10 degrees and 20 degrees while the solitary cup form 35 (Cat. No. 1.013) displays wear at an angle of 90 degrees, which seems indicative of separate packaging of each form. It is interesting to note that the fifteen form 33 cups that display angled wear (of 166 cups stamped by fourteen potters) are all stamped exclusively and almost equally by either Decmus in two forms (DECMI.MA and DECMI.M) or by Caletus in two forms (CARETI.M and CAΛETI.M).

Moreover, the form 33 cups stamped by each potter exhibit wear patterns quite distinct from the other. For example, the wear patterns on the cups stamped by Decmus 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 (Cat Nos 1.074, 1.198-9, 1.379, 1.427, 1.443, 1.497-8). In contrast, many of the form 33 cups stamped by Caletus (Cat Nos 1.200-2, 1.377, 1.382, 1.448 and 1.480) display asymmetrical wear and damage to one side of the rim, which indicates that they have been lying on their sides with a portion of the rim exposed above the seabed silts (see Figure 33). One of the form 33 cups stamped by Caletus (Cat No 1.271) is broken on one side as though it has been wrenched from a horizontal stack of pots. These vessels provide the clearest indication that the products of each potter were packed and transported separately. Moreover, the variation in the size of similar forms 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 determinate 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

Figure 33 Comparison of two form 33 cups stamped by Caletus (left) and Decmus (right) illustrating the distinctive wear. Note the intact footring on the vessel that has been lying in the seabed silts on its side thus protecting the footring. In contrast the footring is missing from the inverted vessel on the left as it was exposed above the seabed silts.

pottery found in the cellar at Burghöfe in Germany 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). The pottery could have been tied together in stacks separated by straw (Rhodes 1989: 46). Alternatively, the variety of wear patterns may reflect 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 anchorage detritus.

Manufacture

The Pudding Pan assemblage is unusual for a number of reasons, not least because a relatively high proportion of the assemblage (87 per cent) is comprised of complete or near-complete vessels thus providing a unique opportunity to undertake a series of measurements that would otherwise be impossible on a more fragmentary assemblage. These measurements should highlight any variation between different potters producing the same forms and also variations between vessels of the same form produced by individual potters. This close analysis of a considerable assemblage of vessels that appear to have been 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, devices for mechanically shaping and smoothing the clay into relatively uniform cups, bowls, and plates etc. 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, footrings 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 appear to have contributed to communal firing rather than using kilns dedicated to one workshop possibly owing to the complex operations involved (Webster 1996: 4; 9-12). A first century 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 standardisation: Vessel size

The Pudding Pan assemblage can be specifically used 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. Was a standard template used for each form by all the potters represented in the assemblage or did each potter use 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 that may have worked together? Did individual potters use 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 footrings, which made little difference

to the results. Measurements were also taken of the length and width of the various potters' stamps. This data was then plotted to highlight variations between different potters and between the products of individual potters.

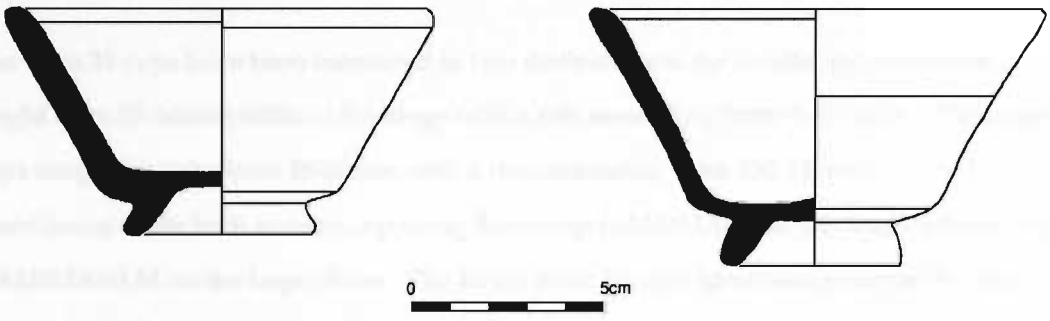


Figure 34 Example of variation in dimensions of small Drag form 33 cup

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 diameter of *c* 5-10mm so some variations reflect the position on the vessel from which the

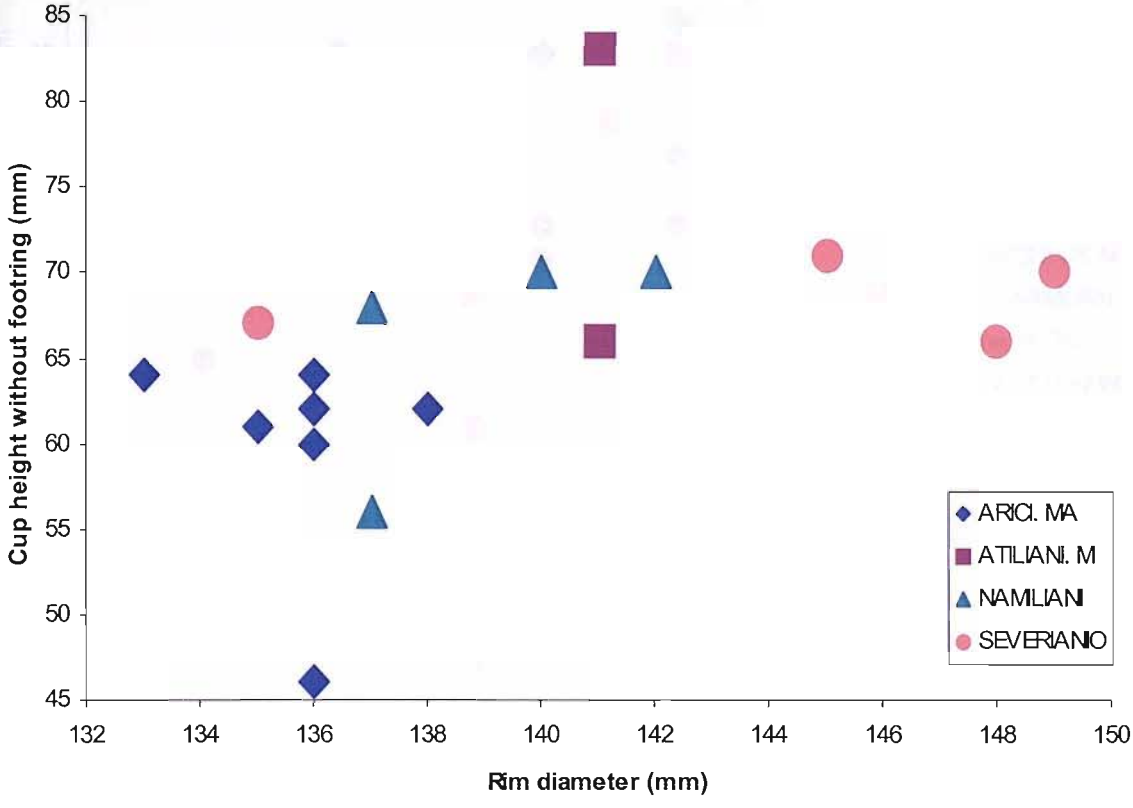


Figure 35 Variations in the dimensions of large form 33 cups

measurement was taken. Despite these factors the results show considerable and significant variations that may 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 form 33 cups have been recovered in two distinct sizes; the smaller cups range in height from 38-54mm without footrings with a rim measuring from 99-111mm. The larger cups range in height from 46-83mm with a rim measuring from 133-149mm. Only Namilianus made both sizes of cup using the stamp NAMILIANI on the smaller form and NAMILIANI.M on the larger form. The larger form 33 cups have been stamped by four potters each of whom seems to have used at least two templates (Figure 35). For example, six of the seven vessels stamped ARICI.MA are clustered in a group with a variation in both dimensions of only 5mm.

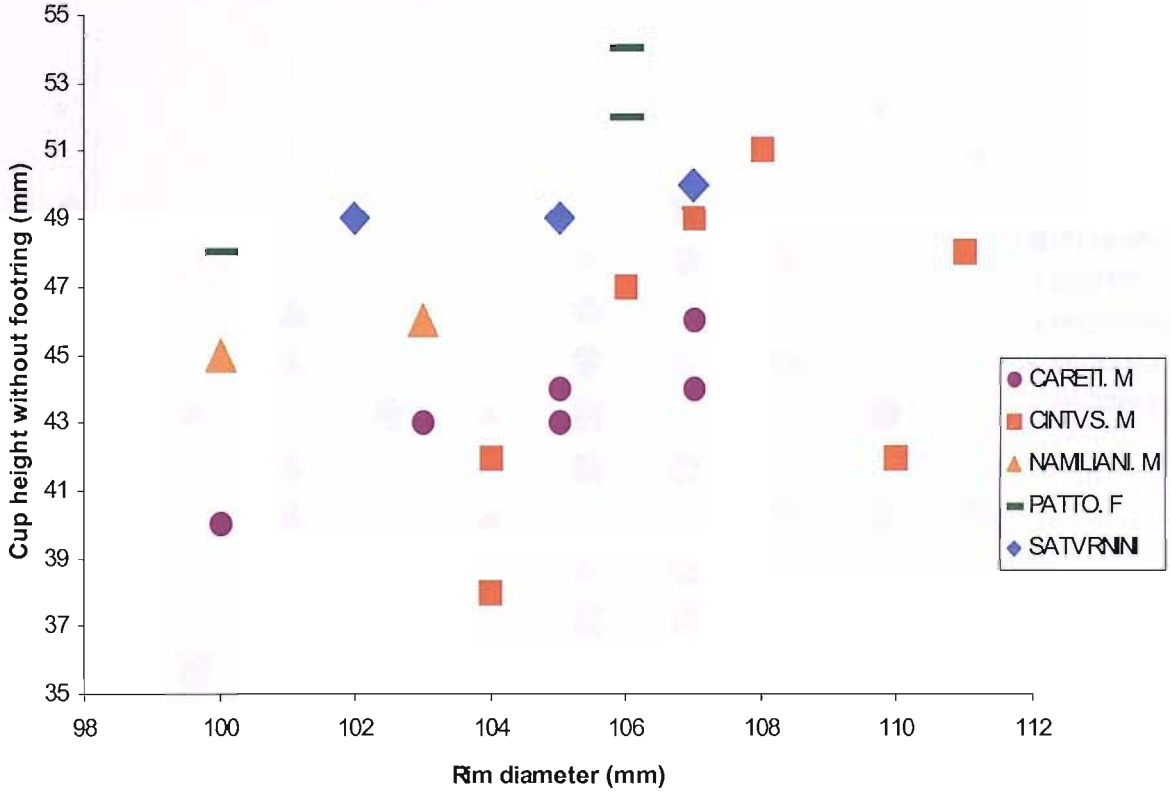


Figure 36 Variations in the dimensions of small form 33 cups

The seventh vessel is 14mm shorter than the smallest of the other vessels, which implies the use of a smaller template. The vessels stamped ATILIANI.M seem to confirm the use of two different templates even though only two examples have been recovered. The two other potters that made the larger form 33 cups display similar results of a closely grouped

cluster with 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 seven potters are represented on the smaller form 33 cups (Figures 36 & 37). Each potter making the smaller cup appears also to have used at least two sizes of template although the results are less equivocal than for the larger cups. For example, five of the six vessels stamped CARETI.M are closely clustered but the outlier is only 3mm smaller both in height and diameter than the smallest vessel in the cluster so could feasibly have been made using the same template. The three vessels stamped PATTO.F seem clearly to indicate two different templates. The greatest variation is displayed in the seven cups stamped CINTVS.M although the variation is only 7mm in the diameter and 13mm in the height. It would appear from their distribution that Cintusmus used three different templates to make these cups. The cups stamped NAMILIANI.M (two vessels) and SATVRNINI (three vessels) each appear to have been made using one template.

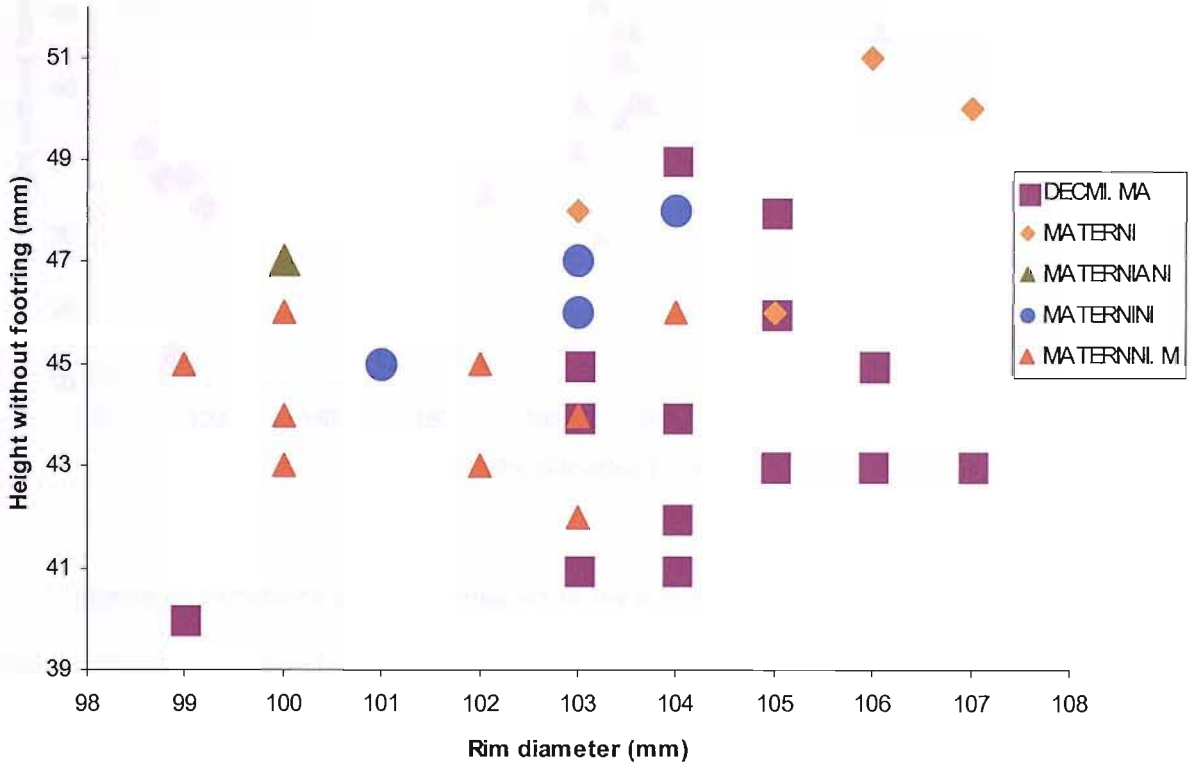


Figure 37 Variations in the dimensions of small form 33 cups stamped by Decmus, Maternus and by Materninus

The stamp that appears most frequently on the form 33 cups is DECMI.MA that appears on fifteen vessels, two of which have identical dimensions (Cat Nos 1.236; 1.240). Again there is a fairly tight cluster of fourteen vessels with a variation of only 4mm on the rim diameter

and 8mm on the height. These dimensions are quite evenly spaced so it is difficult to determine how many templates might be represented and all could feasibly have been made using only one template. However there is one outlier that would seem to have been produced using a different template. The four vessels stamped MATERNI are also fairly closely clustered and could have been produced using one template. The potter Materninus appears to have stamped his form 33 cups using three different stamps, MATERNINI, MATERNNI.M and MATERNIANI although it seems to have no significance in terms of vessel dimension.

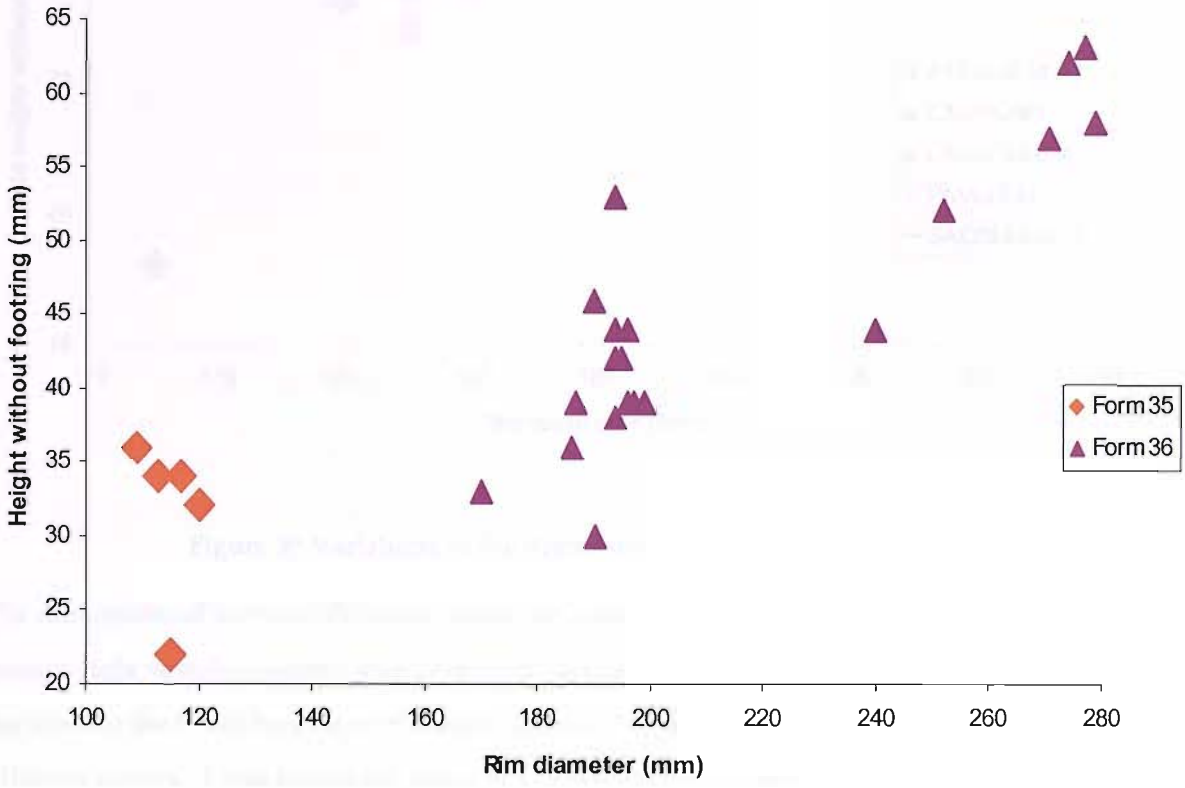


Figure 38 Variations in the dimensions of form 35 dishes and form 36 bowls

The considerable variation between form 35 and form 36 vessels suggests that if one potter produced them a variety of templates were used. Four of the five form 35 dishes are clustered with the fifth of similar diameter but significantly reduced in height that again indicates the use of at least two different sized templates. The form 36 bowls were made in two distinct sizes, which is reflected in two groupings. The four larger vessels are quite tightly clustered indicating the use of one template but the other results are more ambiguous with a broader spread of dimensions across the graph. The main cluster comprises similar diameter bowls but of quite varied height ranging from 30mm to 53mm

which suggests the use of at least two templates of varying height but similar diameter. The dimensions of two vessels fall between these two main clusters.

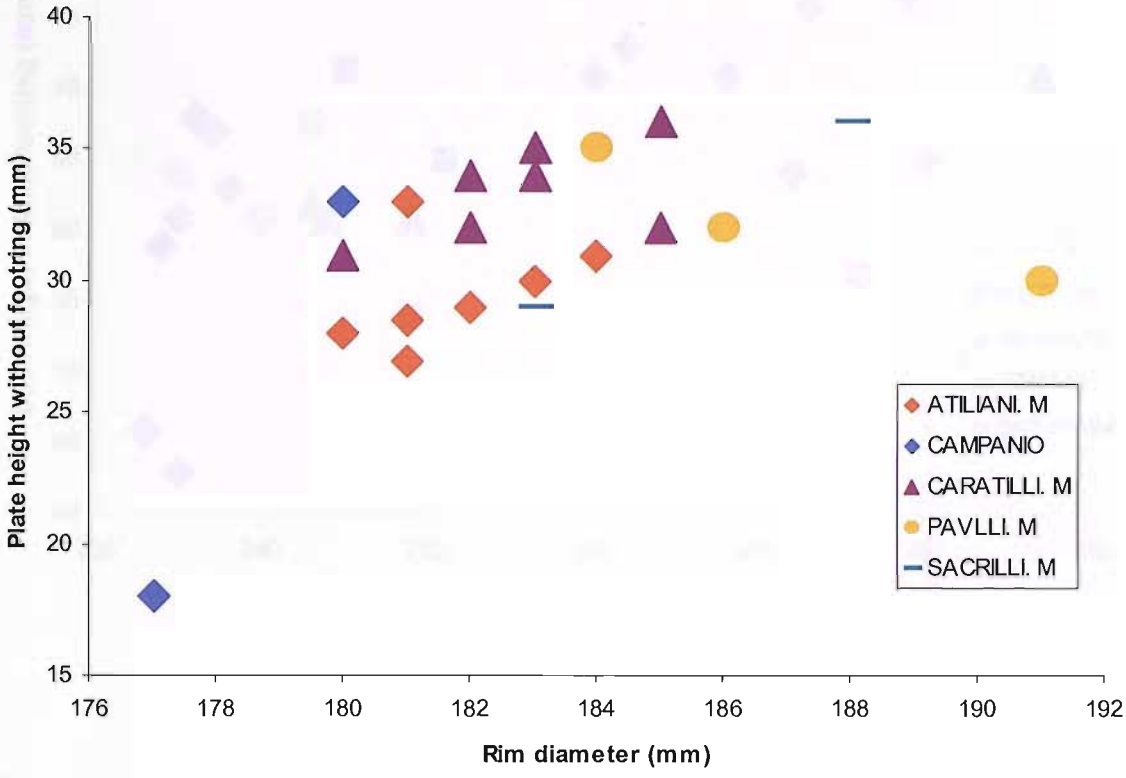


Figure 39 Variations in the dimensions of form 79 plates

The dimensions of the form 79 plates display far greater harmony with twenty-five of the twenty-eight 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 seven different potters. 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. One of the remaining three vessels is smaller in both height and diameter than those in the main cluster, while the other two vessels are slightly wider. 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.

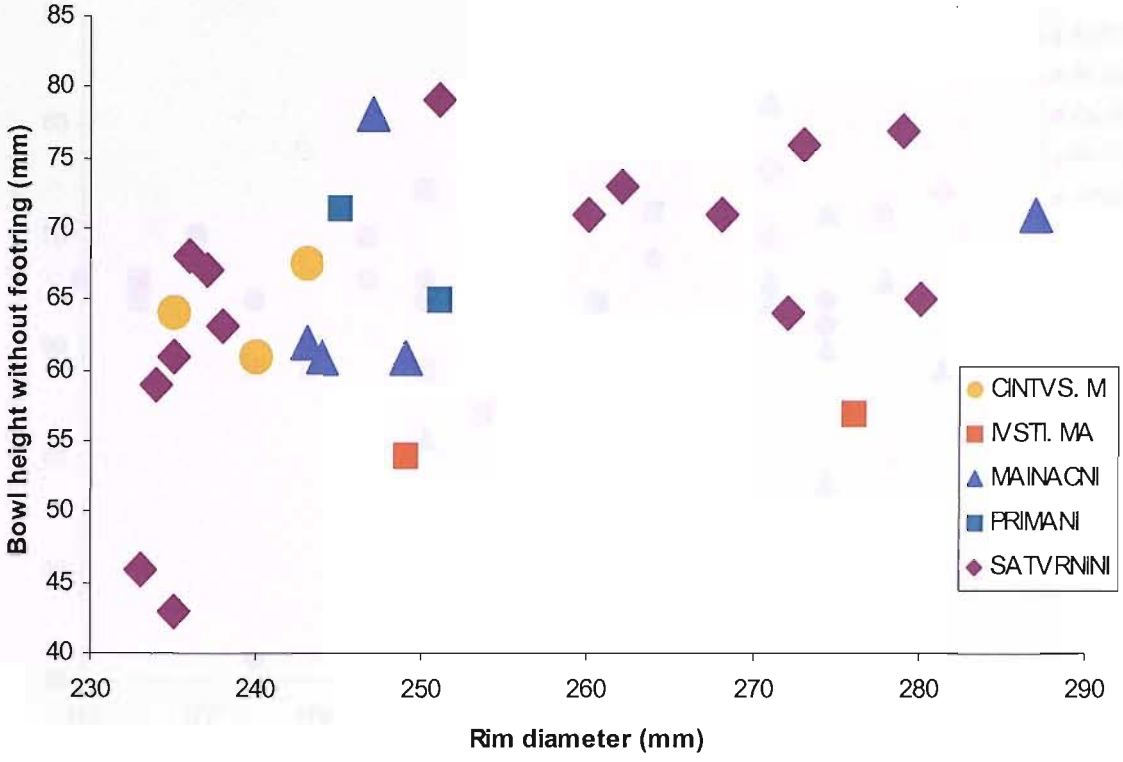


Figure 40 Variations in the dimensions of form 31r bowls

The results from the form 31r vessels are somewhat mixed; two of the five potters represented in this sample, Primanus and Cintusmus, appear to have used one template although their work is only represented by two and three samples respectively. However, Iustus is also only represented by two samples but of very different dimensions that have clearly been made using two different templates. Mainacnus, is represented on five samples, three of which are closely clustered, suggesting that they have been made using three different templates. The most frequent stamp, Saturninus, appears on fifteen vessels that are widely dispersed. His seven smallest vessels are clearly grouped in two well-defined clusters suggesting the use of two templates but only three of the larger vessels are closely grouped so it is possible that four different templates were used to make the larger vessels.

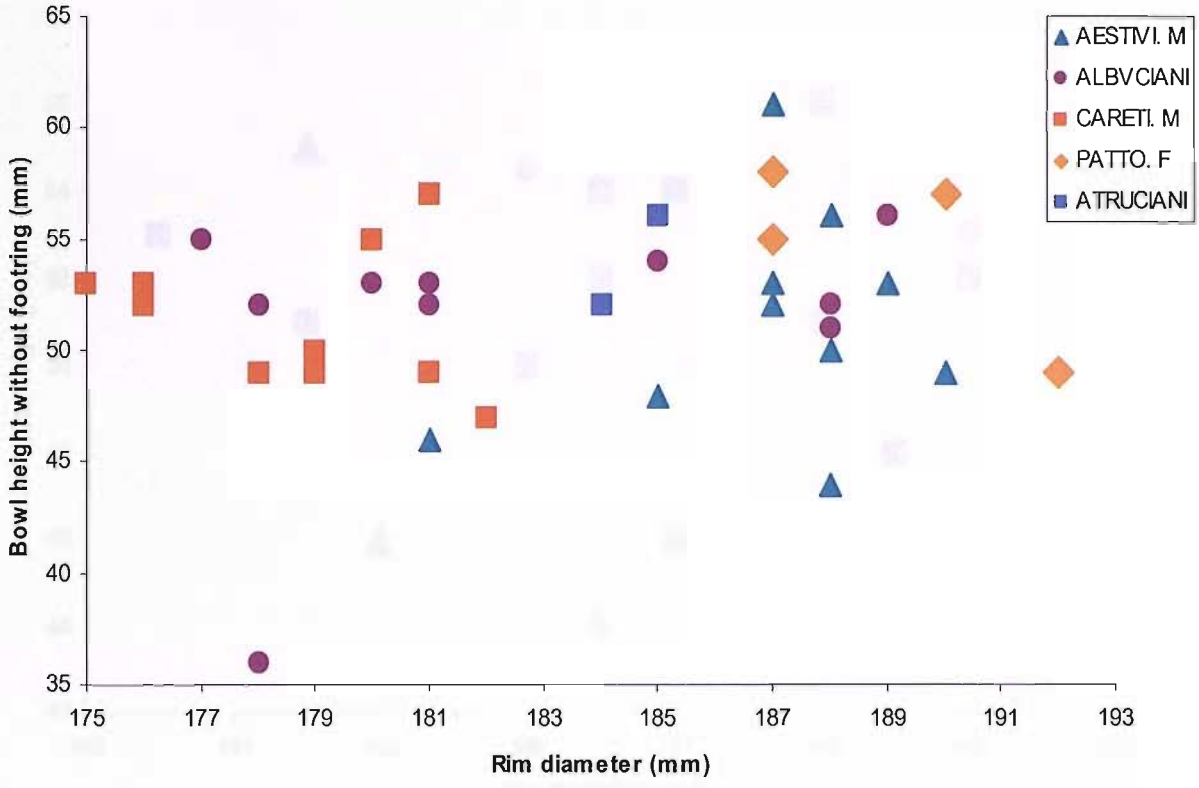


Figure 41 Variations in the dimensions of form 31 stamped AESTIVI.M, ALBVCIANI, CARETI.M, PATTO.F and ATRVCIANI

The largest group in this study is that of form 31 with fifty-five samples, which reflects its ubiquity in the assemblage (Figures 41 & 42). The four vessels stamped by Pattus and two stamped by Atrucianus could each have been made using one template. The ten form 31 vessels stamped CARETI.M are fairly closely grouped with a variation of only 7mm on the rim diameter and 10mm on the height which could have been produced using just one template but more probably by two. Three templates were probably used to make the ten vessels stamped AESTIVI.M, whilst the twelve vessels stamped ALBVCIANI are grouped in two clusters with one outlier suggesting the use of three templates.

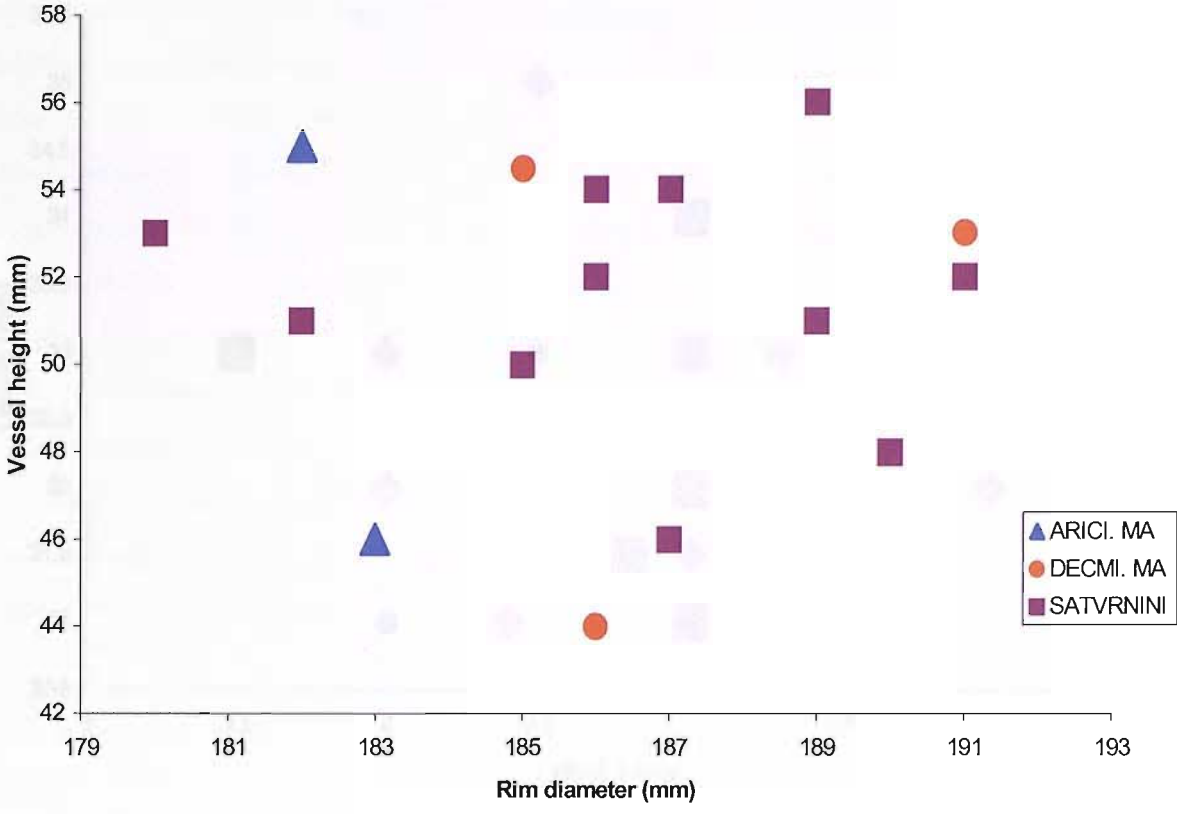


Figure 42 Variations in the dimensions of form 31 stamped ARICI.MA, DECMI.MA and SATVRNINI

The variations in the two vessels produced by Aricus and three vessels produced by Decmus suggest that more than one template was used by each potter (Figure 42). The form 31 bowls stamped by Saturninus, like his form 79 plates, display considerable variation possibly suggesting the use of three or more templates. Once more, Saturninus is the most prolific potter in this sample producing both forms 31 (twelve vessels) and 31r (fifteen vessels). It is clear that there are three distinct clusters of rim diameter, the smallest representing the form 31 bowls and the two larger clusters representing two sizes of form 31r. It is striking how uniform the dimensions of each form are with a maximum variation in the dimensions of either rim or height of only 10mm. Thus a seemingly wide variation is shown to be more uniform than assumed and could be accounted for by a margin of error both in the manufacturing and recording processes.

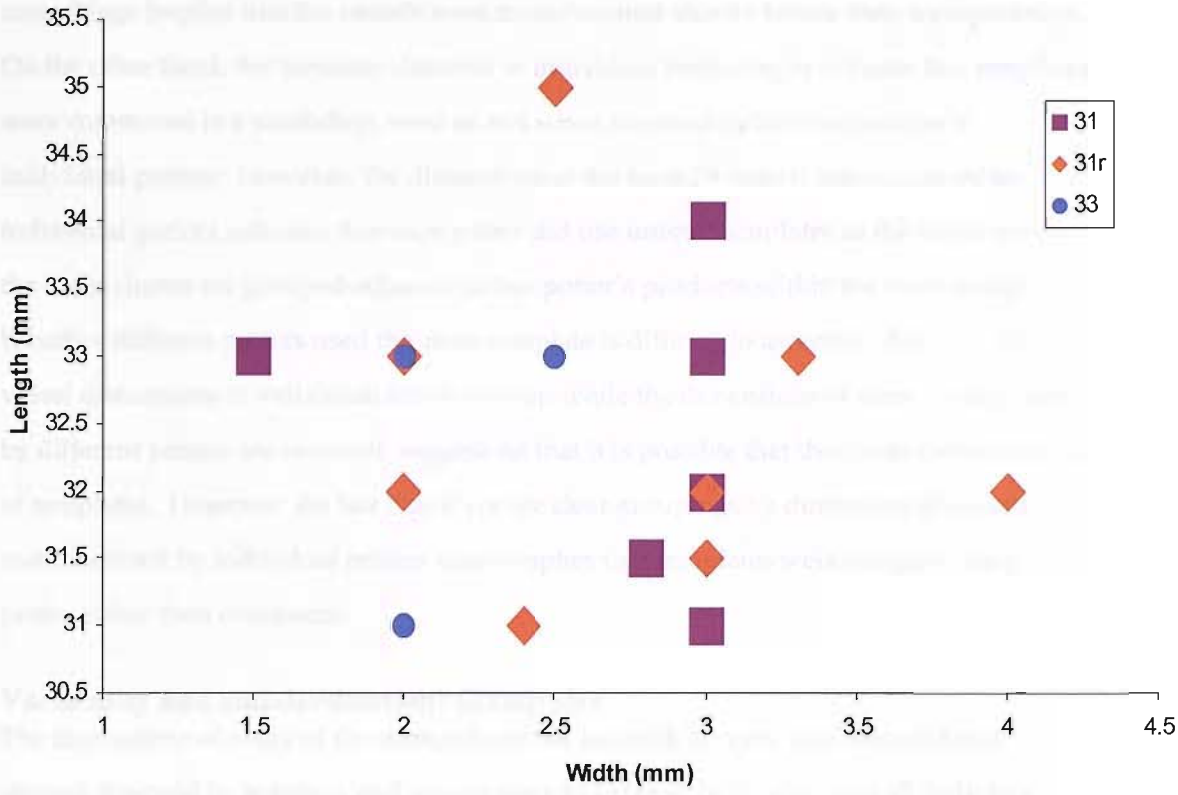


Figure 43 Comparison of dimensions of forms 31 and 31r stamped SATVRNINI

However it is clear 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 the presence of fingerprints in the slip of some vessels, which seems to challenge the 'indisputable' notion that quality control was undertaken on the output of the samian manufactories (cf Dannell 2002; Willis 2005: 9.6; 11.7). But why did individual potters seemingly use a number of templates to make the same form of vessel? Did the templates or shaped burnishing tools break or wear 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 could form part of a very large assemblage, which is consistent with the evidence from the La Graufesenque graffiti, as one would expect less variation in a smaller consignment. Alternatively, these vessels may have been manufactured over a considerable period of time rather then 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. However, the dimensions of the form 79 vessels manufactured by individual potters indicates that each potter did use unique templates as 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. However, 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.

Variability and standardisation: Stamp size

The dimensions of many of the stamps from the assemblage were also recorded and plotted; it would be pointless and unnecessary to present the results from all forty-five potters here as many are represented by very few examples, so only the most ubiquitous stamps in the assemblage are discussed. Moreover, the variety of stamps used by individual potters has

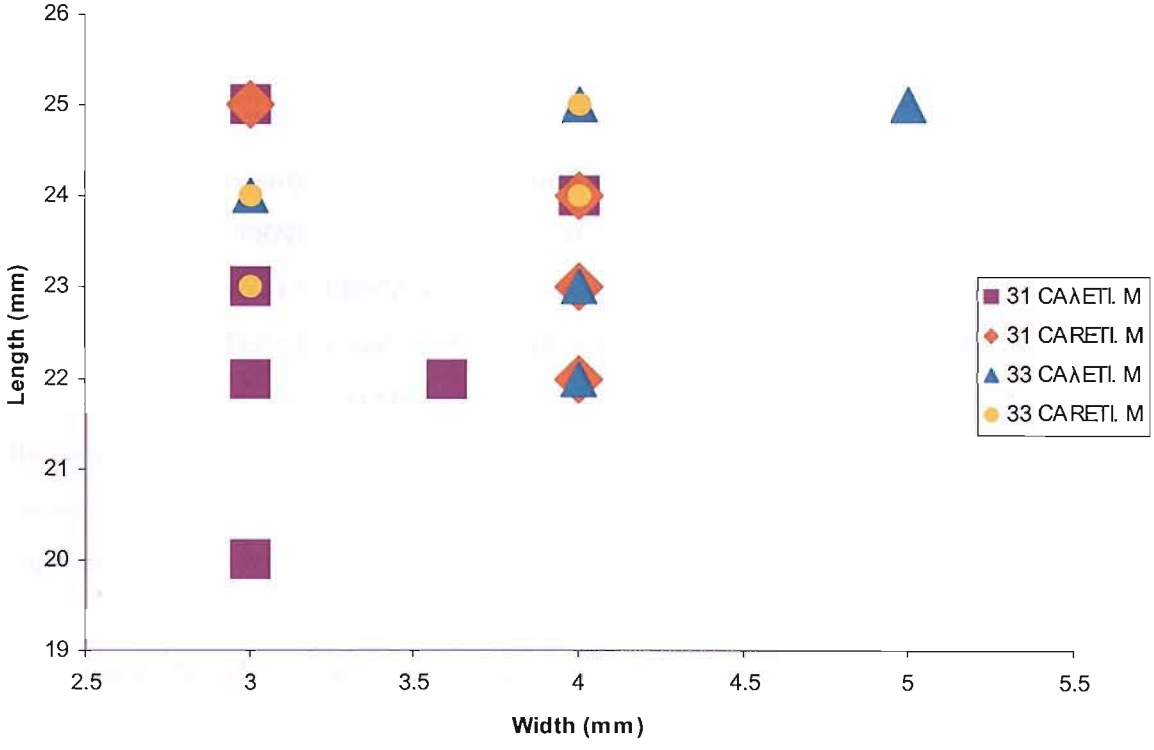


Figure 44 The stamp dimensions of Caretus

been investigated in the compilation of the Leeds Index, which has yet to be published. Here, the dimensions of each potter's stamps are plotted against vessel form to ascertain the number of stamps used by each potter and to identify some of the illegible stamps. Again some margin of error has to be allowed as some stamps were not fully impressed, and to allow for variable shrinkage of the wet clay in the drying and firing processes, and for inaccuracies in the measurement of the stamps, many of which are only a few millimetres wide and difficult to access.

Twenty-two stamps of Caretus were recorded, eleven each on forms 31 and 33 (Figure 44). Caretus appears to have used two different types of stamp, CARETI.M and CAΛETI.M, on both forms. There appears to be no distinction between the use of a particular stamp on a particular form and there is no discernible difference between the dimensions of each stamp. Five stamps of both varieties were recorded with identical dimensions of 24 x 4mm, three stamps measured 24 x 3mm and several other pairs had other identical dimensions.

The variation in the dimensions of both stamps of Caretus on both forms was minimal with only 3mm difference in the length, and 1mm difference in the width of all bar one of the stamps. Given a small margin of error all of these impressions could have been produced by one stamp if it were not for the two varieties of stamp. However, it seems probable that the CAΛETI.M stamp is in fact the CARETI.M stamp with clay or dirt obscuring the upper part of the letter 'R'. Thus we can conclude that Caretus impressed all of his products with just one stamp.

There are a series of twenty-one stamps with similar names including MATERNI, MATERNIANI, MATERNINI, and MATERNNI.M all except one of which appear on form 33 cups; one of the two MATERNIANI stamps appears on a form 31 bowl. The stamps MATERNIANI, MATERNINI, and MATERNNI.M are all believed to have been used by a potter named Materninus, while MATERNI was used by a potter named Maternnus. Three of the four MATERNI stamps are noticeably larger than the other stamps, while the fourth is identical in size to one of the MATERNINI stamps which suggests either that a different stamp was used or that it may have been mis-identified. All the other stamps, except the one on the form 31 bowl, are very closely grouped suggesting that only one stamp of each type was used. The MATERNIANI stamp used on the form 31 bowl is different to the one used on the form 33 cup. One of the illegible stamps, MAI.....NI.M, was thought to have represented

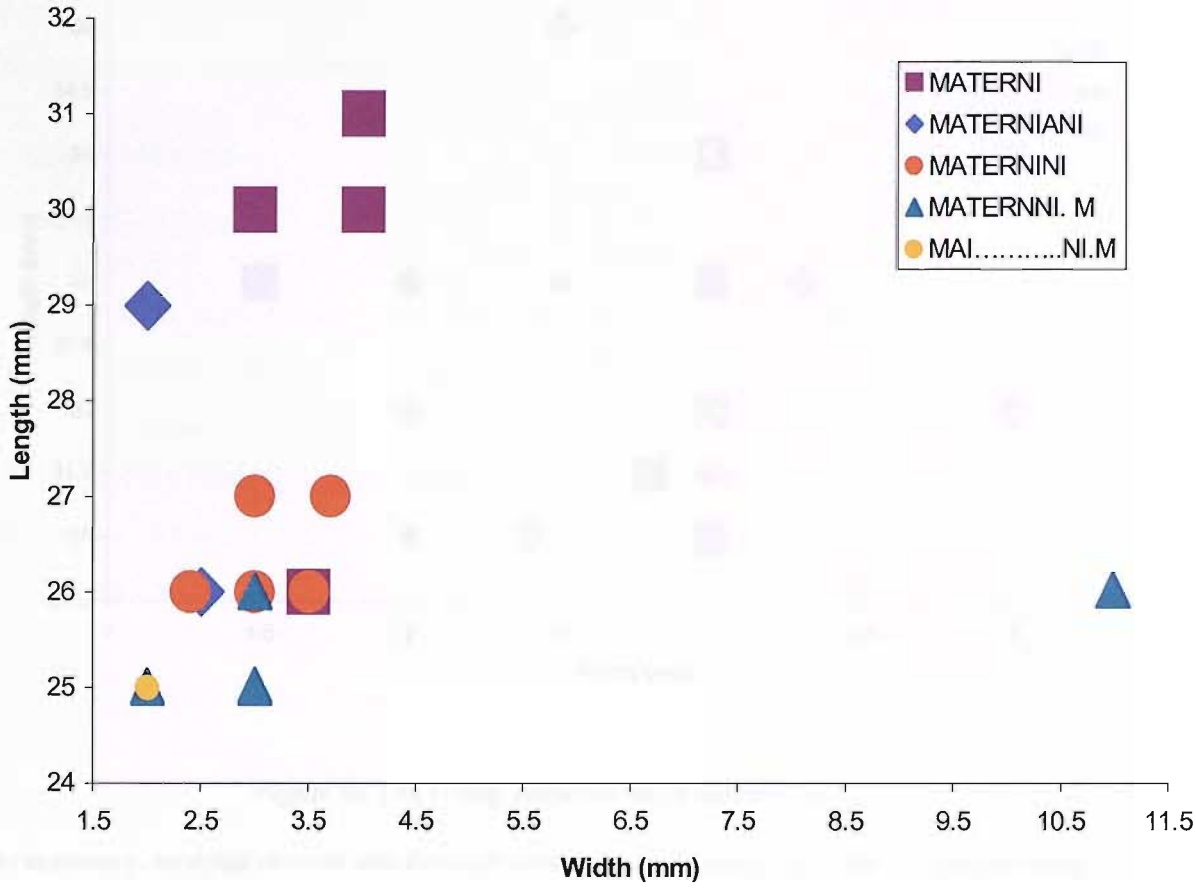


Figure 45 The stamp dimensions of Maternus and Materninus

one of the MAINACNI stamps that are found on form 31r bowls, but is identical in size to one of the MATERNNI.M stamps which must confirm its identity.

The most prolific stamp in this sample is that of SATVRNINI with twenty-eight samples on three different forms (31, 31r and 33) (Figure 46). Nine of the stamps were identical in size measuring 3x32mm, three measured 3x31mm and a further three measured 3x33mm. Given the margin of error the close proximity of these dimensions supports the visual inspection that the same template was used to impress them all. However, there do seem to be identifiable groupings on most of the form 31 bowls and on the form 33 cups implying that separate stamps may have been used for each of these forms. If so, one of the form 31 bowls seems to have been stamped with the stamp used on the form 33 cups and a combination of both stamps appear to have been used on the form 31r bowls.

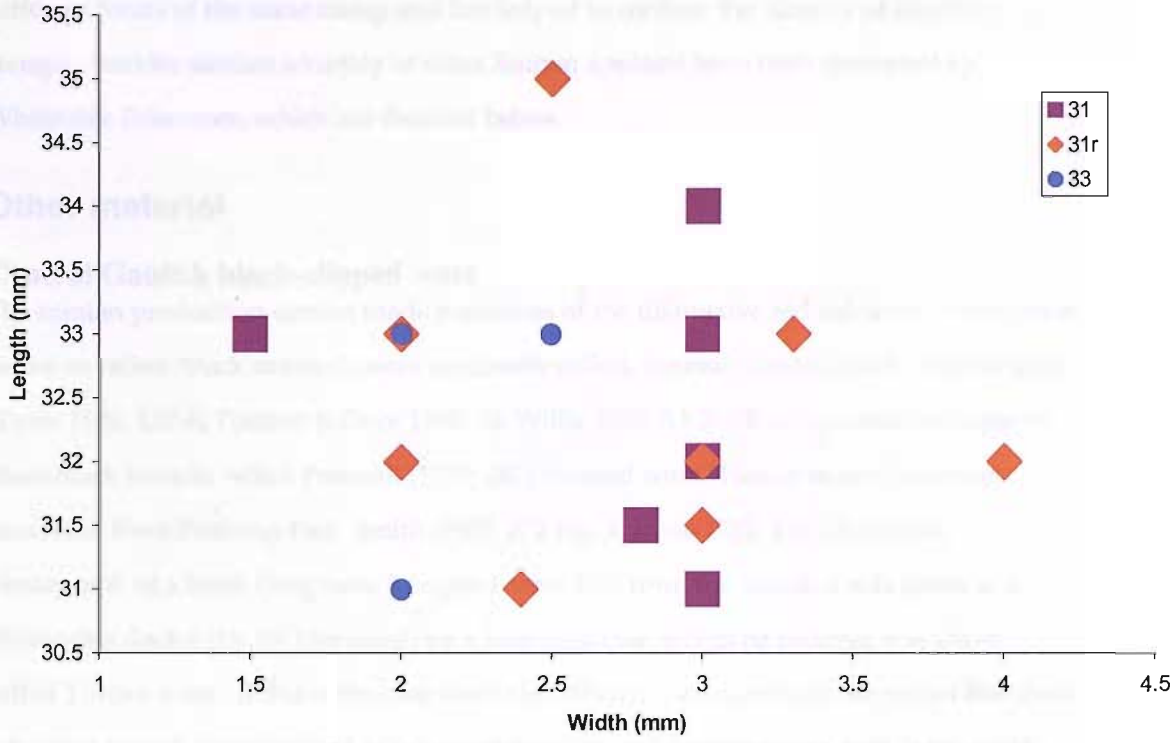


Figure 46 The stamp dimensions of Saturninus

In summary, analysis of wear and damage confirm that the majority of the vessels are lying on the seabed in an inverted position with their footrings uppermost, many of which have been damaged. 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. However, the general homogeneity of forms and potters stamps represented suggests that the consignment was manufactured and assembled over a relatively short period of time. The study of the dimensions of some of the potters' stamps clarifies the association of

different forms of the same stamp and has helped to confirm the identity of illegible stamps. Besides samian a variety of other Roman artefacts have been recovered by Whitstable fishermen, which are detailed below.

Other material

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 & 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. Smith (1907: 272 Fig. 1; Jacob 1782: 124) displays a photograph of a black Drag form 9 'sugar-bason' [*sic*] from the site, that was given to a Whitstable doctor (Dr JW Hayward) by a local collector, which he believes 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). Perhaps they were not recognised as Roman or more probably they were rarely recovered intact as they are thinner-walled and therefore more delicate than the samian vessels. As we have established the collection is more heavily biased towards the collection of complete vessels.

Figure 47 Left: Base of a central Gaulish black slipped cup from Pudding Pan now in Whitstable Museum. Right: Central Gaulish black-slipped 'sugar bason' after Smith (1909)

Consequently, black-slipped wares from Pudding Pan are quite rare with only one basal fragment, identified recently, from which the vertical walls are missing (Cat. No. 2.16; see Figure 47). This adaption may have occurred in antiquity for re-use of the vessel in an alternative function as proposed on other sites (Willis 2005: 8.5.2) or more likely occurred post-recovery. The geographical provenance and date of these black-slipped vessels (*c* 150-200) conforms to the main samian assemblage and could therefore have comprised part 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 & Dore 1998: 61-2) is a fine ware produced in North Africa that was widely distributed in the Mediterranean from the late first to the seventh centuries. It is also widespread around Britain but in small quantities, found in contexts from the late first to at least the end of the fourth century. ARS appears to have filled the marketing void around the Mediterranean 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 second century. The term 'African' is used to cover a number of production centres but the main kiln sites 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 have been ascribed to Pudding Pan; a form 3B bowl (Cat. No. 2.18; Hayes 1980: 522 n.10; Bird 1977: 271 Fig. 20.2) dating from the first half of the second century, and a form 39 bowl (Cat. No. 2.19; Hayes 1972: 58-9) dating from the first half of the third century. The form 3B bowl, equivalent to Drag form 36 (Hayes 1972), was in the Museum of London collections (Acc: 20565), but was subsequently 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. Moreover, the British Museum database describes the surface of this vessel as very pitted, the barbotine decoration abraded and the foot-ring chipped which does conform quite closely with the wear and damage sustained by other Pudding Pan samples. This vessel was not inspected on a recent visit to the museum.

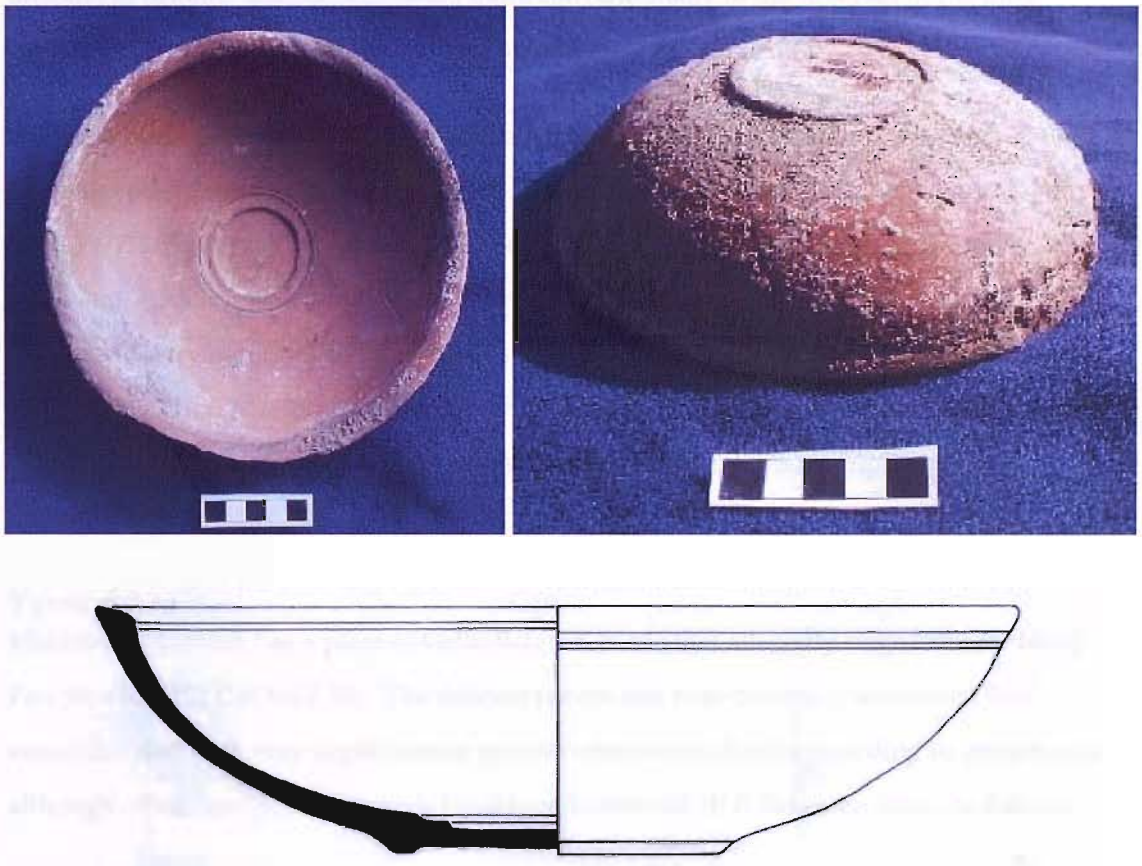


Figure 48 ARS form 39 bowl from Jewry Wall Museum, Leicester

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; Figure 48). This variation might be explained, as form 39 is very rare with only one other complete example currently in the Louvre. The Pudding Pan bowl is intact with a dull pinkish-red burnished surface of very poor quality especially 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 footring on this form is not very pronounced and is therefore far less susceptible to the characteristic damage sustained by its Gaulish counterparts.

By its very nature, ARS is different to 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 first-early second century material, possibly shipboard equipment, although an ARS bowl of this early date is unusual in Britain. The form 39 dated more conventionally to the first half of the third century is considerably later than the bulk of the samian.

This could represent a casual loss or a later source of material although both vessels could represent post-deposition contamination. Greater numbers of these relatively rare imports (Bird 1977: 269; Carandini 1983: 146) will 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 monopolised 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 then they are more likely to represent crew's possessions or ship's equipment rather than cargo.

Terra rubra

Maidstone Museum has a piece of Gallo-Belgic ceramic that allegedly came from Pudding Pan (Box RB21C; Cat No 2.18). The delicate nature and near-pristine condition of this vessel coupled with very slight marine growth raises some doubts regarding its provenance although other near-pristine vessels have been recovered. If it did come from the Kentish

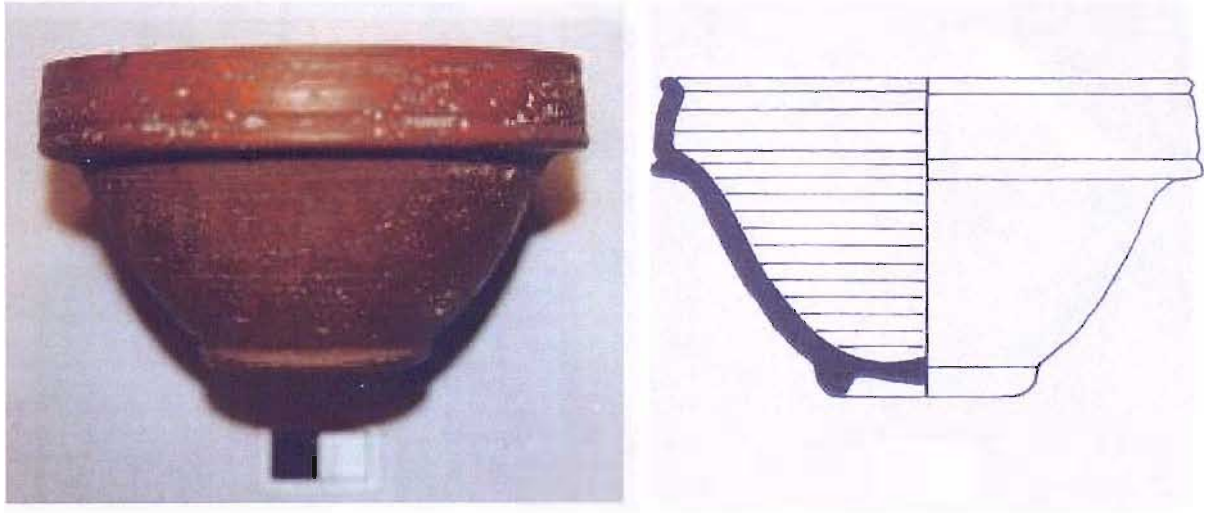


Figure 49 Terra rubra cup form 56c from Pudding Pan

Flats this form 56C *terra rubra* cup dating from 20-60 (Tyers 1996: 162-5 Fig. 198; Deru & Rollet 2000: 346; Tomber & Dore 1998: 12; Bédoyère 2000: 26 Fig. 14b) must have come from the first century source north of Pan Sand rather than from Pudding Pan. Only one vessel of this type has been recorded although its north Gaulish origin is consistent with the other first century finds from Pan Sand.

Lamps

Two samian lamps in Whitstable Museum (Cat No 2.14-5) are alleged to have been recovered from Pudding Pan. One bears elaborate figured moulded relief of a bearded man wearing a helmet facing a woman, while the other is the conventional disc type (Figure 50). 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 rare in Britain and elsewhere in the north-west provinces; the six other samian lamps found in Britain like those from Pudding Pan are central Gaulish and of second century date.

These lamps come from at least three sites; New Fresh Wharf (St Magnus House) in London, Latimer villa in Buckinghamshire and another from 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 losses at the point of import but could also include votive offerings. None have come from deposits within the city (Willis 2005: 8.5.3).

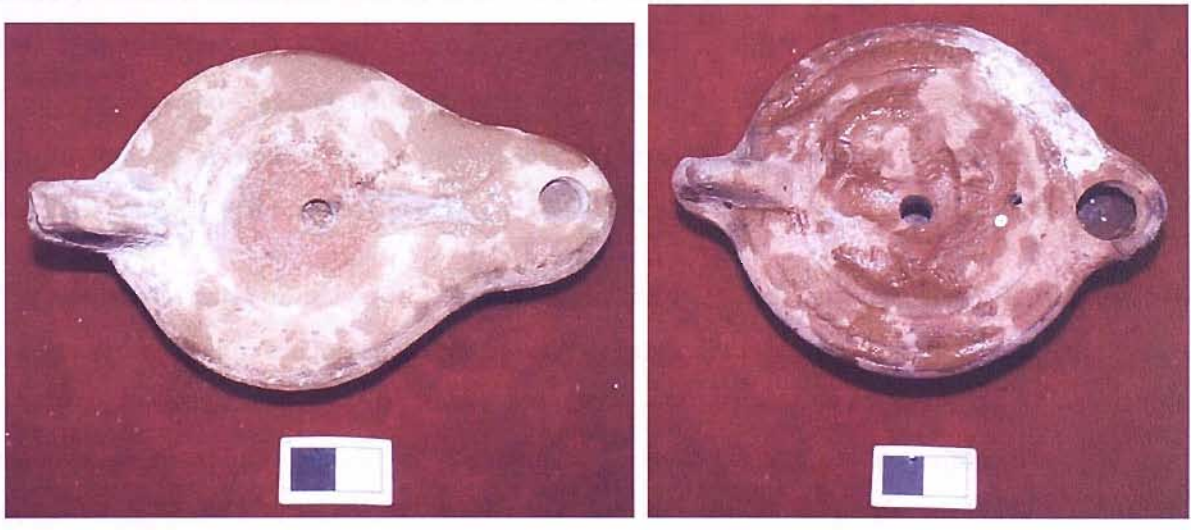


Figure 50 Samian lamps from Pudding Pan currently in Whitstable Museum

Amphorae

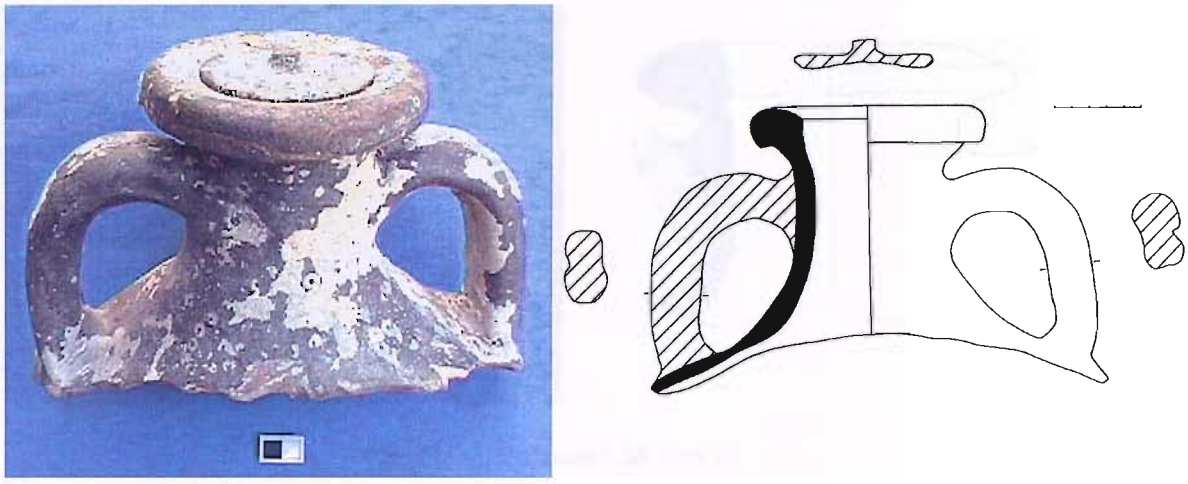
A range of amphora forms of diverse provenance, encompassing a broad range of dates has been recovered from the Kentish Flats. Some of the *amphorae* have been recovered intact while others are represented by rim, neck and handle fragments; interestingly only one basal spike, of a Class 25 Dressel [Dr] 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 has generally been far more accurately recorded than many of the other classes of artefact.

Type	Date	Provenance	Content	Location	Fig
Class 59 London 555	*c* 55 – 130	France	Olives	N.M. Mus.	12
Class 25 Dressel 20: Rim 28	*c* 130 – 170	Baetica, Spain	Oil	Private coll.	51c
Class 25 Dressel 20 spike	*c* 80 – 250	Baetica, Spain	Oil	Private coll.	51g
Class 25 Dressel 20: Rim 29	*c* 120 – 180	Baetica, Spain	Oil	Private coll.	51d
Class 25 Dressel 20 handle	*c* 50 – 250	Baetica, Spain	Oil	Private coll.	51f
Class 25 Dressel 20: Rim 41	*c* 200 – 260	Baetica, Spain	Oil	Private coll.	51e
Class 27 Gauloise 4	*c* 50 – 250	Languedoc, France	Wine	Private coll.	51a
Class 27 Gauloise 4	*c* 50 – 250	Loire, N. France	Wine	Private coll.	51b
Class 30 Gauloise 5?	*c* 60 – 100	Frejus, S. France	Wine	Private coll.	52
Class 6 Dressel 1-Pascual 1	*c* 1 – 80	Barcelona, Spain	Wine	Folkestone	51h

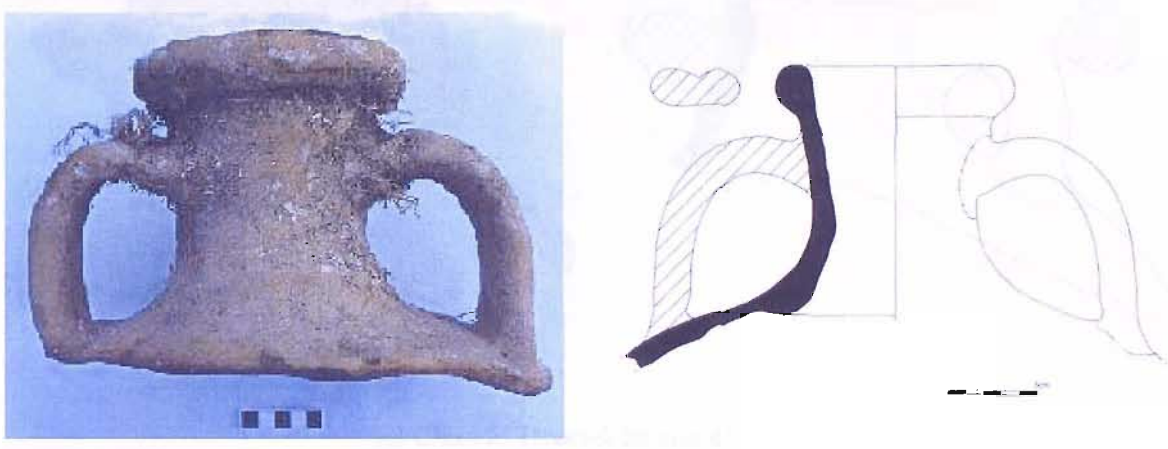
Table 15 *Amphorae* recovered from the Kentish Flats

The most numerous amphora class found are the five Class 25 Baetican Dr 20 amphora fragments (Cat Nos 2.02-6), used to transport oil or olives, many of which are in the possession of private collectors. This form is broadly dated from the mid first to the mid third centuries, but more specifically the type 28 and 29 rims date from the mid second century, which is 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 approximately 6km SE 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 come from a shipwreck.

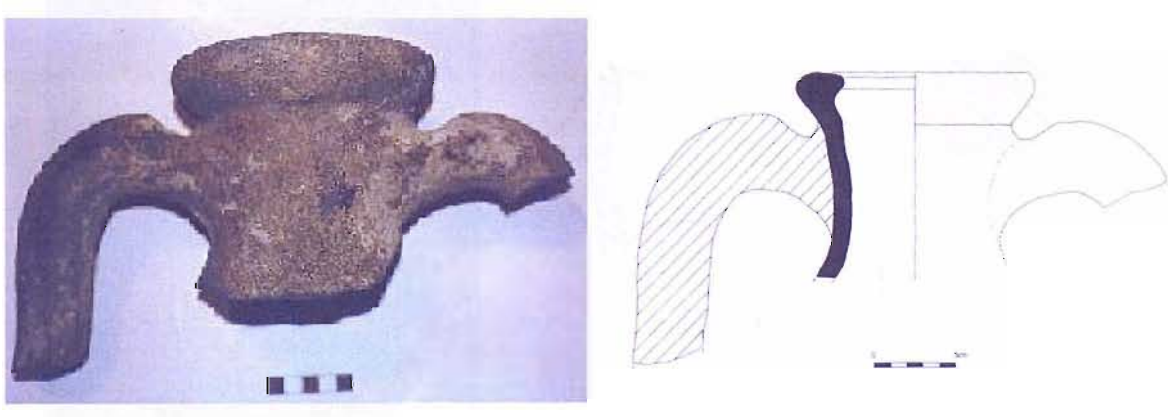
The type 41 rim dates from the first half of the third century which lends credence to the notion of a third source of material. The broad date range of the remaining Dr 20 fragments makes it difficult to assign these finds to a specific source. The broad variation in dates from this small sample suggests that it is unlikely that these Dr 20 *amphorae* comprised a single consignment from Baetica but seem more likely to represent ships' provisions or isolated finds from various sources.



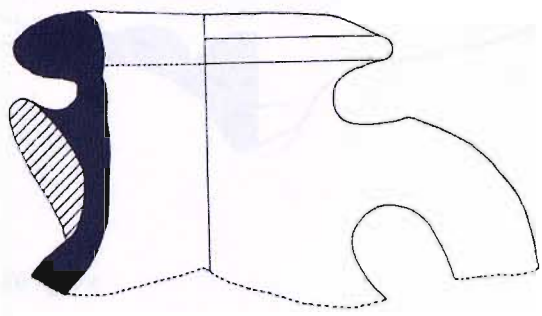
(a) Class 27 Gauloise 4



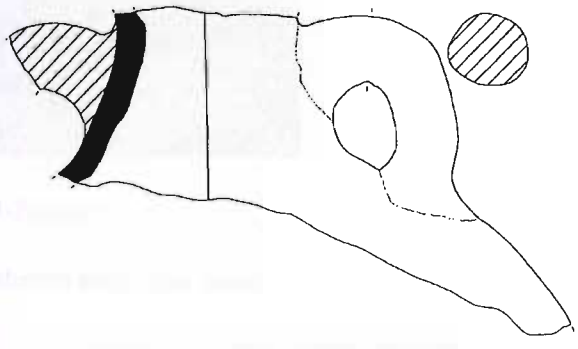
(b) Class 27 Gauloise 4



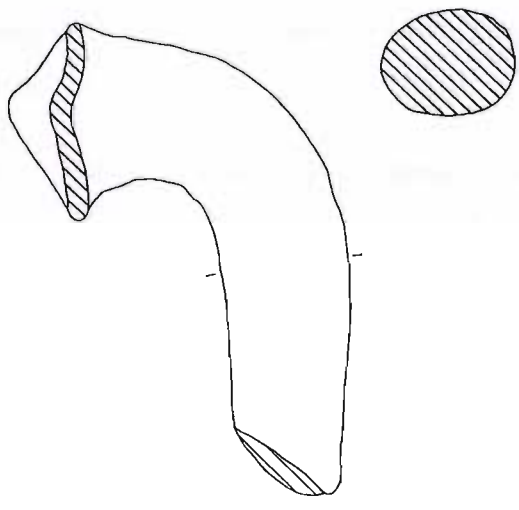
(c) Class 25 Dressel 20: rim 28



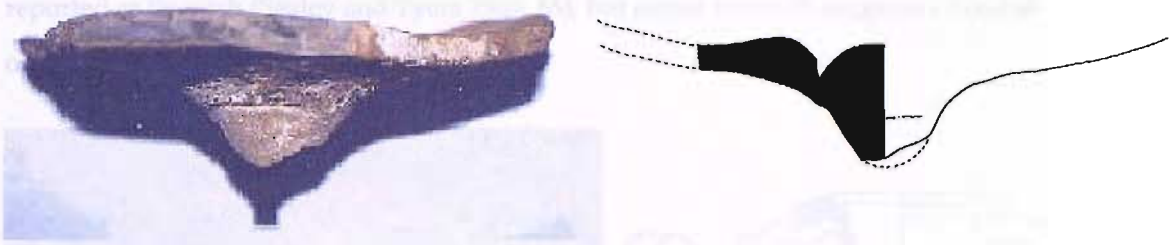
(d) Class 25 Dressel 20: rim 29



(e) Class 25 Dressel 20: rim 41



(f) Class 25 Dressel 20 handle



(g) Class 25 Dressel 20 spike

(h) Class 6 Dressel 1-Pascual 1

Figure 51 Complete amphora and *amphorae* sherds from Pan Sand/Pudding Pan

One of the Class 27 Gauloise 4 fragments (Cat No 2.01), that included the original stopper dates from the mid first to mid third centuries 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). The latter Gauloise 4 was recovered from north of Pan Sand and could therefore comprise part of the first century source. Notwithstanding variation in similar amphora types (Patterson 1982: 156), like the Dr 20 *amphorae*, these two *amphorae* are quite different from each other and are therefore unlikely to have comprised part of a bulk cargo as illustrated by their diverse provenance.

The London 555 amphora that was recovered complete with 6,200 olive pits emerged in the early 50s and it is suggested that production of the form ceased *c* 125/150 (Sealey and Tyers 1989: 67). This date clearly places this find 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 quite specifically and places it north of Pan Sand (see Sealey & Tyers 1989: 53). Therefore we not only have temporal separation from 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 recent research suggests a Gaulish origin (D Williams pers comm).

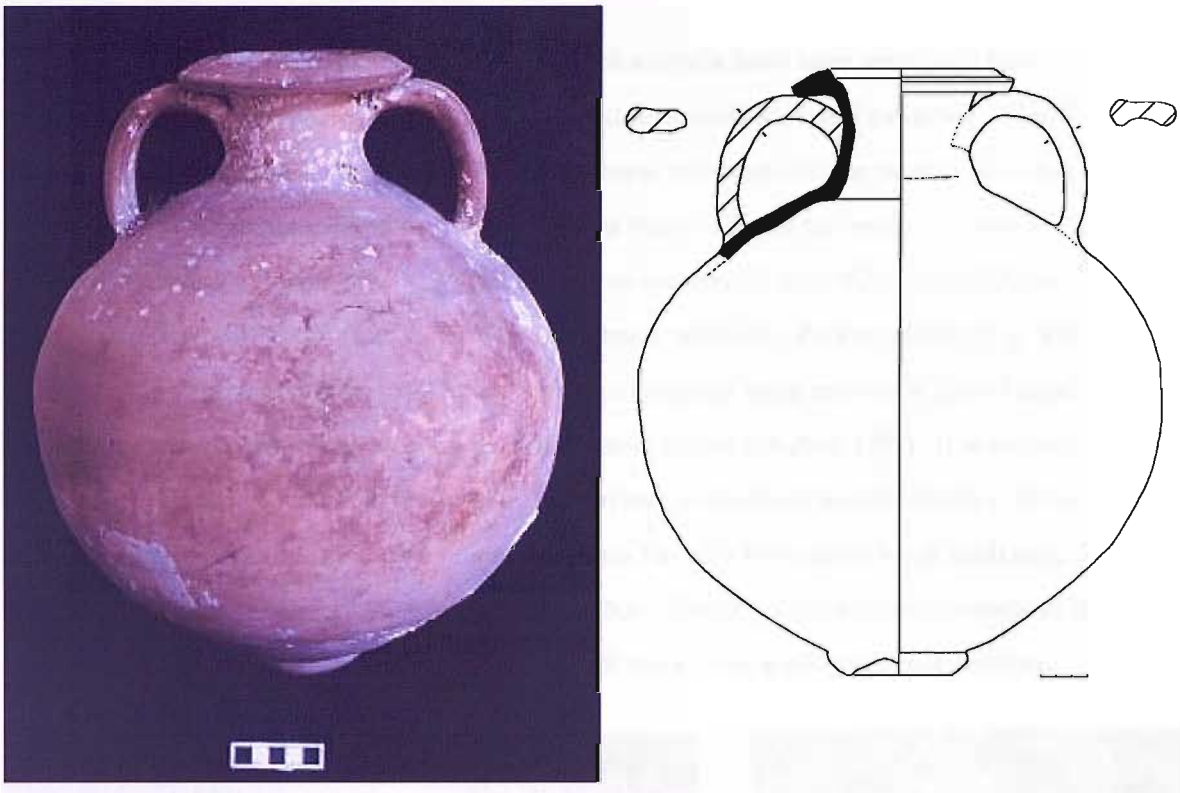


Figure 52 Globular 1/5 amphora from southern France

One of the other complete *amphorae* recorded in this survey is uncommon in Britain and has recently been tentatively identified as a Gauloise 1 or 5 from southern France, dating *c* 60-100, and originally contained 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 has a small flat base-ring and a flattish rim (see Figure 52). There is some confusion as the rim and handle profiles match those of the Class 30 Gauloise 5 but the handles attach to the underside the rim rather like the Class 28 Gauloise 1. This amphora was recovered *c* 1980 from the edge of the Oaze Deep channel that runs roughly north-east to south-west, approximately 6.5km WNW of Pan Sand. It is also approximately 9km NW of Pudding Pan, thus corroborating the notion of a late first century 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 was impossible to draw and difficult to identify with any certainty, although it has the overall shape of a Class 6 Dr 1-Pascual 1 from the Catalan coastal zone of northeast Spain, probably containing wine and dating from the late Republican to 79 although the majority of finds in northwest Europe tend to date from the Augustan period (Peacock &

Williams 1986: 93-5; R Tomber pers comm). If this early date is confirmed this again supports the notion of a first century source.

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 many were not located during the current study. One of the *mortaria* that was inspected in Whitstable Museum (Cat. No. 2.12) was stamped Q.VAL (Q. VALERIUS SE--) as cited by Hartley (1977: 6; Hartley 1998: 206) dating from 55-85. Parker (1992: 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 (Hartley 1977). It is unclear from where the finds location of 'Herne Bay' is derived, as the cited source (Hartley 1977) does not mention it although 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.

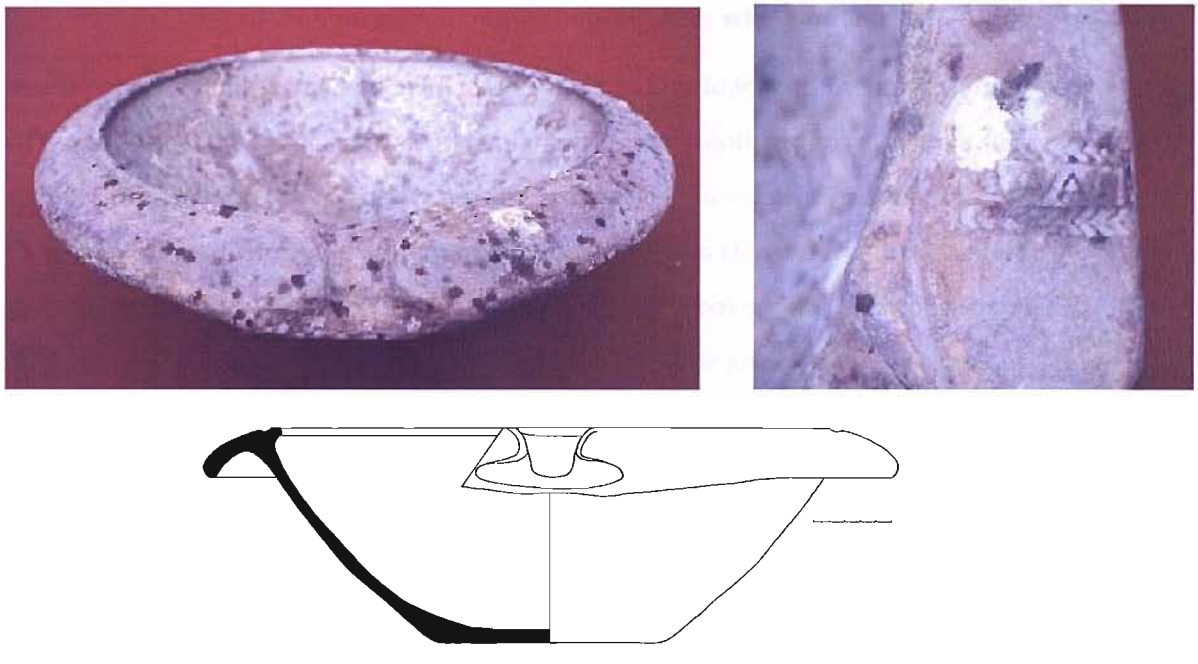


Figure 53 Mortarium from Pan Sand with Q.VAL stamp

There are also conflicting accounts regarding the number of identical Roman *mortaria* stamped CAVARIVS that have been recovered from the Oaze Deep channel by fishermen in the 1970s, from three vessels (Rhodes 1989: 50) to six vessels (Dean 1984: 78; fn. 7). None of these have been located although anecdotal evidence suggests that they were stored at Whitstable Museum (M Dean pers comm). These vessels have been dated to 65-100+ as

mortaria stamped Cavarius have been found in pre-Flavian deposits at Usk and Wroxeter (Hartley 1977: 11). The failure to locate these documented finds is rather alarming but corroborates the belief that considerable quantities of material may have been recovered but not recorded. However, another *mortarium* fragment also impressed with the stamp CAVARIUS has recently been recorded at the East Quay Restaurant in Whitstable (Cat No 2.13; Figure 54).

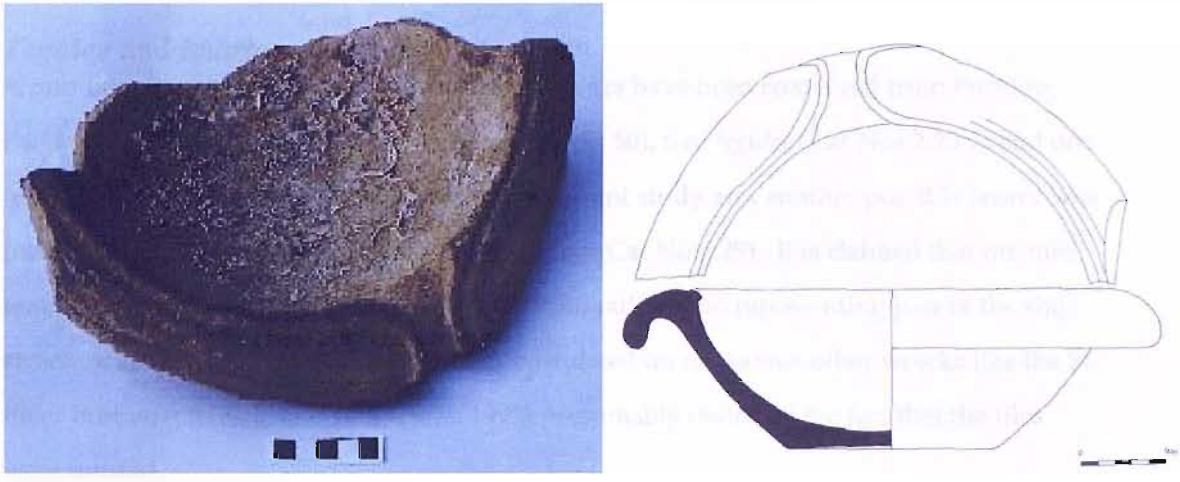


Figure 54 Unstamped mortarium fragment with similar rim

These potters belong to the two main first century groups identified by 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* (Hartley 1977: 5-6). One large complete unstamped mortarium recovered from Herne Bay and currently in Whitstable Museum (Cat. No. 213; Figure 55) is similar typologically to the one stamped Q. VAL, so it seems safe to assume that it stems from the same group. Both these vessels appear to have rim-type 3, which is quite rare for Q. Valerius Se- (Hartley 1977: 8). These *mortaria* were either made in Kent or imported in bulk from Gaul to Richborough from where they were distributed around Britain by sea as they are heavily represented in coastal and adjacent areas (Dickinson & Hartley 1971: 133; Hartley 1977: 13; Rush 1997: 56). This is entirely consistent with their recovery from Herne Bay, which is situated north of the Wantsum channel from which 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 (Hartley 1977: 12).

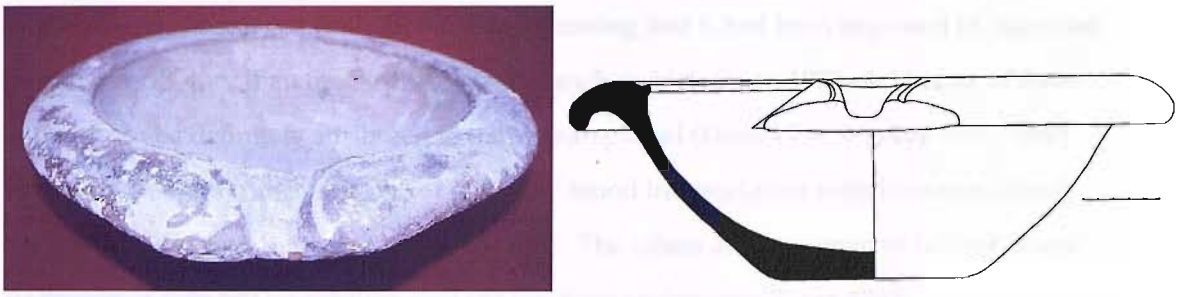


Figure 55 Small unstamped mortarium

Tegulae and *imbrices*

A number of apparently unused *tegulae* and *imbrices* have been recovered from Pudding Pan but the fabrics are undiagnostic (Rhodes 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.

Figure 56 *Tegula* recovered from Pudding Pan, currently in Maidstone Museum

Other finds

A one-hole stone anchor recovered southwest of Pudding Pan (Figure 57) is one of only a handful found on the east coast of Britain; the majority of which (a total of twenty-seven 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 indicating that it had been imported (K Knowles pers comm). Other than the Porth Felen lead anchor stock (Boon 1977a & b) none of these anchors can be definitely attributed to the Roman period (Dean 1984; Markey 1991; 1997). However, 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).

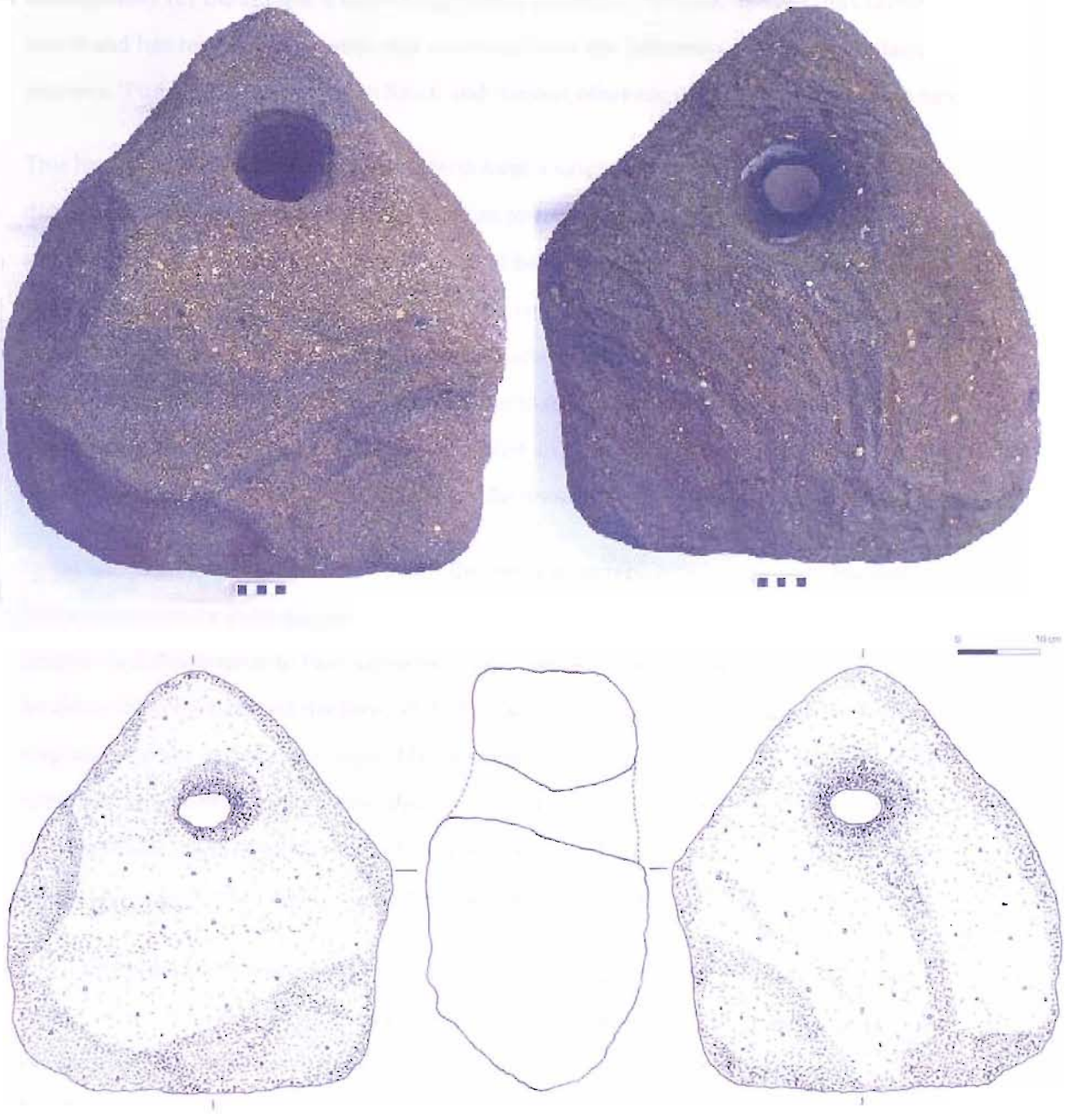


Figure 57 Stone anchor recovered from the Kentish Flats

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 (Figure 58); it would appear that at least two of these distinguishable groups have been recovered 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 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 combinations 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. It 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. This assumption will be challenged in a later chapter that investigates the nature and location of the sources. 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, comprises the mid to late second century plain samian and more elusive black-slipped wares from Lezoux in central Gaul that appear to have come from one consignment. The Spanish Class 25 Dr 20 *amphorae* from Baetica, and the form 39 ARS bowl seem to have comprised part of this ship's equipment rather than cargo. Had the *amphorae* comprised cargo one would expect greater homogeneity of form rather than the varied types represented here. The ARS bowl may represent a private possession of a crewmember and implies 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* 175-195 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 the following chapter.

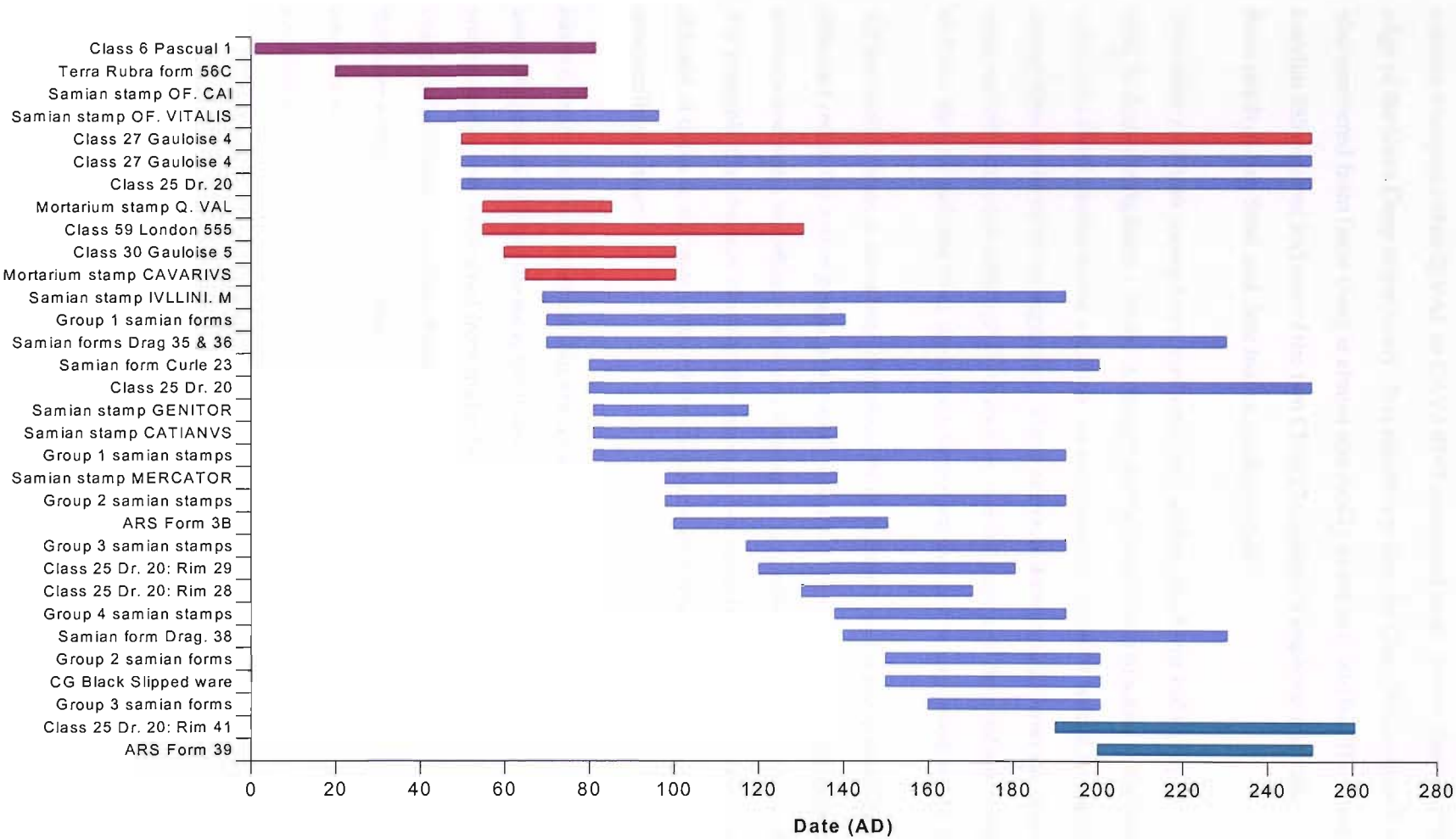


Figure 58 Dates of all classes of Roman artefacts recovered from the Kentish Flats. The red bars denote artefacts known to have come from north of Pan Sands; the burgundy bars are associated with the Pan Sand artefacts by date

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. 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 from *c* 20-65. Although the finds locations of some of the plain samian wares and other similar dated *amphorae* are not clearly recorded it would be logical to assign them to the same consignment. These artefacts date broadly from the mid-first to early second centuries, 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* 65-85.

All the finds known to have been recovered from the north and north-west of Pan Sands, coloured red in the above graph, 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 third century, which lends credence to the notion that artefacts have been recovered from multiple sources. These artefacts include one of the Class 25 Dr 20 amphorae from Baetica and an RS 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 these artefacts represent casual losses. The possibility of an association between this material and the main late second century assemblage again seems unlikely as the bulk of a cargo on an early third century vessel is unlikely to date from the mid to late second century.

Any association, other than contamination, between the third and first century material seems absurd. Having considered the issue of residuality and the probability of multiple sites the following chapter will discuss the nature and probable locations of these sources of material as well as the surveys conducted to locate the main source. Succeeding chapters

will compare this material with similar deposits from terrestrial sites and from the one Mediterranean site that has been rigourously investigated and fully published.

Chapter 6

Interpretation and investigation of the Herne Bay sites

> ...the 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 findspots may bear no direct relation to the source locations owing to the effects of c- and n- transforms (Schiffer 1987). There is mounting evidence that this material has been recovered from multiple sources but the prevailing belief that it has come from one source that has been widely dispersed must be given due consideration. 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 first century assemblage, possibly dating from *c* 65-85, comprises 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 northwest of Pan Sand. Other artefacts dating from the same period, including samian, and a solitary Terra Rubra cup, are likely to have come from the same area.

The main assemblage, for which the area is most famous, dates from *c* 175-195 and comprises the central Gaulish samian and black-slipped wares from Lezoux, a range of *amphorae* primarily from Baetica in Spain, and a solitary ARS bowl. It is highly likely that these latter items represent shipboard equipment or crew provisions rather than cargo. The early third century material includes a Dr 20 Baetican amphora and a further ARS bowl, although the date ranges of some of the other artefacts 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 the possible location, nature and condition of those sources 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. 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 to realistically 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 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. Having considered the location, nature and condition of the sources this chapter will then present the results of several fieldwork seasons that attempted to locate the main later second century source.

Multiple sources, contamination or residuality?

There are three possible scenarios that might explain the broad dispersal of artefacts spanning some 200 years over a wide 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 normally 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 first century artefacts in a third century context would be highly unusual, even though samian, especially decorated wares, seem to have been curated over longer periods than other contemporary pottery and the appearance of apparently earlier samian in later deposits can be acute.

For example, residuality of later first century south Gaulish samian in second century contexts particularly during the Hadrianic to early Antonine period can be high. Curation of Lezoux samian into the third century is also attested (Willis 2005: 5.7.3-4; 5.8.1-4). Secondly, and more plausibly, the artefacts could represent a number of separate incidents that have resulted in depositions at different and as yet ill-defined locations on the Kentish Flats as originally contemplated by Smith (1909: 398). This appears to be borne out by the spatial separation between the finds locations of some of the first and second century material. Thirdly, the existence of broadly dated material in the same area could represent contamination from passing ships or transportation along the seabed from other areas.

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 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', were notorious for their constantly changing shape (Redknap & Fleming 1985: 312) and have always posed a serious hazard to mariners in the area. A lion-headed spout from a Drag 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 sixteenth 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). A cannon, several glass ingots and a human skull have recently been recovered from one of these sites and currently reside in a Whitstable restaurant fish tank!

As discussed previously in the context of the Blackfriars I site (Marsden 1994), it seems highly unlikely that an early third century 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, but the widespread artefactual distribution might be accounted for by post-depositional processes. However, this seems unlikely on topographical grounds as the Pan Sand sandbank that lies between the two locations presents a considerable barrier, but 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 Jeffris & 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* 5 x 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 is difficult to interpret without recourse to multiple sites. Why would a ship with a possible lifespan of sixty years be carrying 200-year-old pottery? Moreover, analysis of the biographies of individual pots has shown that significant quantities of material continue to be recovered to the present day which not only indicates that a significant mass remains *in situ*, but also provides up-to-date locational information. Anecdotal evidence recounts that several samian bowls recovered in one haul, which suggests that they were dredged directly from the point of deposition and is thus potentially a very good indicator of the site location.

Alternatively, the considerable date range coupled with the absence of decorated wares has led to suggestions that the consignment represents old stock that could not be sold closer to the centre of the Empire where contemporary fashions were better observed. Therefore these wares might have been shipped to Britain where they could be sold to naïve and unsuspecting natives. If the Pudding Pan assemblage does represent old unfashionable stock one would expect a broad representation of forms and potter's stamps encompassing a wider range of disparate dates. This is not borne out by the three distinctly dated groups identified above particularly the main closely dated, homogenous assemblage. The fashionability of the assemblage 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 first century material was recovered some considerable distance from the later second 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 first century source[s]

It has been suggested that the *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 first century, the reported finds locations are some considerable distance apart. The Oaze Deep channel, from which the *mortaria* and the similarly dated Gauloise 1/5 amphora were recovered, lies just beyond the Shivering Sand

Towers some 6.5km WNW 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 & Tyers 1989: 53), which is approximately 1km north of Pan Sand. Thus the *mortaria* were recovered approximately 5.5km west of this amphora. It is interesting to note that Smith (1909: 398) states specifically that the samian stamps that 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 first century 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. However, rather than 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. Even samian fragments, which have enabled petrological analysis that had hitherto been impossible on complete vessels, have sharp-edged breaks. 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 is highly suspect as the fishermen only realise that they have 'caught' an artefact when they empty their catches onto their decks. 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 that 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 a broad area but 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 has been decimated. Many fishermen are decommissioning their boats while others are moving to new areas and taking their knowledge with them (Redknap & Fleming 1985: 314). Thus a significant proportion of this first century material recovered from north of Pan Sand in two locations could 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) although an alternative first century source elsewhere on the Kentish Flats cannot be discounted.

The location of the later second century source

The evidence that the bulk of the first century material came from an area to the north and northwest of Pan Sand now seems incontrovertible, but the evidence placing the later second century source in the vicinity of Pudding Pan is as yet inconclusive. The most recent academic study of the site prior to my pilot study concluded that the main source was located in the vicinity of Pan Sand (Watson 1987: 56-7). This conclusion heavily influenced the original choice of area in which to conduct the first geophysical survey in what I now believe was the wrong location to the south of Pan Sand (see below). 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 will finally be resolved here through the presentation of credible evidence for the location of the second century source. It has long been recognised 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 second century 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 a fruitless search.

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. Watson (1987: 56-7) infers from this conflicting evidence 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 for post-depositional movement on the artefacts, 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, rather than transporting 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.

Figure 59 Samian bowl with tell-tale oyster shell still attached

In the absence of evidence for post-depositional movement, the presence of oysters on eighty-four (17 per cent) of the later second century samian vessels is a crucial indicator for the location of the main source. 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 Jeffris & McDonald 1966: 171; Rhodes 1989: 50). This hypothesis of multiple sources renders the question of artefact transportation superfluous. 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 inter-mingling of the terms.

The evidence from Pudding Pan as it exists is somewhat contradictory. The large numbers of complete vessels that have been recovered from the site 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 fall through mobile sand to rest on the chalk bedrock (Redknap & 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 not optimal 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 (1909: 400) diver supports this notion describing the variable condition of the seabed from 'soft to setting hard like stiff sand'. Recent research has suggested that these soft spots may be palaeo-channels representing the ancient watercourses and tributaries of the nascent river Thames and its estuary. A Chirp 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 and help 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 third century material

The source of the early third century material is more difficult to determine because there are so few vessels, which have only recently been recognised as discrete from the other material. The late date and north African provenance of the ARS ware clearly distinguishes 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 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. Multiple wreck sites throughout the Empire bear testament that shipping hazards claimed multiple victims. It is not stretching credibility beyond belief to suggest that the outer approaches to one of, if not the, most important ports of the province of Britannia would have experienced a considerable number of losses in the 400 years of Roman occupation. However, 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 indicates 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 and could indicate a connection with the Mediterranean either belonging to a member of the crew or comprising an item of ship's equipment rather than a complete consignment. It could mean that at least one of the traders was of Mediterranean origin. Alternatively, it might indicate the first consignment found in north-west European waters that originated in the Mediterranean, although the African wares may have been picked up in a north-west 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 one source that has been widely dispersed it is necessary to investigate the nature of those sources. Any conjecture regarding the nature of the later first century source would be highly speculative given the limited number of recorded finds. The recovered artefacts indicate that the consignment included *mortaria* and *amphorae* 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 based on the current evidence. If we assume that this material all came from the same consignment then it seems to represent a northern Gaulish origin. The provenance of all the later first century artefacts has been

identified as Gaulish with some specifically northern Gaulish elements. There is insufficient early third century material to hypothesize on the nature of any source.

In contrast to the other groups of material differentiated by date, the famed later second century 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 *c* 175-195, with a range of *amphorae* that may have conveyed the crew's provisions. The relatively high proportion of vessels displaying similar, uniform wear patterns are more indicative of a shipwreck than a jettisoned cargo (Watson 1987: 32), as the latter would exhibit more random wear synonymous with a jumbled deposit.

As the later second century source appears to represents a shipwreck, the key questions to be answered are: 1) what was the composition of the original consignment, and 2) how much of it remains buried? It is more appropriate to address the latter question first as this will impact on the former. If, for example, 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 its inferred composition is more complex and 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 therefore central to these questions.

As stated, the heavy external wear has removed the burnished surface from the undersides of the majority of the vessels, to varying degrees, as a result of many years exposure on the seabed. Combined with the damaged footrings these wear patterns unequivocally demonstrate 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. In addition, 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 a coherent consignment of separately packaged vessels predominantly lying on the seabed in inverted stacks.

The condition of the later second century source

The condition of the remaining deposit of later second century 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*, only superficially damaged 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 only a small range of forms would have been transported together in any one consignment. The biographies of the Pudding Pan artefacts may not have produced precise dates for the recovery of vessels but it has provided sufficient *termini ante quos* (TAQs) and *termini post quos* (TPQs) to enable the assemblage to be divided by time into significant groups for this purpose.

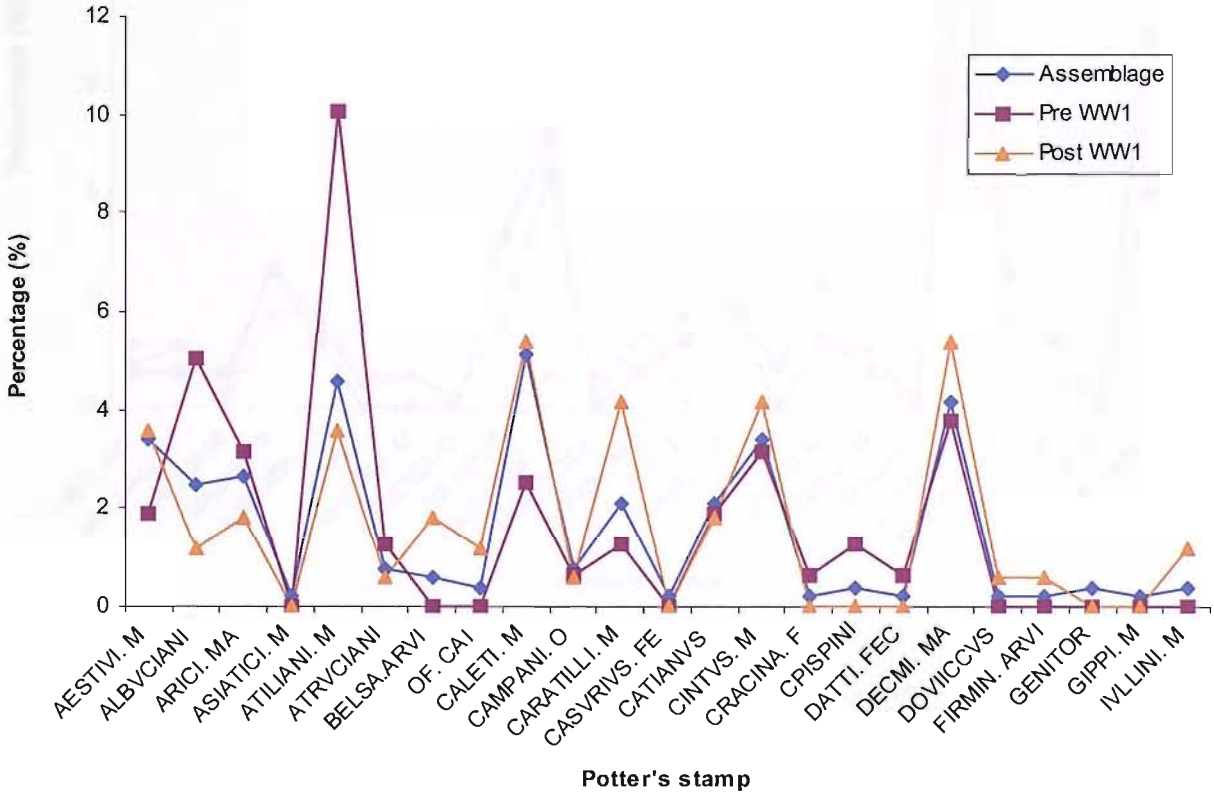


Figure 60 Comparison of relative frequency of potter's stamps (A-I) recovered from Pudding Pan pre- and post-WW1

For the purposes of this analysis the assemblage of 524 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 WW1 with a sample of

159 (30 per cent) vessels with TAQs before WW1 and 168 (32 per cent) artefacts with TPQs after WW1. 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 remaining 38 per cent of the assemblage were excluded either because they could not be located, no TAQ or TPQ could be determined, or the stamp or form was not identified. Comparison of the relative frequency of potters' stamps recovered pre- and post- WW1 with the assemblage in general are surprisingly uniform with a general concordance of peaks and troughs (Figure 60; Figure 61).

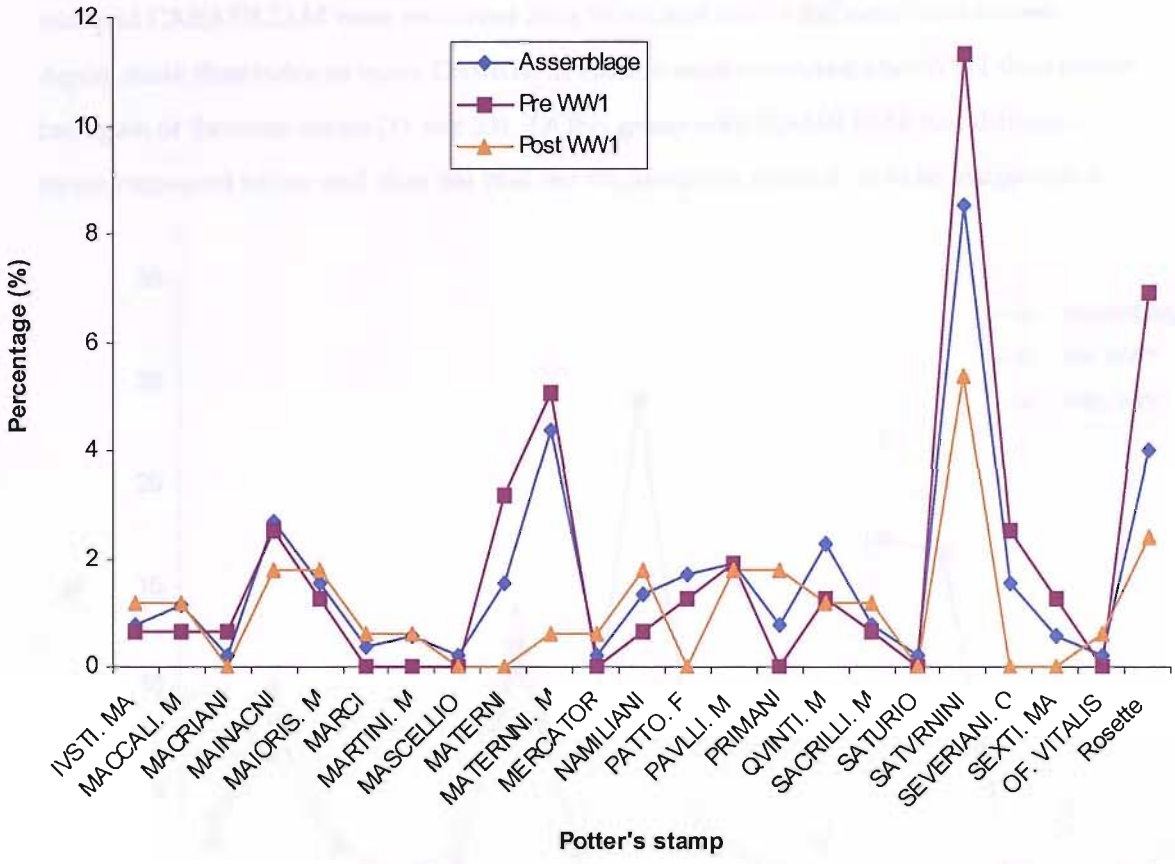


Figure 61 Comparison of relative frequency of potter's stamps (I-V) recovered from Pudding Pan pre- and post-WW1

However there are some distinct variations that warrant further investigation. For example, more of the stamps ALBVCIANI (5 per cent>1.2 per cent), ATILIANI.M (10.1 per cent>3.6 per cent), MATERNNI.M (5 per cent>0.6 per cent) and SATVRNINI (11.3 per cent>5.4 per cent) were recovered before WW1 than afterwards. Conversely, more of the stamps CALETI.M (2.5 per cent<5.4 per cent), CARATILLI.M (1.3 per cent<4.2 per cent) and NAMILIANI (0.6 per cent<1.8 per cent) were recovered after WW1 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 pre- and post- WW1. For example, eight form 31 bowls stamped ALBVCIANI were recovered before WW1 and two of the same form after WW1. Eight form 33 cups stamped MATERNNI.M were recovered before and one after WW1. ATILIANI. M and SATVRNINI are both represented in a wider range of forms but again there is no significant variation between the two periods. Similarly, seven form 79 plates stamped CARATILLI.M were recovered after WW1 and two of the same form before. Again, more than twice as many CARETI. M stamps were recovered after WW1 than before but again of the same forms (31 and 33). Of this group only NAMILIANI had different forms recovered before and after the War but the sample is so small as to be insignificant.

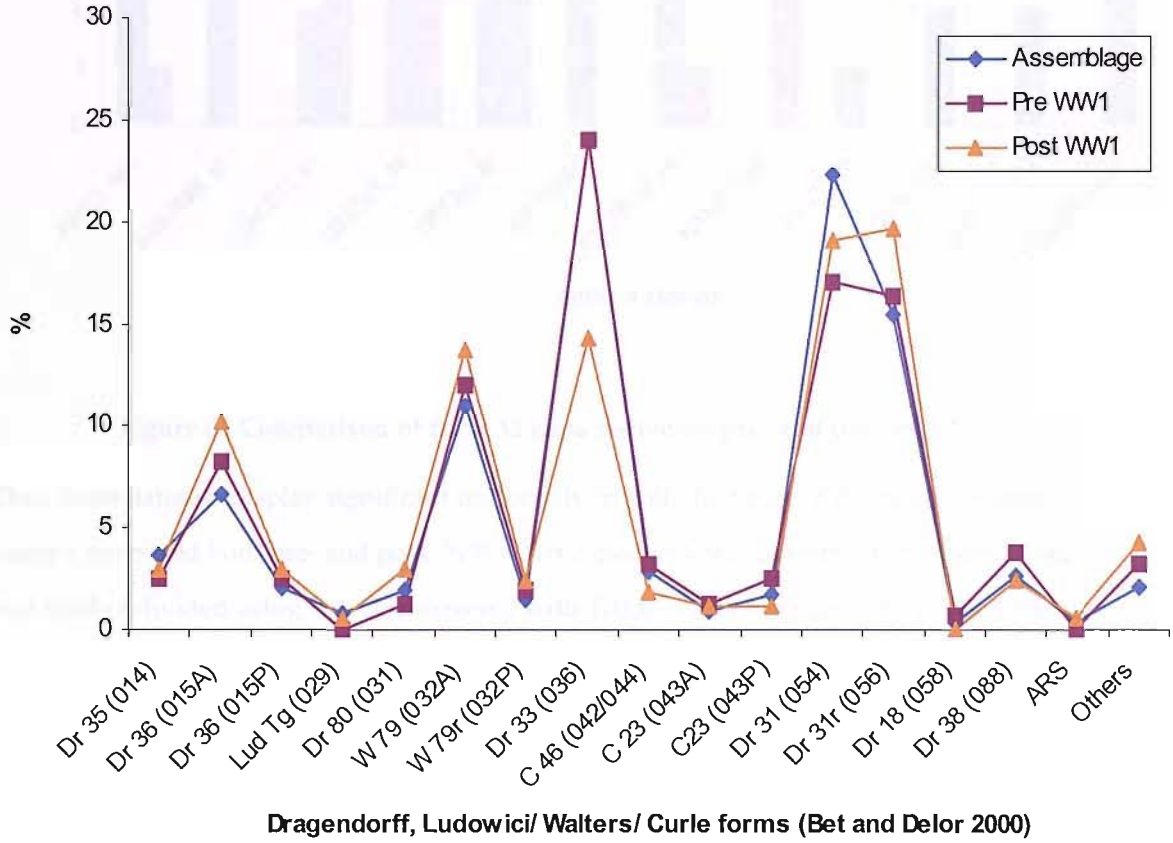


Figure 62 Comparison of relative frequency of samian forms recovered from Pudding Pan pre- and post- WW1

Comparison of forms recovered pre- and post- WW1 also display close correspondence between each period. Again there are a few, albeit minor variations, the greatest of which

is found in the form 33 cup which was collected in greater numbers before the war (23.9 per cent) rather than after (14.3 per cent). However, although a greater variety of stamps were represented on pre-war form 33s, equal numbers of stamps (six) were recovered both before and after WW1.

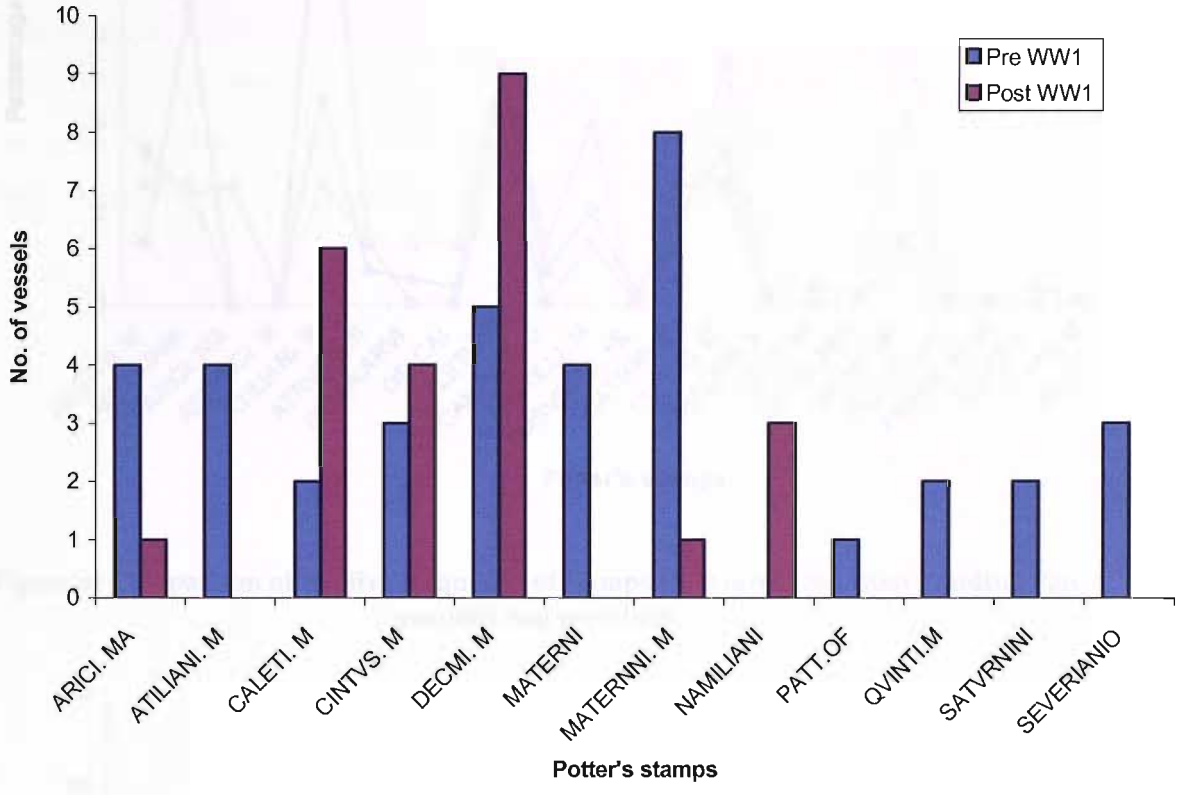


Figure 63 Comparison of form 33 cups recovered pre- and post-WW1

Thus these datasets display significant uniformity in both the range of forms and potters' stamps recovered both pre- and post- WW1. To crosscheck this uniformity the assemblage was further divided using vessels recovered with TAQs before 1885 and TPQs after 1950. The vessels recovered before 1885 largely derive from the considerable collections of Townley and Faucett. Each sample comprised seventy-five and seventy-four vessels respectively which each represent just over 14 per cent of the total assemblage. Admittedly this is a relatively small sample but the division of sixty-five years should more clearly highlight any variation that may have been masked by the close proximity of the previous comparisons. The following graphs compare the relative frequency of potters' stamps recovered pre-1885 with those recovered post-1950 (Figures 64 & 65).

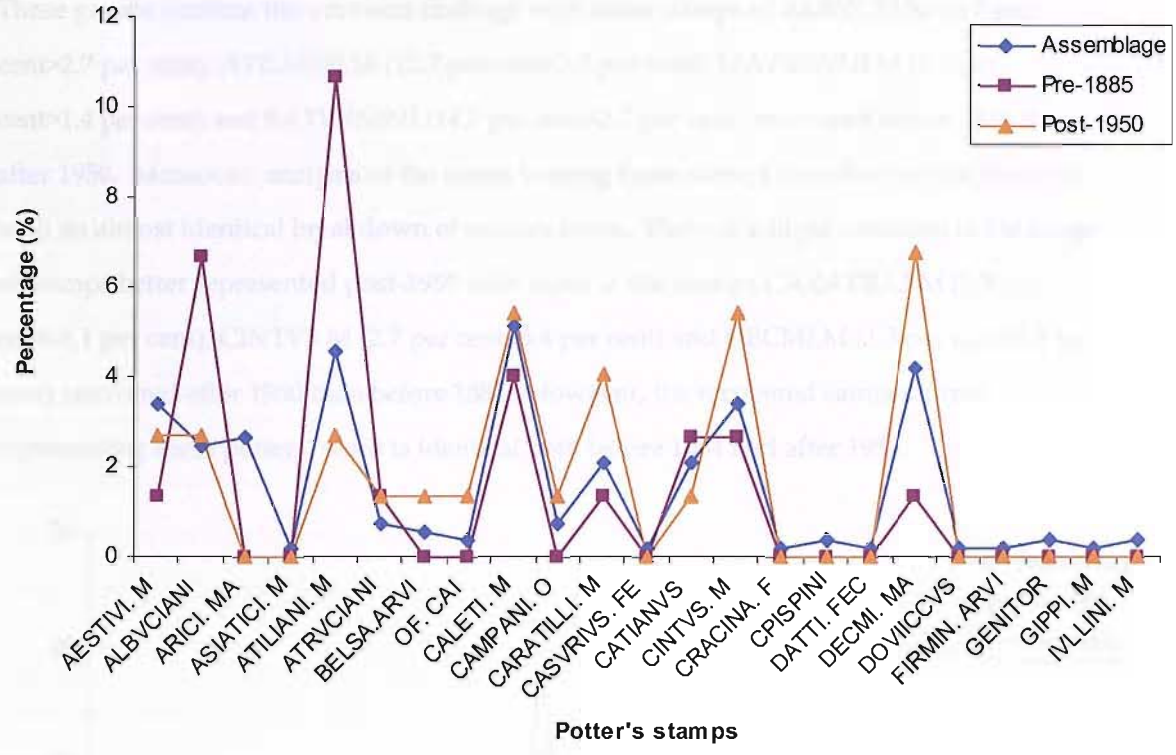


Figure 64 Comparison of relative frequency of stamps (A-I) recovered from Pudding Pan pre-1885 and post-1950

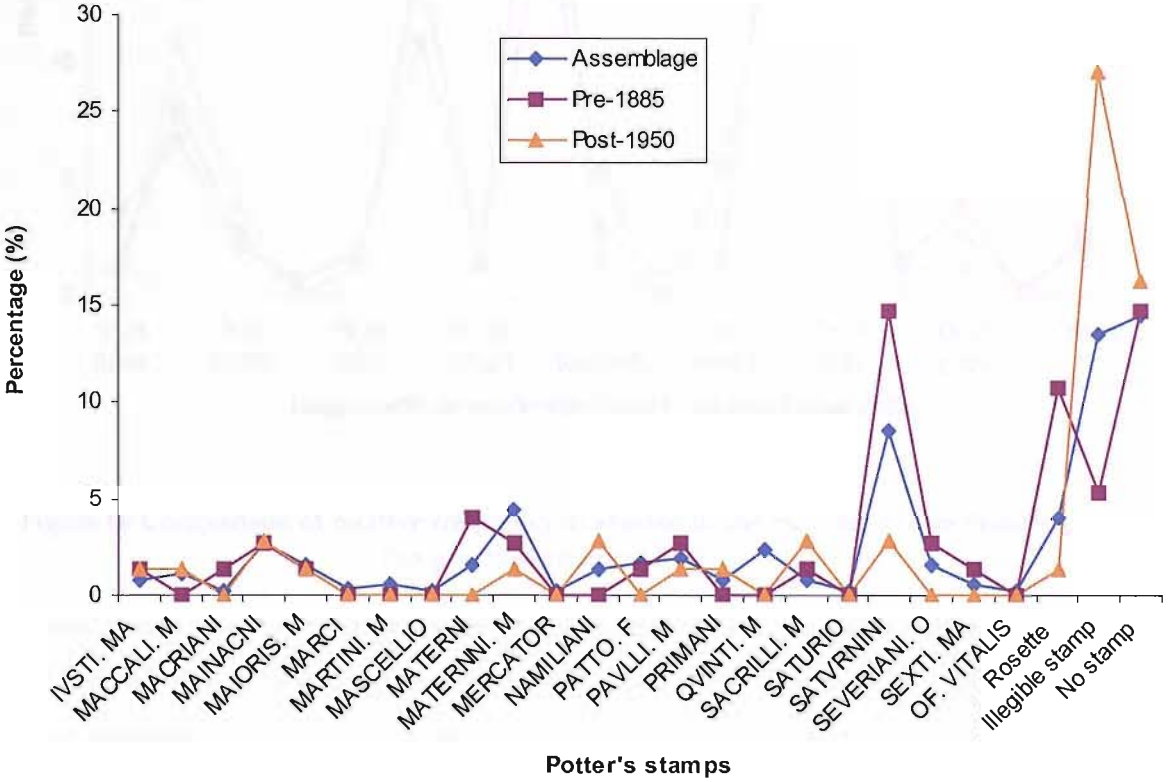


Figure 65 Comparison of relative frequency of stamps (I-V) recovered from Pudding Pan pre-1885 and post-1950

These graphs confirm the previous findings with more stamps of ALBVCIANI (6.7 per cent>2.7 per cent), ATILIANI.M (10.7 per cent>2.7 per cent), MATERNNI.M (2.7 per cent>1.4 per cent) and SATVRNINI (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. There is a slight variation in the range of stamps better represented post-1950 with more of the stamps CARATILLI.M (1.3 per cent<4.1 per cent), CINTVS.M (2.7 per cent<5.4 per cent) and DECMI.M (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.

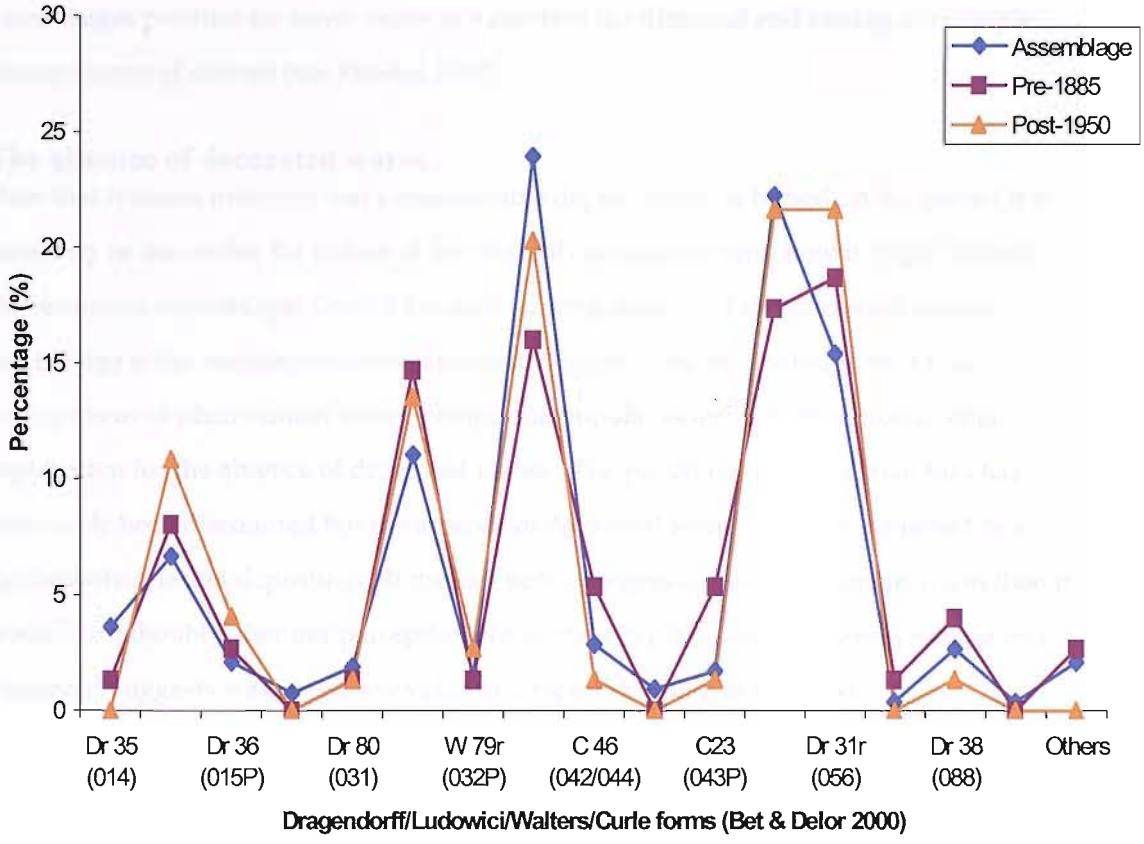


Figure 66 Comparison of relative frequency of samian forms recovered from Pudding Pan pre-1885 and post-1950

The graph comparing the relative frequency of samian forms (Figure 66) recovered pre-1885 and post-1950 shows no appreciable difference between the two periods. Marginally greater numbers of forms 31, 31r, 33 and 36 were recovered after 1950 than before 1885, but the differences are so marginal as to be insignificant. This reaffirms the results from the larger pre- and post- WW1 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 is the greatest indication yet that we are dealing with a coherent deposit of some considerable depth. As the oyster dredges only comb the surface of the seabed they appear to be sampling only the extremities of a considerable, deeply buried deposit. Moreover, the assemblage of 524 vessels including forty-five potters' stamps produces a ratio of almost twelve vessels per potter, which is a very high ratio when compared with terrestrial sites, and endorses the notion of a cohesive cargo that has not been widely dispersed. Terrestrial assemblages produce far lower ratios as a result of the dispersal and mixing of multiple consignments of samian (see Rhodes 1989).

The absence of decorated wares

Now that it seems probable that a considerable deposit remains buried on the seabed it is necessary to determine the nature of the original consignment and how it might relate to the recovered assemblage. One of the most striking features of the recovered samian assemblage is the seeming absence of decorated wares. Are we dealing with a bulk consignment of plain samian wares, contrary to popular belief, or is there some other explanation for the absence of decorated wares? The possibility of a collection bias has previously been discounted but the absence of decorated wares could be explained as a deliberately selected deposition. If this is a bulk consignment of plain samian wares then it would considerably alter our perception of the trade in plain samian wares which general consensus suggests was of too low value to warrant shipping in isolation.

However, other than the obvious explanation that Pudding Pan genuinely represents a plain ware consignment there are a number of possible reasons for the absence of decorated wares. The source may have been intentionally deposited rather than the result of an accident with the deliberate exclusion of decorated wares. For example, could the Romans have been actively farming oysters off the north Kent coast? We know that British oysters were popular in Rome at least in the first century (Pliny, NH IX.169; XXXII.62; Juvenal, 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. There is ample evidence 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). If the recovered material had been more fragmentary than this theory would be difficult to challenge. However the deposition for this purpose of a high proportion of complete pots in almost pristine condition, displaying signs of stacking, seems highly implausible.

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

> ...we 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. Is it possible that this could account for the Herne Bay assemblages? Beyond the obvious objection that Herne Bay is clearly some distance from any quay, this seems unlikely for two reasons. Firstly, decorated wares would have been as likely to break in transit as their plain counterparts and therefore should comprise an element of an assemblage discarded for this purpose. Secondly, some of the recovered samian vessels are in pristine condition and therefore would not have been deliberately discarded for this reason, although they might have been had the ship been in jeopardy. If the site did

represent a jettisoned cargo (see Tacitus, Annals II.23), then given the aforementioned relative value of decorated wares, *c* 20 asses compared with 12 asses, the plain wares may have been sacrificed in order to refloat the ship which then continued 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 (Willis 2005: 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. However, this seems highly unlikely at Pudding Pan not only because of the relatively low value of the commodity but also the poor diving conditions which are challenging for even the best equipped modern diver.

On the other hand, if as now seems clear the Pudding Pan site does represent a cohesive shipwreck then the level of the ship in which the decorated wares were stored may not yet have been exposed and therefore 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 be in packing cases that have not yet been disturbed.

In summary, the absence of decorated wares presents two viable possibilities; firstly, a shipwreck in which the decorated wares remain buried, which obviously cannot be discounted until the wreck is discovered and fully investigated. Secondly, an accurate reflection of a shipment from which decorated wares had been deliberately excluded. Decorated wares might have been deliberately excluded for three reasons; firstly, contrary to popular belief, consignments of plain wares might have been the norm rather than the exception. Selective supply or demand for decorated bowls cannot be discounted (Willis 1997b: 41). Secondly, this shipment may have comprised old, unfashionable stock that could not be sold on the continent so was shipped to Britain for sale to less discerning customers across the Channel (cf Haverfield 1909-11: 120).

Assemblages from the Boudiccan 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 homogenous and therefore contemporary stock. In addition, one would expect a greater variety of forms in a consignment of redundant stock rather than the limited number of forms represented at Pudding Pan. Thirdly, the consignment might be explained as a specific cargo intended for some as yet unspecified purpose which should become apparent through further analysis.

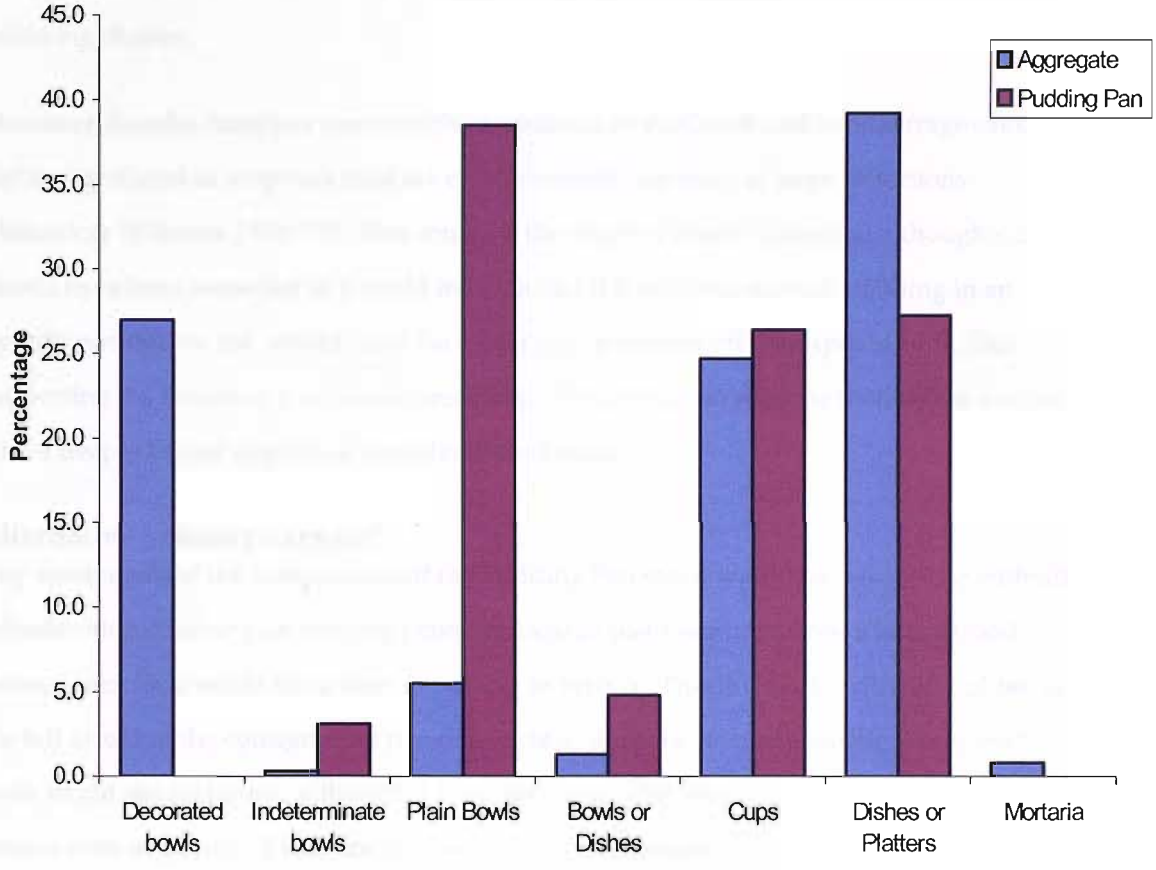


Figure 67 Comparison of characteristics of samian groups from different site types with similar groups from Pudding Pan (after Willis 2005)

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 (Figure 67). 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 a selection or recovery bias which again supports the notion of a shipwreck over a jettisoned cargo. Moreover, it appears to confirm that the recovered assemblage is a representative sample reflecting the characteristics of the original consignment rather than a heavily biased selection. This 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 the following chapter.

Moreover, besides complete *amphorae* the prevalence of rim, neck and handle fragments is highly significant as amphora rims are comparatively rare even in large collections (Peacock & Williams 1986: 19). This could be the result of biased collection although other sherds have been recorded so it could indicate that the *amphorae* are still 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 second century merchant might have been importing to Britain. This is fraught with difficulties, as the full extent of the consignment remains unclear; proponents 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 first or early second century deposit of grain at 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). However, it seems that manufactured goods that dominate the archaeological record also comprised the bulk of importations to Britain (Fulford 1984: 132).

The final destination of the Pudding Pan consignment is significant as it is likely that the importation of staples 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 wine, olive oil, fish-sauce, dried fruit, and other exotica conveyed in amphorae, or 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 second century. 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 invasion to the end of the first century, with a considerable reduction in the second century and even less importation in the early to mid-third centuries (Fulford 1984: 132; see 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 (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.

However, this appears to contradict Fulford's (1984: 136-7) suggestion 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 (IV, 5, 2), filling ships that would otherwise have returned empty. The need to import staples in the later second century 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 comprise a bulk shipment of samian, although the presence of an additional amphora-based consignment cannot yet be discounted.

To summarise, it is now clear that rather than one widely dispersed deposit the recovered material represents a number of sources. Subsequent analysis suggests that there is considerable evidence that a ship loaded primarily with a consignment of plain samian wares from Lezoux sank *c* 175-195. Analysis 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 that has only been sampled and 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 *c* 65-85. Whether this material represents a shipwreck or a jettisoned cargo and whether all the later first century artefacts came from one source remains unclear. At present there are too few artefacts from the early third century to determine what they represent and where any deposit might be located. As yet it could represent post-depositional contamination but further discoveries may prove otherwise.

The search for the later second century shipwreck

Analysis of the recovered assemblage has now shed considerable light on the number of sources, their locations, nature and condition, and has altered my opinion since the initial fieldwork surveys were conducted. The pilot study had focussed on the well-known assemblage from 'Pudding Pan' as the Romano-British maritime site of greatest potential with a long history of artefact recovery from a relatively well-defined area. The main aims of the initial study were to establish the extent of the recovered assemblage and to identify the area in which the wreck might lie. The literary review not only detailed the public institutions that held Pudding Pan collections but also indicated the areas in which previous investigators believed the wreck might be found.

The consensus of prevailing opinion cited an area to the south of Pan Sand as the most likely location of the main samian source (see Watson 1987). Consequently, the original geophysical survey was conducted just south of Pan Sand in the summer of 1997. This entailed the use of sidescan sonar to identify upstanding anomalies protruding from the seabed as well as the use of a metal-detecting marine magnetometer. Following analysis of the geophysics results a diver survey was conducted in the following summer to ground-truth the identified anomalies. The compilation of an updated catalogue of the recovered assemblage concluded the pilot study (Walsh 1998).

The Roman Shipwrecks Project was subsequently established to continue the search for Roman maritime remains in British waters with the primary focus on Pudding Pan. As stated, subsequent analysis of the assemblage recovered from the Kentish Flats and liaisons with Whitstable fishermen indicated that Pudding Pan rather than Pan Sand was the more

probable location of the later second century wreck and the surveys were redirected accordingly. Consequently, an extensive geophysical survey was conducted over Pudding Pan in 2001 followed by three phases of diver survey to identify the detected anomalies.

Confirmation that Pudding Pan is the probable location of the later second century source came from a series of controlled dredges, conducted as the fishermen dredged for oysters, during which a number of Roman artefacts were recovered; a fragment of a samian bowl was also recovered on one of a series of drift dives. The results of these various surveys have been digitised using geographical information systems (GIS) to combine the various datasets and further refine the search area. In addition, the government sponsored Archaeological Diving Unit (ADU) also conducted surveys on the Kentish Flats in 2002 under the direction of Martin Dean. Their limited survey was conducted north of Pan Sand in an area determined by the aforementioned discovery of the London 555 amphora, which could mark the location of the later first century material. The ADU completed a geophysical survey, which produced a number of interesting targets that remain unidentified. The results of the various surveys conducted at Pan Sand and Pudding Pan are presented below.

Geophysical Survey

The original geophysical survey of an area to the south of Pan Sand was conducted by the Department of Oceanography, University of Southampton in conjunction with the then recently formed maritime section of the National Monuments Record of the Royal Commission on the Historic Monuments of England. This was the first prospective survey undertaken by these institutions to locate and discover the nature of the source of the Roman artefacts.

The prospection tools currently available are not entirely appropriate for the task that we are undertaking. Any ancient wreck is likely to be buried under the seabed silts whereas our primary prospection tool only surveys the surface of the seabed. The side-scan sonar can survey a broader area of the seabed (approximately 70m either side of the tow-fish) thereby facilitating a far greater search area, but is non-penetrative and therefore incapable of detecting anything buried under surface silts. Unfortunately the device with this capability, a 'Chirp' sub-bottom profiler, is unsuited to prospection over large, ill-defined areas like Pudding Pan.

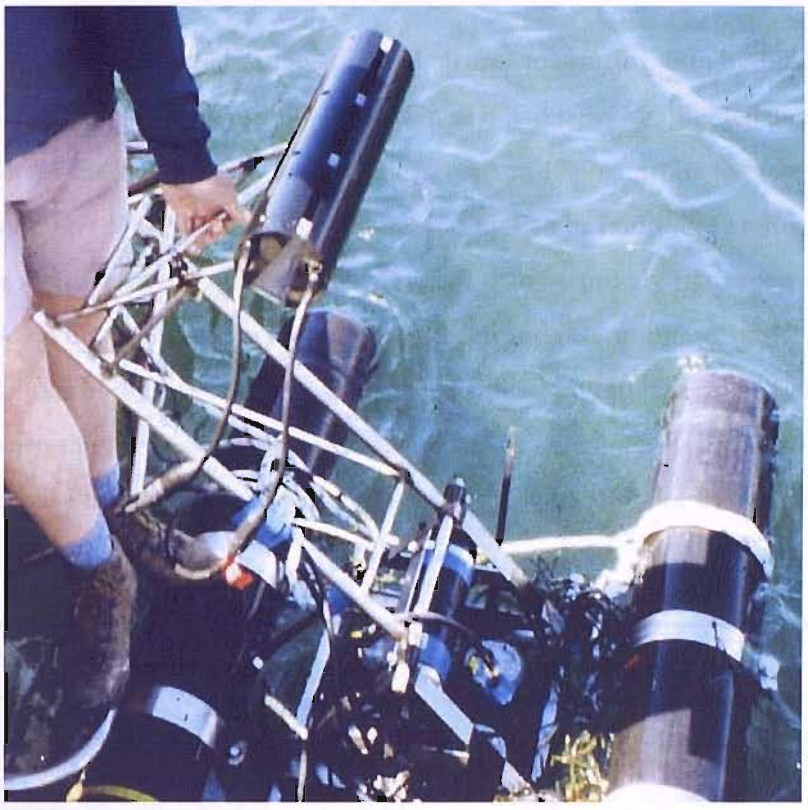


Figure 68 Deploying side scan sonar mounted on a catamaran

Given the likely dimensions of a Roman freighter (*c* 20m x 5m) the line spacing of a Chirp survey would have to be so tight that it would be impractical, if not impossible to achieve, and the chances of missing buried remains would be extremely high. A Chirp survey conducted at 10m line spacings would probably have missed the confined Culip IV assemblage completely (Millett 1993: 415). Consequently, the current configuration whereby a wide area can only be surface surveyed is of little use as a general prospection tool when searching for buried remains.

The benefits of the Chirp device become evident once buried remains have been located when it can be used to delineate the extent of the deposit. The survivability of any Roman remains depends on the extent to which the deposits have been buried which in turn depends on the softness of the seabed. Thus Chirp could be used at Pudding Pan to determine the geology of the sub-seabed and to locate the aforementioned palaeo-channels in the likelihood that any significant buried remains might be found there. Geophysical techniques are rapidly advancing but a prospection device capable of penetrating the seabed over a wider area is likely to remain prohibitively expensive for this application.

Results

The original surveys conducted in 1998 covered an area measuring 4km by 1.5km to the south of Pan Sand. This area was initially chosen as it had been highlighted as the most likely location for the source of the samian ware (Watson 1987), despite the fact that the provenance of many of the vessels is given as Pudding Pan or Pudding Pan Rock. However, these provenances were given less regard than seemingly rigorous academic investigations owing to the aforementioned confusion and intermingling of the two areas in many publications of the site. In the course of these initial investigations, especially as a result of enquiries to enhance the assemblage and subsequent analysis of the artefacts, it became clear that Pudding Pan was in fact the more likely location for the source of the samian.

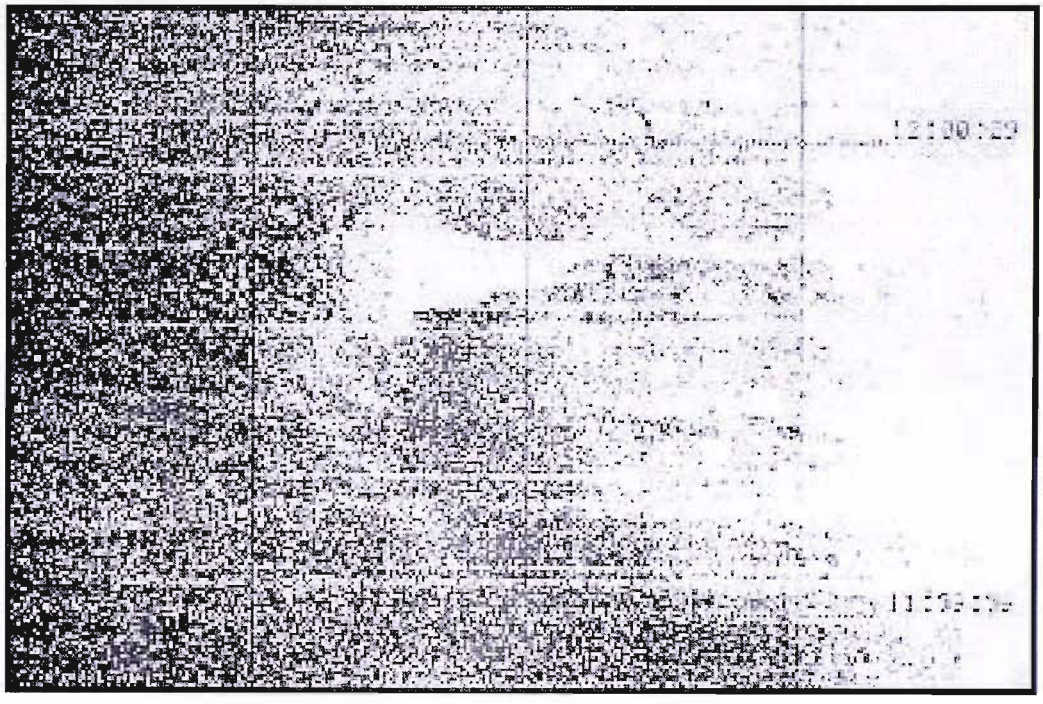


Figure 69 Example of side scan image showing large upstanding feature

Consequently, a second side-scan survey was conducted at Pudding Pan in 2001 over an area measuring 6.4 x 3.7km, representing approximately 237 linear kilometres of seabed (see Figure 71). In total, almost 30 square kilometres of the seabed have now been surveyed. Different side-scan systems were used for the two surveys as the system had been upgraded by the time of the second survey. This is reflected in the results from the two surveys that produced large variations in the number and quality of anomalies detected. The 1998 survey identified over 350 anomalies thus increasing the detection rate by a factor of 50. Details of both surveys have been reported elsewhere (Walsh 1998; 2002). Several contributory factors could account for this increase, the most obvious being that the

area surveyed was over three times larger. The upgraded system could also account for the greater detection rate although the results are more likely to reflect the variation in the topography of the seabed in the two areas. The Admiralty chart denotes Pudding Pan as an area of 'cement boulders', which are difficult to distinguish from archaeological anomalies on the side-scan image. Only when the diver survey is conducted can these 'anomalies' de discounted. In addition, a pre-disturbance survey was conducted by Wessex Archaeology in 2004 in preparation for the construction of a new wind farm development to the north of Pudding Pan in a previously unsurveyed area.

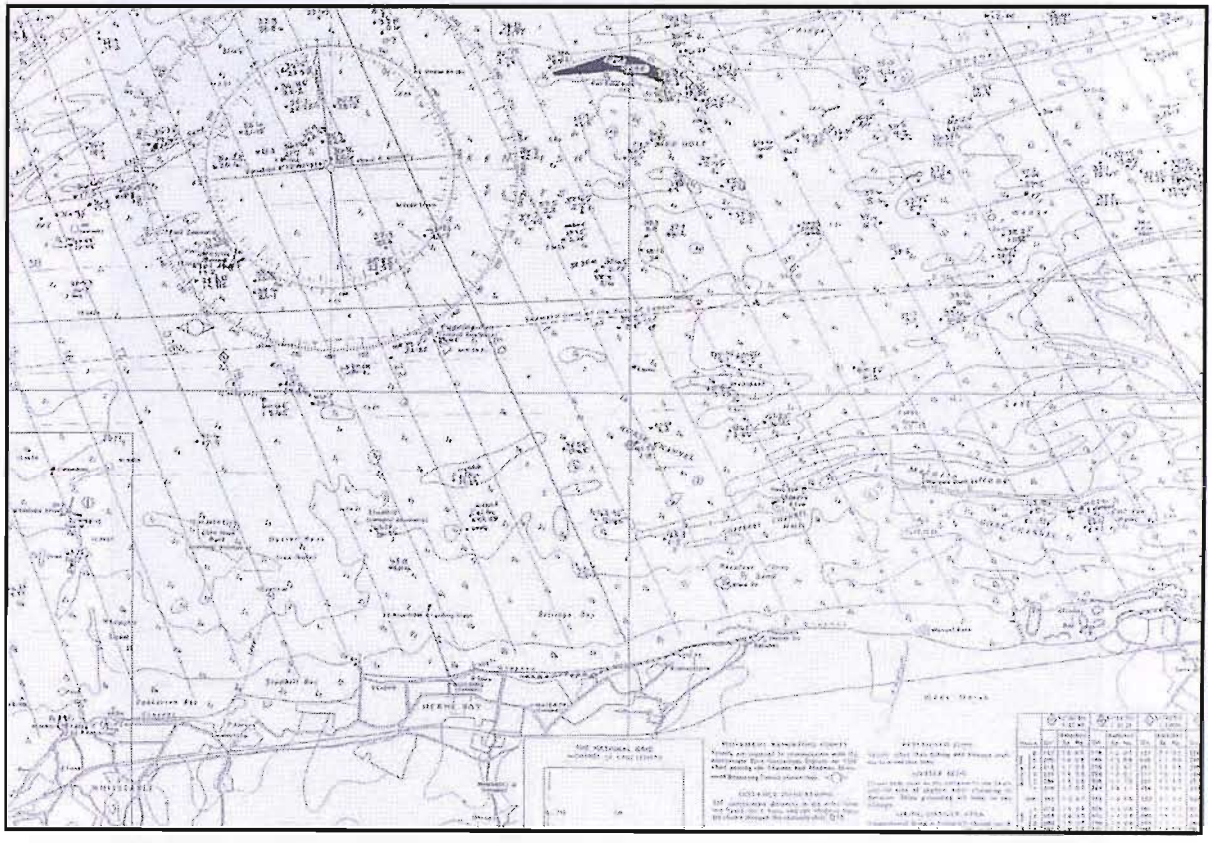


Figure 70 A section of a Whitstable fisherman's net fastening chart

The various datasets have been collated and digitised in a GIS package together with a whole host of other detailed information such as net fastening locations, samian and amphora findspots etc from the fishermen who work in the area. The digitisation of the various datasets facilitates far more accurate spatial analysis. It also provides a useful tool for analysing the site evolution processes that have impacted on the site enabling us to more accurately pinpoint the location of the wreck. Whitstable fishermen have provided copies of their net-fastening charts which record upstanding feature on the seabed which

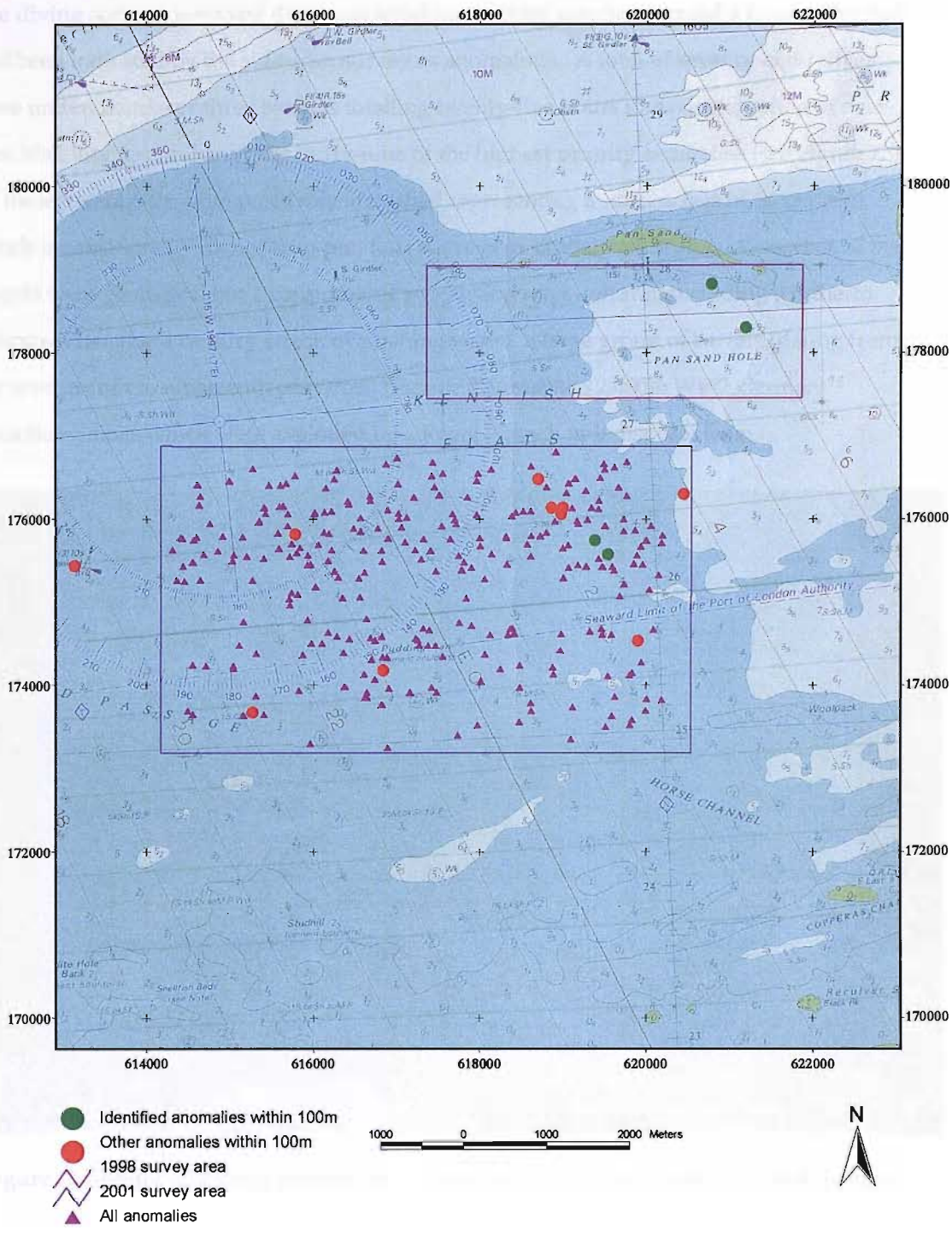


Figure 71 Survey areas indicating target anomalies

are very useful for comparing side-scan co-ordinates to identify possible sites (Figure 70) (see Walsh 2002; Redknap & Fleming 1985: 314).

Diver survey

The diving surveys involved divers undertaking circular searches around a fixed point that had been indicated by the side-scan survey as anomalous. A total of seventy-eight dives were undertaken over three seasons totalling twenty-five hours underwater, often in near-zero visibility, ground-truthing thirty-nine of the highest priority anomalies (see Figure 73). Of these, twenty-six were positively identified representing a success rate of 66 per cent, which is considerably higher than previous surveys in similar conditions. A number of the targets were geological but a considerable proportion were cultural, including a hitherto unknown twentieth century wreck of a fishing vessel, a large group of barrels (dating from the seventeenth to nineteenth centuries) (Figure 72), and two 2,000lb WW2 German parachute mines which were exploded by a Royal Navy bomb disposal team.

Figure 72 Mound of barrels discovered by divers investigating anomaly pictured above

A series of drift dives were undertaken when the current was too strong to conduct circular searches. During one drift dive a solitary sherd of a Drag 31r bowl was discovered (Cat No 1.184), which is the first time in the history of the site that Roman pottery has been recovered from the seabed by a diver. Unfortunately this sherd was uncontextualized, sitting on the surface of the seabed and despite a fingertip search of the surrounding area

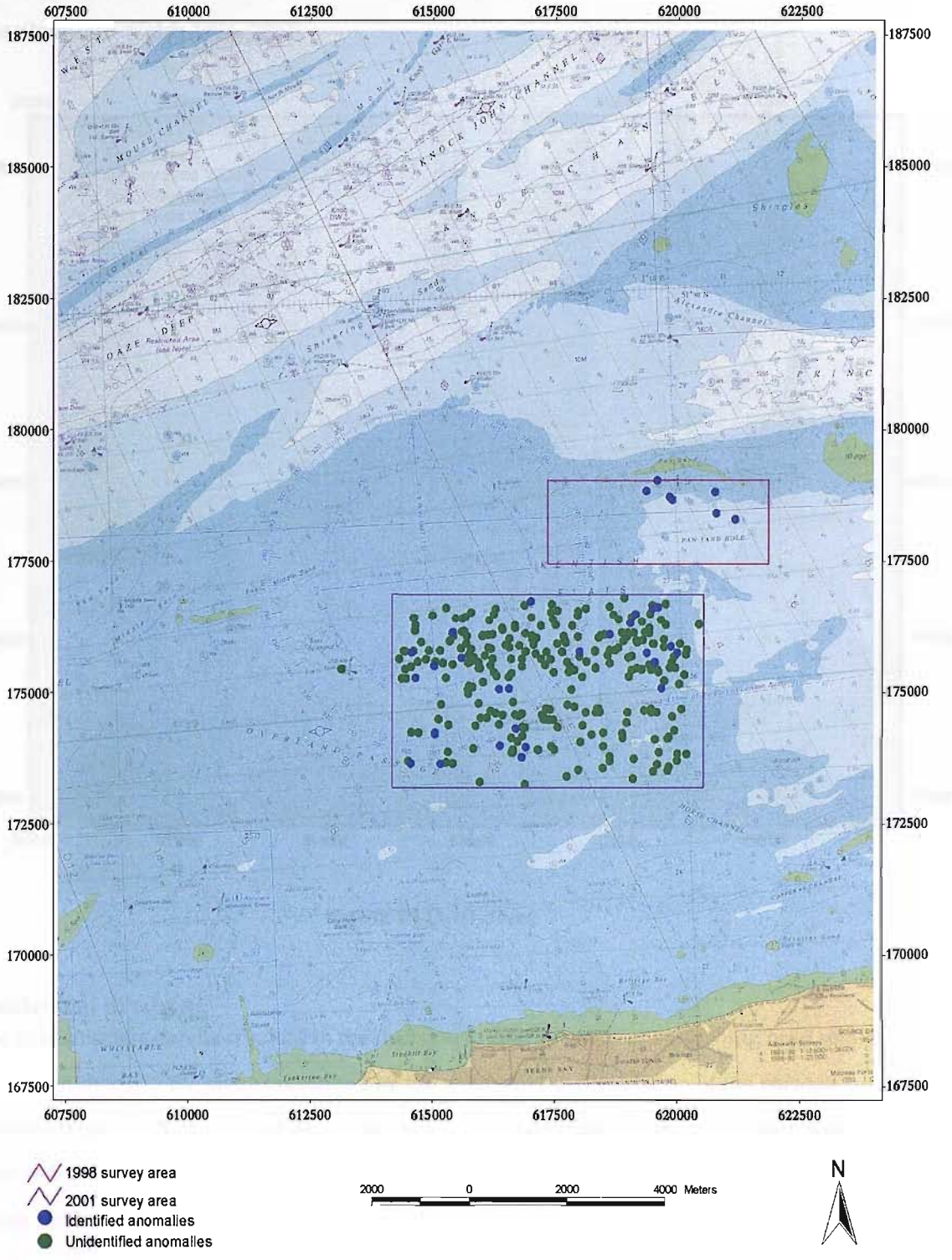


Figure 73 Dived anomalies

no further remains were discovered. The path of these drift dives were plotted using GPS with an accuracy suitable for our needs by recording the co-ordinates at the start and finish of each dive (Figure 74). The drift dive during which the samian ware was recovered has been highlighted. The details of the diver surveys and drift dives have been recorded elsewhere (see Walsh 1998; 2002).

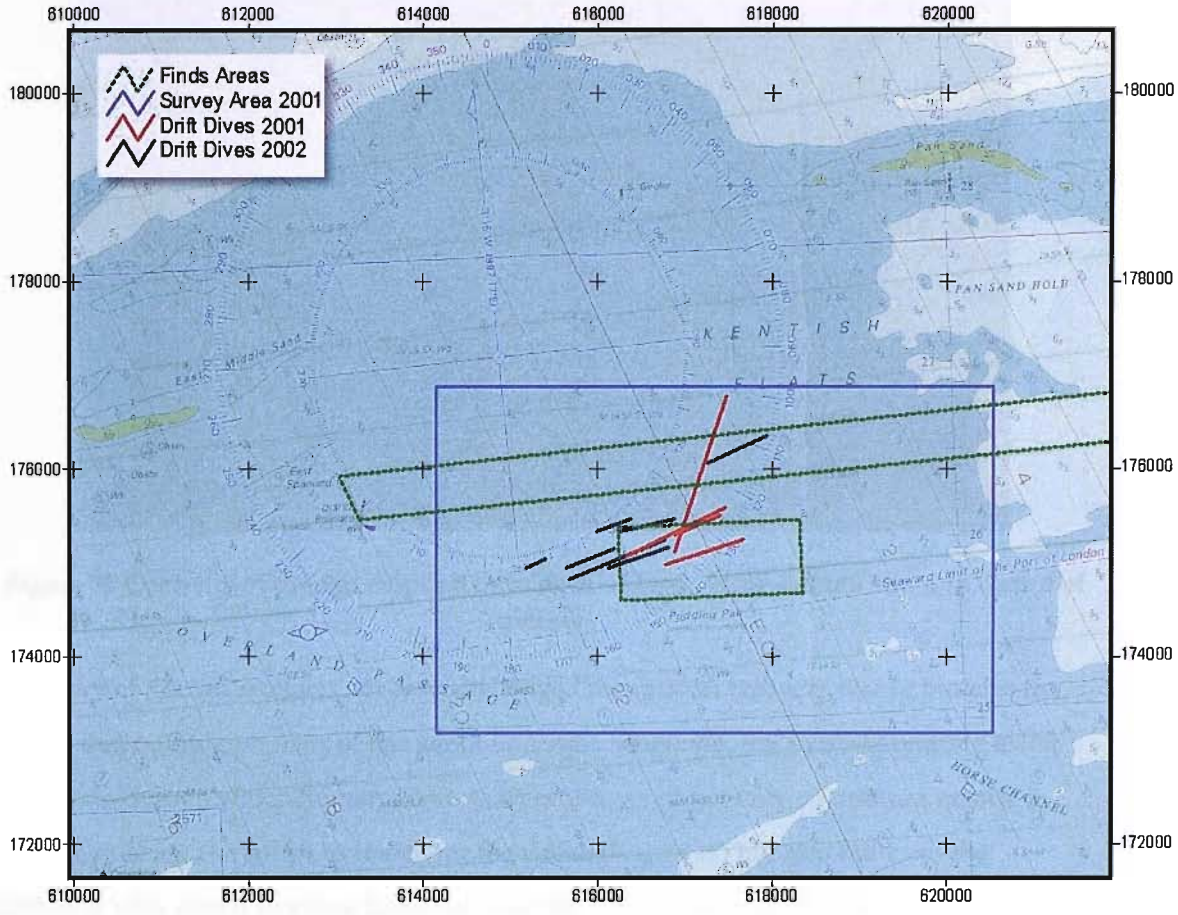


Figure 74 Drift dives

Controlled dredging

The nebulous site details resulted in the decision in 2001 to conduct a watching brief while fishermen dredged the areas prescribed by the results of the digitisation of the various datasets (Figure 77). This practice is condemned in some quarters but the area has been dredged, and Roman pottery recovered with no detectable ill effects on the deposit, for many centuries. The exercise was surprisingly successful as a number of archaeological finds were recovered including a complete Drag form 80 samian vessel (Cat No 1.469), several other large samian fragments (Cat Nos 1.102; 1.144; 1.183), a Roman roof tile

(*imbrex*) (Cat No 2.29) and various other artefacts dating from the eighteenth century to the present day (Figure 76).

Figure 75 Contents of dredge emptied onto deck of boat. Note samian sherd in centre of picture.

Recovery of Roman artefacts not only challenged the cyclical recovery theory but also the notion that nothing remains of the wreck or cargo. Moreover, the accurate plotting using GPS of dredges in which Roman artefacts were recovered not only contributes greatly to reducing the area in which to search for the wreck (Figure 77) but also indicates the difficulty with which working fishermen identify recovered fragments (see Figure 75). The recovery of Roman artefacts appears concentrated in the north of our favoured area although there are too few results to form any definitive conclusions. In order to ascertain whether these results are significant further controlled dredging over a wider area is required to establish whether similar results could be obtained in other areas of the Kentish Flats. The focus so far has been on the location of the source of the later second century samian, although the results of the ADU surveys to the north of Pan Sand should also be utilised.

It must be stressed that this aspect of the work is not presented as a *fait accompli*; this is ongoing research from which we cannot draw categorical conclusions regarding the existence or absence of a shipwreck in a particular location. The survey areas were based on contemporary evidence and were constrained by time, resources and weather

conditions. It is only possible to state that the wreck is likely to exist within the survey area but this cannot be proven conclusively; the problem is that we have a finite resource and

Figure 76 Results from watching brief including samian ware and an *imbrex*

infinite possibilities. Ideally, a wider area would have been surveyed and more controlled dredging would have been conducted to ascertain whether the results presented here are anomalous. By plotting further controlled dredging results any concentration should become immediately apparent. Given perfect conditions much more could have been done but one must adopt a pragmatic approach and work with the available data, which is subject to the prevailing conditions. For obvious reasons the discovery of the source was never a primary aim of this thesis, but is the *raison d'etre* of the associated Roman Shipwrecks Project.

However, it is hoped that one of the outcomes of this thesis will be to highlight both the importance of these sites and the great potential of locating one or more Roman trading vessels in north-west European waters. It should also indicate the tremendous advances that have been achieved in narrowing down the areas in which to search for the sources of material. It is to be hoped that this will translate into further funding so that a variety of additional work can be undertaken. This will include a Chirp survey between Pudding Pan and Pan Sand in order to identify the locations of the palaeo-channels, as well as further extensive controlled dredging.

This new data will then be added to the existing GIS mapping together with additional datasets including topographical information from Admiralty charts, and current and flow charts from the Coastguard Agency. This combined data should provide a better indication of any post-depositional movement. Once this work has been completed and the areas have been more narrowly defined then further use could be made of side-scan sonar and diver survey.

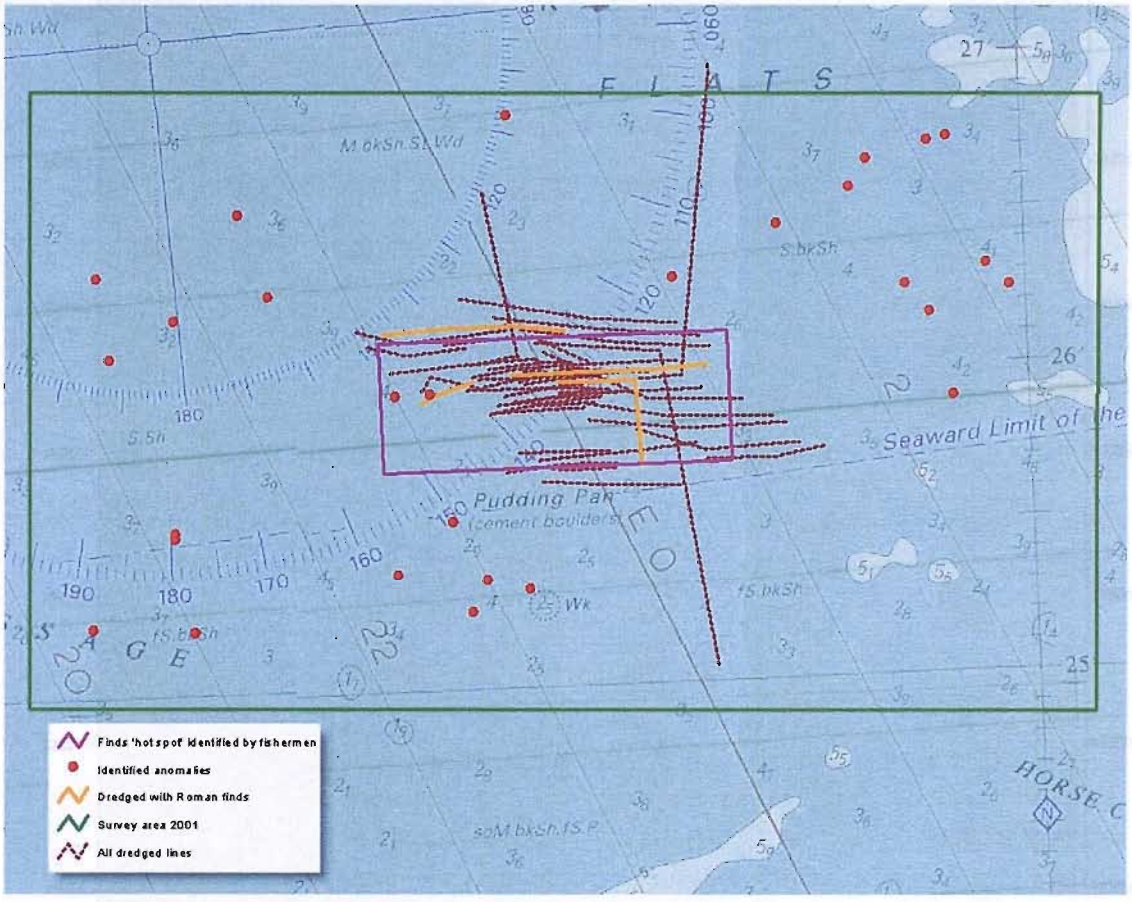


Figure 77 Courses taken by dredge during watching brief

One of the lessons that has been learned to date is that the nature of the seabed in the target area over Pudding Pan complicates and nullifies the use of side scan. The large numbers of small rocks sitting proud of the silt in small scour pits produce a large number of anomalies; considerable resources would be expended investigating each of these targets with the result that a very high proportion are geological. Therefore to continue the side scan survey without re-defining the search area would be a waste of these limited resources.

The fieldwork that has been undertaken at Pan Sand and Pudding Pan has provided a detailed understanding of both the optimum working conditions and a detailed knowledge

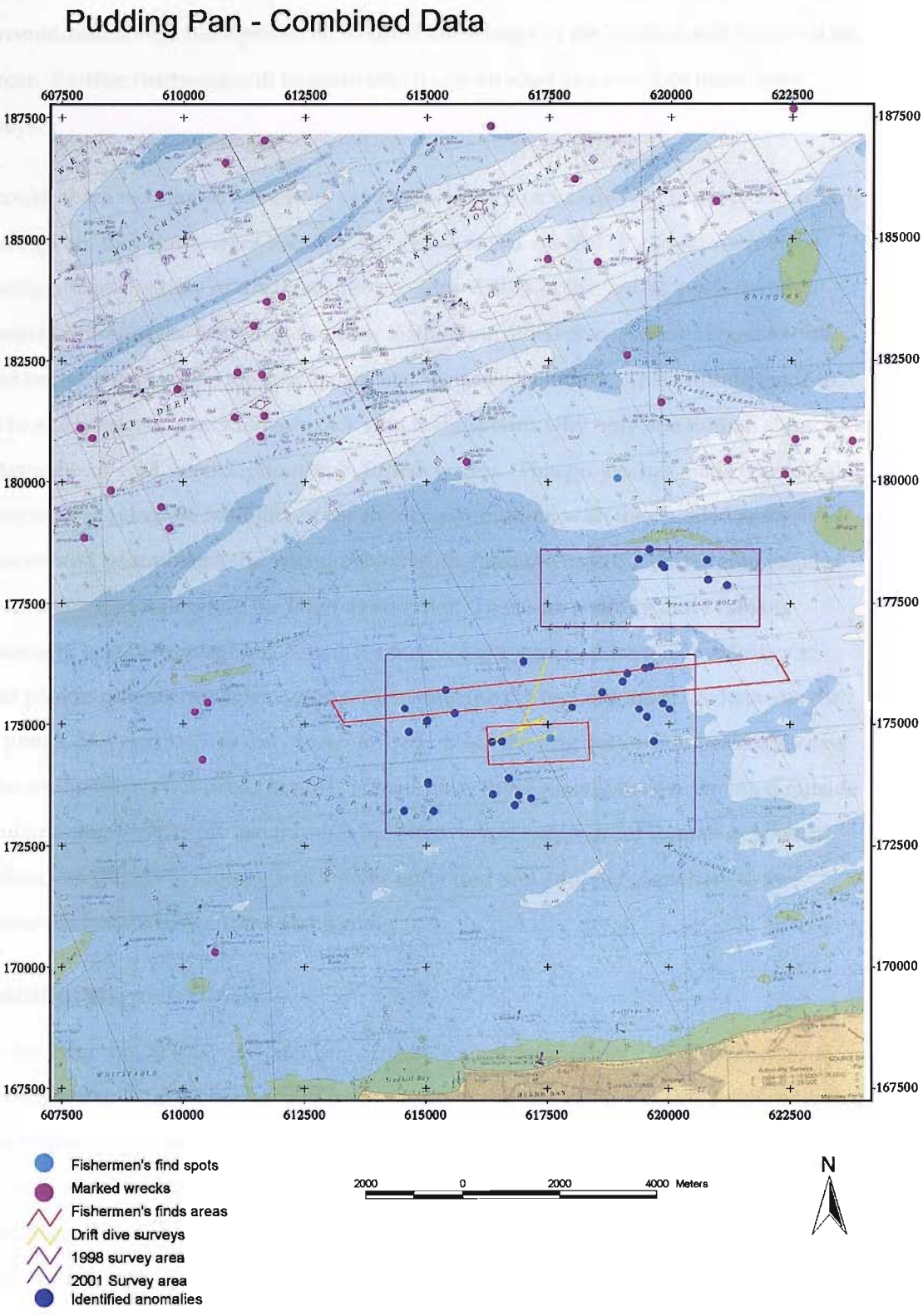


Figure 78 Combined datasets

of the seabed topography in the area. In addition, interviews with fishermen and the surveys conducted to date coupled with analysis of previous investigations and of the recovered assemblage have produced detailed knowledge of the location and nature of the sources. Further fieldwork will be more effectively directed as a result of these initial surveys.

Although these techniques have been used previously on a whole variety of sites including Pudding Pan, they have never been used in such a sustained and systematic manner, collating a whole variety of disparate information. Critics of the project point to the repeated failures of the last three centuries insinuating either that nothing remains to be found or that the search is too speculative and therefore pointless. This attitude tends to lead to a concentration on known wreck sites and explains why only one Roman shipwreck has been discovered, serendipitously, in British waters. This project has made considerable advances in proving the fallibility of the former assumption, with the detailed analysis of the recovered assemblage; the considerable results from the controlled dredging suggest that future results will refute the latter assumption. To use an analogy that I think is particularly pertinent astronomers had, for many years, searched for a methodology to detect planets outside our solar system. By measuring the oscillations of the host star the first planet, 51 Pegasus, was discovered in 1995. Since the origination and proven success of this methodology hundreds of other planets have subsequently been discovered outside our solar system. Once proven through the discovery of a significant Roman deposit at Pudding Pan this methodology will then be embraced and adopted elsewhere to the tremendous benefit of maritime archaeology.

Conclusion

It is now clear that at least one later first century source dating from *c* 65-85 is situated to the north of Pan Sand while the later second century source dating from *c* 175-195 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 first century material represents a shipwreck or jettisoned cargo. Similarly, there is insufficient evidence regarding the nature and whereabouts of the third century source.

In contrast, the uniform wear and evidence for inverted stacking in separate packaging of the later second century 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, rather than remaining buried, decorated bowls 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 emphasises the need to identify the area in which the wreck lies, which has been considerably narrowed by the current ongoing study. The following chapter will explore the significance of these findings through comparison of the recovered assemblage with similar assemblages that, unlike this consignment, 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 this pottery on a number of levels particularly, in the context of Pudding Pan, its transportation and distribution networks, but also its social and economic context (Willis 1997b: 38; Hartley 1969: 235). 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 (Willis 1997b: 42).

The recently completed 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, which stresses the importance of the assemblages from the Kentish Flats. The importance of the significant size of the main Pudding Pan assemblage of *c* 470 samian vessels is accentuated by the fact that the Castleford assemblage of *c* 529 vessels is considered notable (Willis 2005: 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 one hundred samian sherds, representing on average one stamp per twenty-six vessels (Willis 2005: 5.3.1). At Pudding Pan there is one stamp for every 1.16 sherds which is more striking given that unstamped forms 35 and 36 comprise *c* 15 per cent of the assemblage.

This chapter will place Pudding Pan in its context as a significant link in the samian supply chain, by comparing the recovered assemblage with those from end-user sites that, unlike the Pudding Pan consignment, reached Britain. While these comparisons are useful for assessing the character of the Pudding Pan assemblage, the evidence from end-user sites is limited in terms of its relation to trade. Therefore, comparisons with similar assemblages from sites more directly related to trade should not only shed more light on the nature and

composition of the original Pudding Pan consignment but should also reveal more about the transportation and distribution of samian. These comparisons highlight the importance and tremendous potential of the main Pudding Pan assemblage whose maritime context and close proximity to the mechanisms of samian transportation and distribution provide a unique insight into this cross-Channel trade.

If, as the evidence presented here suggests, the Pudding Pan assemblage does represent a bulk consignment of plain samian wares then it undermines conventional thinking on the trade and distribution of samian. 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 to have been of too low value to warrant transportation in its own right (Middleton 1979; 1980; King 1981: 69; 74 fn. 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 cheaper than their decorated counterparts, exacerbates 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). Is it possible to determine beyond reasonable doubt that the Pudding Pan assemblage genuinely represents a bulk consignment of plain samian wares thereby undermining the current orthodoxy? If Pudding Pan does represent a bulk consignment, does it represent the norm in samian distribution rather than a one-off anomalous cargo that was 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 of samian consignments crossing the Channel in the later second century? It is important not to over-emphasize the economic importance of samian from the abundance of samian potteries or its ubiquity in the archaeological record as the trade in more ephemeral commodities 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 deposits from refuse sites. Were goods that were made together, fired, transported, sold and used together? How do we explain the absence of decorated wares in the Pudding Pan assemblage? Were plain and decorated wares normally transported separately as the

Pudding Pan assemblage seems to indicate? 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). Although this evidence emphasises the more common combination of plain and decorated wares, it in no way proves unequivocally that plain and decorated wares were shipped in combination. 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 north-west 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. 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 so, 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?

Does this evidence confirm or undermine the notion that the original Pudding Pan shipment comprised a bulk consignment of plain samian wares? If confirmed, can we determine the likely destination of this consignment? Given that an unknown proportion of the original consignment remains buried can we characterize the Pudding Pan assemblage sufficiently to compare it with particular types of site, which might indicate the likely recipients of this particular cargo? Alternatively, evidence of plain only samian deposits may display consistent characteristics, which may 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? What impact does this analysis have on our understanding of the trade and distribution of samian wares? If bulk

consignments were the norm rather that the exception why have we 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 re-appraisal (Rhodes 1989: 44). The following chapter 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 subsidiary 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 110 (Webster 1996: 2). The transportation of heavy, bulky goods south for subsequent distribution further north seems counter-intuitive 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 forty 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 Dr 20 *amphorae* in the first century (Marsh 1981: 202; 230 n.6). Calculations of the relative costs of shipping Lezoux samian to Britain based on Diocletian's Price Edict support this hypothesis producing the following comparative costs: via the Loire 8, the Seine 8, the Somme 10, and the Rhine 14.5 (King 1981), but this takes no account of the relative risks involved. The composition of the Pudding Pan cargo that 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 commercial financiers (*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 middle-men (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, is somewhat ambiguous. It would appear to suggest that if bulk shipments were the norm then either there was an exceptionally large pool of stamps in use at the time (Millett 1987: 96 fn. 9), or 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 organisations 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 transhipment presented ample opportunities for the dispersal of an individual workshop's output prior to its deposition in the archaeological record. Thus, the heterogeneity of an assemblage may reflect either the composition of the pottery kiln that might have contained the produce of many potters, or the manner in which it 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 homogenous groups, the mixing of different potters' work could have occurred at the entrepôt/dockside, warehouse or pottery shop such that the cohesion of a consignment was dissipated each time the shipment was unpacked and resold.

This 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 (ie from wrecks, warehouses,

shops etc) has shown that the average number 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).

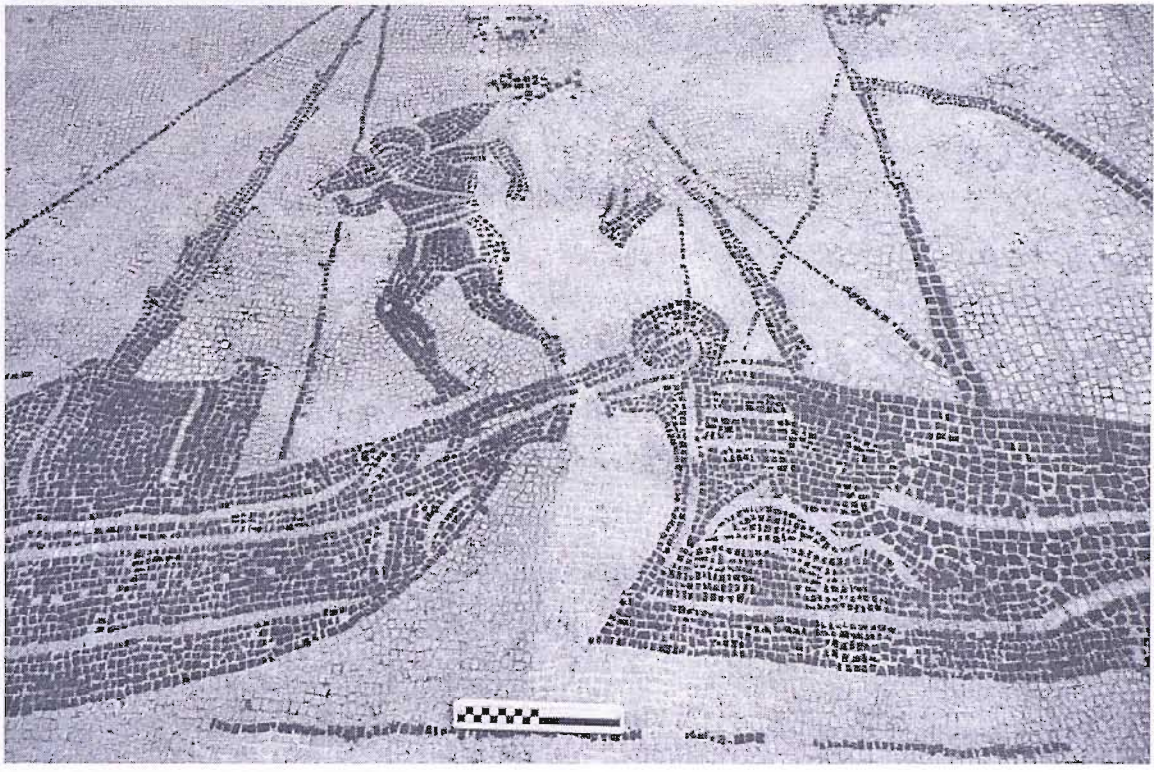


Figure 79 Mosaic depicting transhipment from the Piazzale della Corporazione

In 1989, the Pudding Pan assemblage included 219 stamps from thirty-seven 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). 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.

Thus the assemblage is more closely connected to the source of samian supply than either Wroxeter or Castleford and therefore must have passed through fewer exchange nodes so was less susceptible to contamination. However, this anomaly can be explained as 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 430 stamps representing forty-five potters producing an average of 9.6 stamps per potter, which is 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 (1989: 48) assertion that a 'complete absence of east Gaulish samian' from Pudding Pan and from the Corbridge shop 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 ARS 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.

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 previous chapter that decorated wares were deliberately excluded and replaced by large plain samian bowls. Might this have been a common practice in samian supply, with separate bulk shipments of plain and decorated wares regularly crossing the Channel? This is difficult to corroborate, as Pudding Pan is unique in north-west 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 north-west 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. The reputation, quality and popularity of red-gloss ware began to wane at the end of the first century in deference to metal and crystal vessels (Evans 1981: 520) which may have resulted in a concentration on plain over decorated forms to supply a new social level (Marsh 1981: 208). Ancient writers are somewhat ambivalent towards ceramic tableware as a substitute for silver or bronze. On the one hand it indicates poverty or frugality, on the other it avoids ostentation and symbolizes virtue and honest simplicity. For example, Juvenal (Satire III.168) contrasted the affectation and expense in Rome of refusing to eat off pottery dishes with the simple life of the country where pottery was in everyday use (Evans 1981: 520). With the rise of Christianity came the notion of simple communal eating; Clement of Alexandria urged the use of simple vessels of clay rather than gold or silver, and the eschewing of luxuries in general (Hawthorne 1997: 34). Thus, there may have been less demand for decorated bowls in Britain.

However, although plain samian deposits are known (see below) they are rare and cannot support this hypothesis. Moreover, supply figures seem to reflect the output of kilns rather than the particular demands of the consumer in Britain. For example, the supply of

decorated wares from Lezoux reached a peak *c* 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 implies that merchants filled their ships with what was available rather than with what, or what they thought, the consumer 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 (see above; Smith 1907: 289; *contra* Haverfield 1909-11: 117; Hartley 1969: 239). Alternatively, samian output may have been so vast that shipments comprised whatever vessels were available at any particular time whether plain or decorated wares. There is little or no evidence to suggest that producers manufactured, or that traders transported, vessels to specific orders. Consequently, to discuss the distribution of samian in terms of supply and demand is to assign a level of sophistication that is inappropriate (see 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 first century BC. Before 215BC contracts to supply the army were sold by auction to the lowest bidder who was responsible for buying the goods and then 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 sub-contracted to supply the goods. Pottery is never mentioned in army supplies but perhaps this is because, like salt, it was of low value (Evans 1981: 528).

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, with fluctuations throughout the mid-first to the end of the second century. For this reason samian, like coins, must be calibrated to compensate for fluctuations in supply before it can be used to indicate site occupation and status. So the variations in the quantity of samian at different periods, which is common to British and continental sites, reflects fluctuations in supply rather than consumption (Marsh 1981). 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 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 *c* 10,000 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 second century (see Hartley 1969: 238)? However, somewhat perversely, 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 greatest supply, would increase the risk of wrecking. 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 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 organised 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 evidence from Mediterranean wreck sites must represent opportunist trade by merchants eager to fill available spaces on their vessels. Thus in the absence of other corroboratory or contradictory evidence from north-west Europe it seems sensible to assume that consignments like Pudding Pan were commonplace. Therefore, the absence of decorated wares is more likely a result of supply factors, possibly but not necessarily a shortage, rather than specific demands of the consumer in Britain. On this evidence it appears safe to assume 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 7,414 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 (Willis 2005: 7.3.1-10; Millett 1987: 93).

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 (see Figure 80). At major civil sites the average figure is around 26 per cent, while decorated wares represent *c* 17-20 per cent on the majority of Romano-British sites including 'small towns', religious foci, roadside settlements and rural sites (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 these different consumers. For example, dishes/platters are the most frequent of all types among military sites (*c* 40 per cent), with decorated bowls being the second most frequent category (27 per cent) and cups 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 Figure 80).

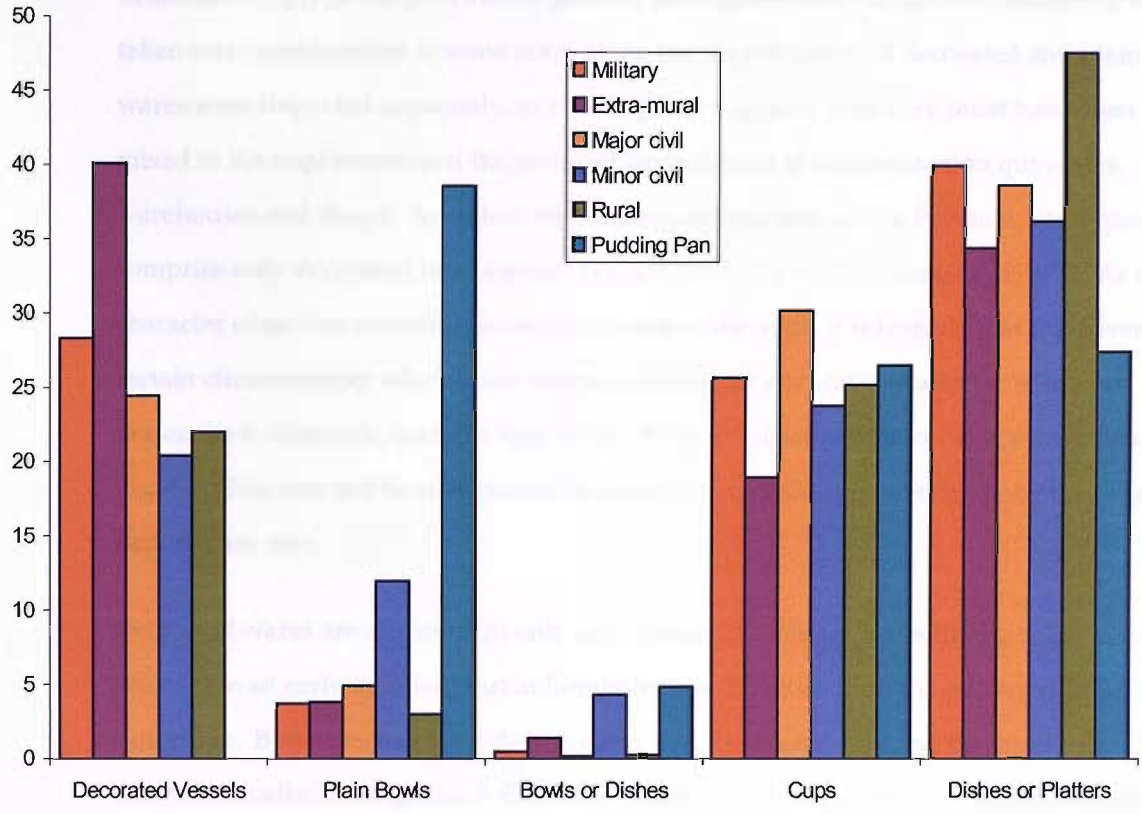


Figure 80 The characteristics of samian assemblages from various site types (after Willis 2005)

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 (Willis 2005: 6.3; 7.3.1; King 1981: 69; cf Middleton 1979: 92).

Thus Pudding Pan seems to represent the first known example of a bulk shipment of samian wares not only in north-west Europe but throughout the Empire. The recognisably varied characteristics of samian assemblages at different site-types suggests 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 Pudding Pan suggests, then they must have been mixed to the requirements of the end-user upon arrival at the destination quaysides, warehouses and shops. As stated, the samian consignment on the Plavac A site appears to comprise only decorated terra sigillata (Parker 1992: 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 are 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, and the other from the pottery shop at Corbridge. Both sites had been destroyed by fire, the former *c* 69 and the latter *c* 180. The burned out cellar at Burghöfe in Germany contained the fragments of *c* 300 plain south Gaulish samian vessels dating from the Claudian-Domitianic period. Given the relative rarity of unused samian deposits the existence of two plain ware assemblages with close military connections seems significant. If these unusual deposits so closely associated with the trade in samian wares contain no decorated wares, might this 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?

As Haverfield (1909-11: 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, whether this implies that the Pudding Pan plain ware assemblage was destined for a military market on the northern frontier or the entrepôt of London remains open to question.

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 first to third centuries (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 its distribution. For example, *mortaria* from the region of Verulamium are rarely found in areas such as the south and east coasts that probably benefited from direct supply primarily for the fleet rather than from London. The eastern supply route that persisted through the second century may have been responsible for the samian and the *mortaria* from Colchester found at the Castleford pottery shop. Evidence from Corbridge (Stansfield & Simpson 1958: xlix) and from York (Dickinson & 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 first century. From the early second century, new *mortaria* kilns at Mancetter and Hartshill (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).

While the samian supply to the province seems to have been prescribed by what was available rather than what was required, the varied proportions of plain and decorated wares usually found at consumer sites implies 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 also 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 quaysides, warehouses and shops. These sites, yielding large quantities of unused samian ware that has 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 as that of Pudding Pan (for a summary of similar continental sites see Rhodes 1989: 50ff).

At least thirty-seven deposits of unused pottery have been discovered on thirty-three sites in north-west Europe marking various distribution points from the principal centres of manufacture, primarily in Gaul (see Table 16; after Rhodes 1989: 44). These deposits range in date from the late first century BC to the mid-fourth century with the bulk of the deposits dating equally from the second half of the first and the second half of the second centuries (see Figure 81). 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 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 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. Detailed 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).

No	Site	Date	Type	Contents
1	Loire mouth, France	M 2nd C	Wreck	Lezoux TS
2	Vichy (Allier), France	100-200	Wreck	Lezoux TS
3	Arles, France	L 1st C	Quayside	La Grauf TS
4	Bitterne, England	L 1st C	Quayside	SG samian
5	La Nautique, France	41-69	Quayside	La Grauf TS
6	New Fresh Wharf I, Eng.	170-80	Quayside	Lezoux samian
7	New Fresh Wharf II, Eng.	200-50	Quayside	EG samian
8	Gauting I, Germany	pre-139	Warehouse	SG TS
9	Gauting II, Germany	150-63	Warehouse	CG TS
10	Regis House, England	80-125	Warehouse	SG & CG samian
11	Untersechenz I, Switz.	M-L 1st C	Warehouse	EG TS
12	Untersechenz II, Switz.	1st C	Warehouse	EG TS
13	Ansedonia, Italy	40-5	Shop/booth	Arretine
14	Bellheim, Germany	pre-M 4th C	Shop/booth	Coarsewares
15	Bregenz, Austria	140-55	Shop/booth	Lezoux TS
16	Budapest, Hungary	pre-178	Shop/booth	Lez & Rheinz TS
17	Burghöfe, Germany	41-69	Shop/booth	SG TS
18	Castleford, England	140-50	Shop/booth	Lezoux
19	Colchester I, England	50-5	Shop/booth	SG TS
20	Colchester II, England	pre-61	Shop/booth	*Mortaria*, flagons
21	Corbridge, England	150-80	Shop/booth	Lezoux
22	Kempten, Germany	L 160s	Shop/booth	Rheinz TS
23	Magdalensberg, Austria	E 1st C	Shop/booth	Arretine
24	Mainz, Germany	11BC-20AD	Shop/booth	Arretine
25	St Albans, England	c 80	Shop/booth	SG samian
26	Szombathely, Hungary	??	Shop/booth	TS
27	Winchester, England	L 2nd C	Shop/booth	Lezoux
28	Wroxeter, England	165-75	Shop/booth	Lez & Rheinz samian
29	Alchester, England	150-65	Shop break.	Lezoux samian
30	Autun, France	120-40	Shop break.	Lezoux TS & CGBS
31	Zugmantel, Germany	L 2nd C	Shop break.	Rheinz. TS
32	Cirencester, England	60-5	Fort discard	La Grauf. samian
33	Inchtuthil, England	83-7	Fort discard	Samian
34	Le Langon, France	L 1st C	Other	Montans TS, c/wares
35	St Katherine Coleman	E 2nd C	Other	Montans samian
36	Nijmegen, Netherlands	65-80	Other	Arretine & SG TS
37	Pompeii, Italy	79	Other	SG TS, Italian lamps

Table 16 Unused samian deposits found outside the Mediterranean (after Rhodes 1989)

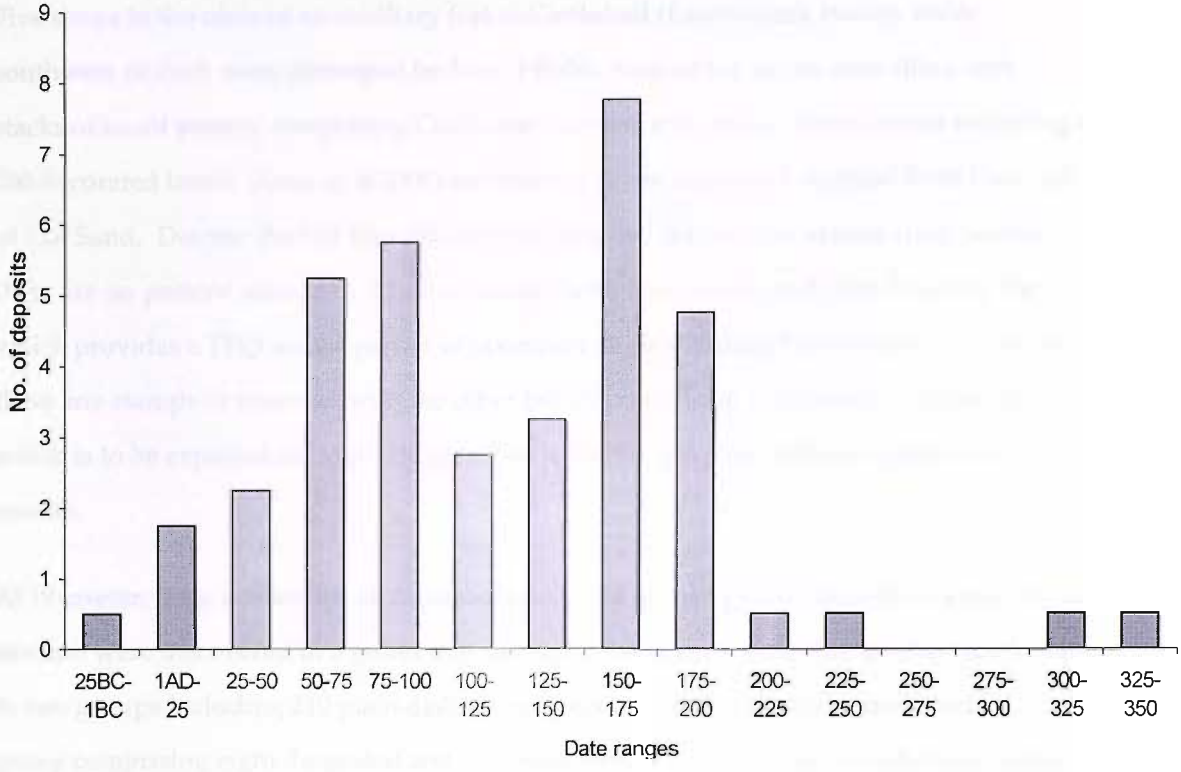


Figure 81 General date ranges of unused samian deposits

Two deposits of south Gaulish samian at Colchester were interpreted as the contents of two pottery shops dating *c* 50-55. The samian was stacked in inverted groups and one deposit was covered in melted glass indicating that glass objects were also being sold (Hull 1958: 153-5). 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* 120-125. The *c* 600 vessels came primarily from Les Martres 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. Other than 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), twenty miles southwest of York were destroyed by fire *c* 140-50. Four of the shops were filled with stacks of burnt pottery comprising Colchester *mortaria* and samian from Lezoux including *c* 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 TPQ for the period of operation of the Pudding Pan potters. Neither are there any stamps in common with the other two deposits from Colchester or Regis House, which is to be expected as both are significantly earlier and 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 including 210 plain dishes from Lezoux and Rheinzabern and a second group 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 (Wacher 1974: 364; *contra* Atkinson 1942: 129), as posited at Pompeii (see Atkinson 1914) and at Pudding Pan. Seventeen of the Mancetter *moriaria* from the same deposit bore the stamp of the potter Sennius and date from *c* 165-175. A pile of one hundred stone bars, possibly whetstones, was also found lying as though they had been packed in a box. A recent re-examination of the petrology of these hones 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 (see Marsden 1990). The plain wares were limited to a few forms including forms 31, 33, 35, 36, and 38 dating from the mid-second century so slightly earlier than the main Pudding Pan assemblage.

At Corbridge, a store containing pottery, *mortaria* and samian ware closely resembling that from Pudding Pan and the Wroxeter stalls, was destroyed by fire *c* 180 (Rhodes 1989: 53; *contra* Haverfield 1909-11: 114; Brassington 1975: 75; Smith 1909: 410). The pottery appears to have fallen from shelves where it had been arranged in three groups, by far the largest comprised *mortaria*, the second was composed of coloured coarse wares and the third included approximately thirty plain samian wares from Lezoux primarily of Drag forms 31 and 33 with a few form 38 bowls (Haverfield 1909-11: 115; Rhodes 1989: 53; Hartley 1972: 46). There are a number of common features between Corbridge, Pudding Pan and the

Wroxeter stalls which all comprise a few common forms with a few samples of other forms. Like Pudding Pan, the Corbridge shop contained only plain wares with some stamps 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 thirty 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.

In contrast, 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 form 31 bowls, suggests that this unused samian formed part of a single consignment dating within the period c 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 third century when relatively little samian is known to have been imported into Britain thus providing important evidence for this late trade. This deposit might be contemporary with the construction of the quay as evidence suggests that the samian formed part of a deliberate infilling of the third century quay during the construction phase.

This samian has been described as new and unused due to two diagnostic features; sand and clay particles from the kiln stacking still adhering to the base, and red slip covering the trituration grits on the Drag 45 *mortaria* (Bird 1986). Neither diagnostic can be applied to the Pudding Pan assemblage as the footrings have borne the brunt 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 at Shadwell, which includes a number of the same potters. In fact, the decorated east Gaulish ware equates to 40 per cent of the total decorated ware from all east Gaulish potteries in the Museum of London collection (see Bird 1986: 139 Fig. 78). 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 first century south Gaulish samian recovered from waterfront excavations at Bitterne Manor, Bitterne in the late 1930s (Rhodes 1989: 51). In addition, a deposit of thirty-seven unused samian vessels from Verulamium Insula XIV has been re-interpreted as stock from a stall beside the street (Millett 1987: 104). Given the proximity of the waterfront it has been speculated that the late second-early third 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 Boudiccan 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 (Rhodes 1986: 200; Hull 1958: 153-8) 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 bronze-work (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 seems probable that these items were transported alongside samian and provides some indication of items that 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 that 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 & 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 (see Table 17). 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, Saturninus and Paullus, exported a range of at least five different forms all of which included forms 31, 31r, 33, and 79. The four potters that produced at least four forms, Cintus, Maccalus, Primanus, and Severianus 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.

Potter Form	31	33	31r	38	79	79r	80	Lud Tf	No of forms
ATILIANI. M	2	4	0	1	17				5
PAVLLI. M	0	0	1	0	8				5
CINTVS. M	0	12	3	3					4
MACCALI. M	4	0	1	1					4
SATVRNINI	18	4	21		1	1			5
PRIMANI	0	0	3				1		4
MAIORIS. M	1	0	7						3
MATERNNI. M	1	20	2						3
SEVERIANI. O	0	7		0		1			4
AESTIVI. M	18	0		0					3
ALBVCIANI	13	0		0					3
IVLLINI. M	0	0		2					3
CARATILLI. M	0	0			11				3
QVINTI. M	2	9			1				3
ARICI. MA	3	11							2
CALETI. M	13	14							2
DECMI. MA	3	19							2
GIPPI. M	1	0							2
MATERNI	1	7							2
PATTO. F	6	3							2
GENITOR	1		1						2
MARTINI. M	0				3				2
IVSTI. MA		0	4						2
MACRIANI		0	1	0					3
MAINACNI		3	11		0				3
SEXTI. MA		0		3	0				3
NAMILIANI		6		1					2
SACRILLI. M		0			4				2
MARCI			2		0				2
BELSA.ARVI			0			3			2
CATIANVS					2		7	2	3

Table 17 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 found at Pudding Pan.

Relatively few of the potters are represented by their full repertoire of forms in the assemblage recovered to date from Pudding Pan. For example, Paullus is known to have exported at least five forms to Britain but appears on only two forms at Pudding Pan. Similarly, Primanus and Severianus appear on two of their four known forms and Aestivus, Albucianus, and Caratillus 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 at least these types remain buried. In addition, fourteen 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 Aricus, Atilianus, Caletus, Caratillus,

Cintusmus, Gaius, Iullinus, Iustus, Marcus, Mascellius, Maternus, Mercator, Namilianus, Paullus, Primanus, Sacrillus Saturninus, and Sextus (Smith 1907; Stanfield & Simpson 1958: 293; contra Haverfield 1909-11: 116). Might this suggest that we should expect to find the decorated wares of these potter's amongst this consignment? It is possible but there is no evidence to suggest that each consignment contained the full repertoire of each potter and, as stated, plain bowls appear to have been substituted for decorated bowls in this instance.

This evidence might provide some clues as to what remains buried but equally 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 appears to confirm a somewhat erratic production with numbers of vessels fired in one kiln ranging from thirty '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).

Therefore there seems no reason 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. However, it seems unlikely that a consignment would contain solitary examples of some potters' products.

Over two hundred 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 specialised in certain forms and the order in which the vessels are listed appears to reflect the way in which the kilns were loaded. 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

utilise several different kiln operators in order to have their entire range of products fired (Polak 1998; King 1980). Consequently, plain and decorated wares may well have been fired separately by kiln operators who specialised 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 may 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 (Dickinson and Hartley 2000; Millett 1993). Thus, even lists of potters from samian assemblages from adjacent areas of forts and towns are unlikely to display similarity (Willis 2005: 10.3).

	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	3.3 (9.9)	8.6 (16.8)
Forts	4.5 (11.5)	7.5 (8.5)
Corbridge	3.8 (12.7)	7.9 (13.7)
Silchester	5.5 (10.5)	4.6 (13.7)
Wroxeter	5.5 (13.9)	5.2 (15.7)
Leicester		

Table 18 Percentage of dies in common and, in parentheses, other dies of the same potters (after Hartley 1972: 27 Table II)

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, 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' (see Table 18). 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 emphasises the broad distribution of the products of the Pudding Pan potters. Moreover, this must provide some

Site	Wroxeter *c* 165-75	New Fresh Wharf *c* 170-80	Corbridge *c* 180
Aestivus			X
Albucianus		X	
Aricus	X		
Asiaticus			
Atilianus		X	
Atrucianus			
Belsa Arve...		X	
Gaius			
Caletus		X	
Campanio			
Caratillus			
Casurius			
Catianus	X		
Cintusmus		X	
Cracinus			
Crispinus			
Dattus			
Doviiccus			
Firminus			
Genitor		X	X
Gippus		X	
Iullinus	X	X	
Iustus	X	X	
Maccalus		X	
Macrianus	X	X	X
Mainacnus			
Maior		X	
Marcus	X	X	X
Martinus		X	
Mascellio		X	
Maternus	X		X
Maternianus		X	
Mercator		X	
Namilianus		X	
Pattus			
Paullus	X	X	
Primanus	X	X	
Quintus		X	
Sacrillus		X	
Saturius			
Saturninus		X	X
Severianus		X	
Sextus			
Vitalis		X	
Total	9	25	6
Percentage	20%	57%	14%

Table 19 Comparison of stamps from Pudding Pan with those from Wroxeter, New Fresh Wharf and Corbridge

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 Pudding Pan assemblage the number of potters from Pudding Pan in common with Corbridge and Wroxeter have increased whilst comparison with the potters from New Fresh Wharf produces a quite remarkable result (Table 19). It is regretable that the corpus of samian stamps has still not been published and is therefore not widely available in order to cross-reference specific dies from Pudding Pan with those from other sites (see Millett 1993: 416). However, 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 twenty-five potters in common representing 57 per cent of the group found to date at Pudding Pan (see Bird 1986: 140; 146 fn. 3). This must provide the strongest indication of the likely destination of the Pudding Pan consignment and emphasises 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 second century thus implying a long working association between them. The higher than average proportions of potters' stamps and dies in common also highlights the close contemporeneity of these sites, particularly the New Fresh Wharf deposit, which focusses the date of the Pudding Pan wreck still further. We have previously established that the deposition occurred between 175 and 195 but the extraordinary similarity with the New Fresh Wharf deposit dated c 170 to 180 suggests that the sinking occurred towards the earlier period of this range.

If the sinking did occur later than it implies a close working relationship between these potters extending over a considerable number of years. Moreover, it suggests that a not dissimilar consignment from that lost at Pudding Pan reached its final destination. This not only implies an established trading network thus providing the best evidence yet for the likely destination of the Pudding Pan shipment but also provides clues regarding the composition of the original consignment. Future discoveries from Pudding Pan may well include more products made by potters represented at New Fresh Wharf (see 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 number of stamps of different potters. For example, there are relatively large numbers of stamps of potters such as Saturninus (forty-five stamps), Caletus (twenty-seven stamps), and Atilianus (twenty-four stamps), whereas twelve potters are each represented by only a single stamp. Of 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. It would also suggest that the later second century New Fresh Wharf deposit is indeed that of a single consignment (Bird 1986: 142) rather than debris from disused warehouses (Rhodes 1986: 203).

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 unoccupied at this time (Hartley 1972: 29) (see Figure 82). This pattern of distribution is based on forty-six dies (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 tended to be distributed to sites within easy reach of ports on the east coast rather than those inland or in the west (Hartley 1972: 23).

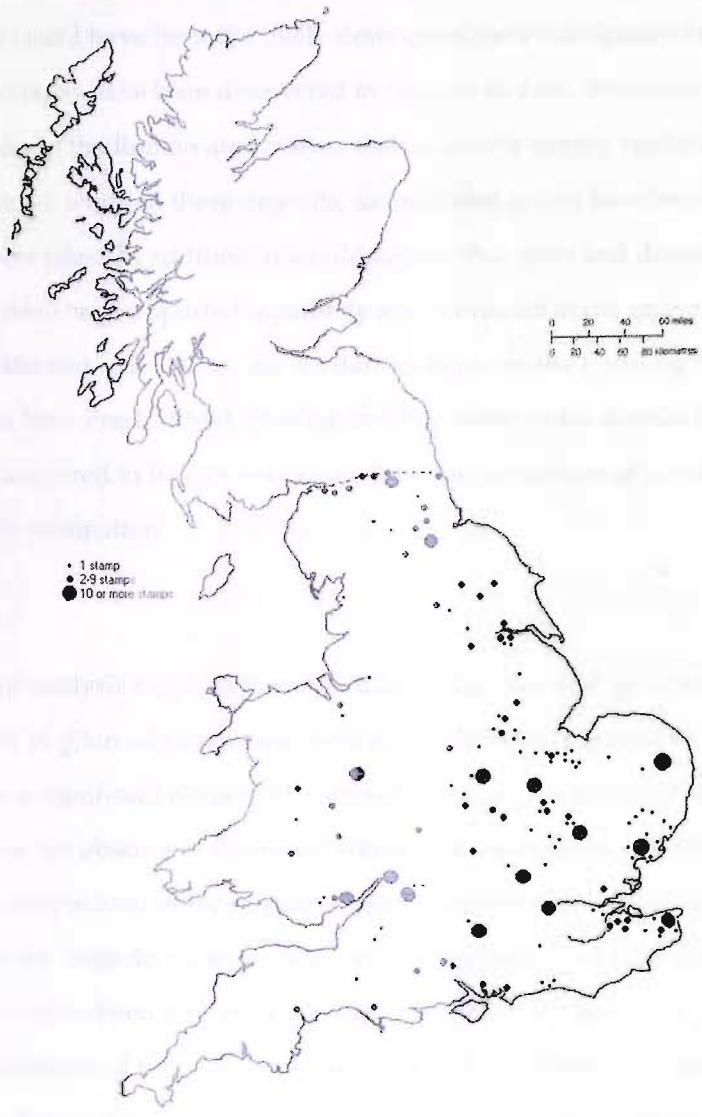


Figure 82 The British distribution of stamps found in the Pudding Pan assemblage. Note the complete absence of stamps north of Hadrian's Wall (after Hartley 1972: 28 Fig. 2B)

Rhodes (1989: 50) suggestion that the 'obvious contender' as the destination port of the Pudding Pan ship was Reculver seems unlikely for two reasons. Firstly, the dates are incompatible; the main wreck site dates from *c* 175-195 while Reculver is thought to have been built *c* 210-235 (Pearson 2002). Secondly, the likely site of the 'wreck' appears to indicate that the ship had 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 passing through the Wantsum channel could have lost control and been driven past Reculver, sited as it was at the northern end of this channel.

The absence of decorated wares in deposits at Burghöfe and Corbridge suggests the northern frontier could have been the likely destination for a consignment of plain wares as no similar assemblages have been discovered in London to date. However, as stated the hierarchical nature of the Roman army rather than a specific supply could account for the absence of decorated wares in these deposits, as decorated wares have been discovered in other areas of these sites. In addition, it would appear that plain and decorated samian wares may well have been imported separately and combined at the quayside to the requirements of the end-user. 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 must indicate 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 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.

Thus, it is perfectly plausible that there was a regular and substantial cross-Channel trade in bulk consignments of plain and decorated samian wares that 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 well represent the norm in the cross-Channel mass transportation of plain samian wares that has hitherto remained unrecognised. 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 common to both sites must identify London as the final 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. But if this is the case, what are these factors that might explain the overwhelming misconception that has arisen from other related evidence? The most obvious one is the almost complete absence of evidence for samian transportation in north-west 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 only transported 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 be justifiably 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 of 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 third and fourth centuries 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 north-west European waters is even more seriously lacking as, besides Pudding Pan, no significant quantities of samian have been found on any other 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 non-amphora shipwreck data.

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)

A previous chapter established the paucity of wreck sites from around the empire that contained significant quantities of samian, terra sigillata or equivalent wares. The few sites that have been discovered, account for a tiny fraction of the acknowledged massive trade in these tablewares. As stated, of the *c* 1,200 wrecks sites catalogued by Parker (1992a) only forty sites contained TS but only six of these, besides Pudding Pan, contained sufficient quantities of terra sigillata (TS) to indicate that it represented cargo. However, looters 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 TS that failed to reach their destinations around the Mediterranean? This chapter will compare the only two significant maritime samian/TS 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/TS trade.

Comparisons between these sites are not straightforward as Pudding Pan is more than a century later in date, so the samian/TS assemblages are very different and derive from different regions; the Culip IV TS came from La Graufesenque. As stated, the most effective comparisons can only be achieved between samian/TS assemblages from the same region. The TS on Culip IV was clearly supplementary to a cargo of *amphorae*, thus supporting the notion of a 'piggy-back' trade. However, bulk consignments of TS may have been the norm but for the reasons previously stated they have not been discovered in the archaeological record.

In addition, there is no guarantee that evidence from the core of the Empire is applicable on the periphery where the mechanics and mechanisms of samian/TS transportation may have been quite different. However, 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/TS 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

Cap de Creus is situated on the northeast coast of Spain at the foot of the Pyrenees. It was one of the few refuges situated on this coast at a dangerous point for navigation and one that would probably have been avoided had it not been situated in a position that unites the north and south of the western Mediterranean. Thus Roman ships coming from the mouth of the Rhone and bypassing the Pyrenees passed Cala Culip while rounding the Cap de Creus *en route* to Empurias. The twenty 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 at Cap de Creus: five (designated Culip I-V) dating from the Roman period and one (designated Culip VI) dating 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 and 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, that has been almost completely looted, and Culip III, that 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*. Culip IV, which sank between 69 and 79, primarily comprised TS from La Graufesenque as well as Dr 20 *amphorae* and fine-wall wares from Baetica. The Culip IV cargo appears to have

landed on a bed of seaweed that continued to grow after the deposition, which protected the deposit. Consequently, when the deposit 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 protecting it from exploitation (Nieto Prieto *et al* 1989: 28, 30). Culip VI contained medieval ceramics dating from the fourteenth century. There are also indications of another shipment of Dr 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 60x25m which is a fraction of the area of Cala Culip so it seems highly 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 1,500m^2 could contain three ancient wrecks corroborates not only the use of the cove as a refuge (Nieto Prieto *et al* 1989: 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 TS yet discovered on a shipwreck, although it is approximately one hundred years earlier in date than the main Pudding Pan assemblage and from a different production centre. Even though 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 TS transportation, which make comparisons worthwhile.

Despite the fact that heavy swells had moved the shallow deposits, including rocks weighing three or four kilos, the TS was in surprisingly good condition with clean break lines without any signs that the pieces had been rolled. This seems to have resulted from the vessel landing on the seabed in an inverted position at the time of the sinking, such that the hull of the vessel provided a protective covering for the cargo (Nieto Prieto *et al* 1989: 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 TS, 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 footring 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 (Nieto Prieto *et al* 1989: 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. Moreover, there is 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 to those at Culip IV; the clean break lines seem symptomatic of a well-buried deposit that is only disturbed 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 TS and fine-wall wares had survived much better due 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. This suggests that the *amphorae* from Pudding Pan had been better protected due to deeper burial in protective silts or in less corrosive conditions. However the fine wares from both sites were damaged by the crystallisation of salts on the surface of the pots that caused crazing of the glaze (Nieto Prieto *et al* 1989: 46-7).

At Culip IV the impression that the ship turned upside down was supported by the abundance of Dr 20 *amphorae* spikes found in the higher levels of the deposit (Nieto Prieto *et al* 1989: 40). In contrast, the abundance of amphorae rims and handles and complete absence of spikes would imply that the Pudding Pan shipment had remained upright. This evidence implies that the TS vessels were transported upright on the Culip IV ship but inverted on the Pudding Pan ship. The transportation of TS 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 (Nieto Prieto *et al* 1989: Fig 158) shows two people carrying what appears 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 (Nieto Prieto *et al* 1989: 231). The Neumagen monument shows *amphorae* protected with jackets of coiled straw, although 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 like 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 comprised parts of packing cases. The similarity between the TS from Culip IV and the TS contained in the crate at Pompeii, which must date to the year 79, suggests a great chronological proximity between both sets (Nieto Prieto *et al* 1989: 235; Millett 1993: 416).

The well known consignment of pottery in the charred remains of a wooden crate found at Pompeii (Region VIII.5.9) comprised ninety south Gaulish decorated TS bowls from La Graufesenque and thirty-seven pottery lamps from northern Italy that 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 their place 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 TS needs of the Italian market (Atkinson 1914; Evans 1981: 527).

The vessel

Further evidence for the inversion of the ship at the time of the sinking comes from the absence of any of the principle elements of the ship, such as the keel, under the deposit. However rather than principal elements of the ship, only a few insignificant pieces of the hull were recovered. As the Culip IV boat had inverted neither the cargo nor the sediments that covered it protected 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). Likewise, as a result of the inversion, remnants of any deck structures

should have survived under the cargo but as none were found it must be interpreted that none existed. In contrast, 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* that have been associated with deck structures on other Roman wrecks (see Rule and Monaghan 1993) were discovered on Culip IV. It would be ridiculous to suggest that this small number of roof tiles were sufficient to cover the roof of a shelter on the boat although they would have been sufficient to form a flat surface on which to ignite the fire in the galley of the boat, with the *imbrices* forming pan supports. This function is supported by the evidence for fire on the convex surfaces of the *imbrices* (Nieto Prieto *et al* 1989: 217 fig. 153.6). Therefore, Culip IV was either an open vessel or 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 (Nieto Prieto *et al* 1989: 209-12).

The wood that had survived was concentrated in a line extending approximately parallel with the 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 N-S and approx. 3m E-W supporting the view that this was a small boat. Various wooden elements of the vessel had survived; all but one of the wedges were made from the wood of the olive tree, the 'quadernes' were made from white pine and the hull fragments and the remaining wedge were 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 its abundance in the Mediterranean river basins. In addition, wood from the olive tree has been used to make wedges on the Mahdia and the Bourse boat and white pine was used to make the 'quadernes' of the boats of Cavaliére and Kyrenia (Nieto Prieto *et al* 1989: 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 (Nieto Prieto *et al* 1994: 212-223).

Obviously, without the hull it is impossible to determine the precise dimensions of the boat but there is sufficient data to hypothesize its dimensions. For example, about 200 iron and ten 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 (Nieto Prieto *et al* 1989: Fig. 152.1) and the lead plates (Nieto Prieto *et al* 1989: Fig. 152.2) reflected the longitudinal concentrations of wood but extended further to approximately 8m, with a few nails found at 9 and 10m, and extending 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, which is not dissimilar to the dimensions of the Cavalière vessel that had a length of 12.98m and a beam of 4.6m.

If the vessel had been larger, nails and other elements of naval construction would have been found over a wider area and the cargo would have dispersed to occupy a larger area after the destruction of the hull that had contained it. However, the dispersion area is only slightly greater than that of the nails so the dimensions of the vessel are not much greater than the dimensions given by the distribution of the nails. Moreover, if the proposed length of Culip IV 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. This seems to indicate that the relation between the two dimensions proposed for Culip IV is within the canon possible for naval architecture in antiquity (Nieto Prieto *et al* 1989: 224).

The depth of the vessel is also indeterminate from the remains of wood but can be approximated from the arrangement of the cargo within the boat. The boat carried a minimum of seventy-six Dr 20 *amphorae* that would occupy an area of $24m^2$ in a single layer with a height of 0.74m, which exceeds the proposed length and beam of the Culip IV boat. It therefore seems that the *amphorae* travelled in a minimum of two layers as a great number of the handles and rims were damaged by rubbing from the body 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, 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 $15m^2$, and would 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 seems 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 Nieto Prieto *et al* 1989: Fig 156). Assuming that there was no other significant cargo that has disappeared leaving no archaeological trace, and including the oil contained in the Dr 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 7.776 kilos. The close correspondence between these different methods of approximation and with the archaeological deposit confirms that Culip IV was a small vessel (Nieto Prieto *et al* 1989: 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 Dr 20 *amphorae* were present throughout the area occupied by the boat, they displayed a greater concentration in the central zone (see Nieto Prieto *et al* 1989: Fig.s 42 & 43). An arrangement of *amphorae* in two layers with forty-eight *amphorae* on the bottom arranged in four columns of twelve rows and thirty-three *amphorae* in three columns and eleven rows on top such that each amphora on the upper layer sits between four on the bottom layer (Nieto Prieto et al 1989: Fig. 157) results in a total of eighty-one *amphorae*. This is very close to the minimum number of seventy-six *amphorae* found during the excavation some of which must be removed to allow for the bilge pump and other ship's. The graphical distribution of the cargo illustrates the space left between the main Dr 20 *amphorae* cargo and the prow and the stern of the boat as revealed in the excavation and also the ample space between the upper layer of *amphorae* and the sides of the boat (Nieto Prieto *et al* 1989: 229), which could have been filled by the secondary cargo.

Thus the Culip IV wreck 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 due to the growth of new zones of economic importance (Nieto Prieto *et al* 1989: 204). However, the limited

quantities of TS found as secondary cargoes can in no way account for the undoubtedly massive trade in TS 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 TS or fine-wall pottery, with better preservation of footrings 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 $1m^2$, 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 the sectors 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 between which it was difficult to differentiate in post-excavation analysis. For example, 7,754 fragments of Drag form 18 *paterae* were recovered (Nieto Prieto *et al* 1989: 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 ship equipment, the crew's personal possessions, and from 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 seventy-six Dr 20 *amphorae*, some of which were complete but 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. The consignment included at least 1,947 plain south Gaulish TS vessels of the forms Hermet 1 and Drag forms 36, 35, 27, 15/17, 24/25 and 18, and a minimum of 729 decorated vessels of Drag forms 29 and Drag 37 and twenty-four Déchelette form 67 vessels. The secondary cargo included forty-two oil lamps; all but two of those retaining legible potter's stamps were stamped OPPI. As expected, the forms and potters' stamps of the Culip IV TS assemblage are very different from Pudding Pan, which is approximately a century later in date, with only forms 35 and 36 in common. This

emphasizes the longevity of these particular forms, which as stated are usually unstamped, spanning the later first to the later second centuries.

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 the one Pelichet 46, two Haltern 70, and the Dr 2/4 that were positioned in the front half of the ship, another Pelichet 46 and the Gauloise 4 that were in the rear half, and the Gauloise 1 that was in the stern (Nieto Prieto *et al* 1989: 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 which suggest that the boat sank in the summer when peaches are in season.

Other items, possibly belonging to the crew, included a single south Gaulish TS lamp of the form Hermet 18 that showed signs of use possibly to illuminate the boat, and another bearing the stamp MYRO. A set of twenty-three white and blue/black glass gaming pieces were discovered, similar to those found on other wrecks such as Diana Marina, Spargi and the Madrague de Giens, and frequently found in terrestrial deposits. Various solitary examples of south Gaulish TS forms, an unguentarium of green glass and two 'plaquetes' of stone of trapezoidal section were also found. Two mortars were also found, one was complete bearing two stamps of FORTVNA DOMITIO, and the other of Italic production possibly from Campania was badly broken. These 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 (Nieto Prieto *et al* 1989: 215-9).

A single fragment of a Drag form 27 bowl dating from the mid-first century 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 (Nieto Prieto *et al* 1989: 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, three ornamental bronze rings that may have been silver-plated, and a concretion revealed

a void left by a 'pig foot' (nail bar/claw hammer). The most original 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 was also recovered that 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 (Nieto Prieto *et al* 1989: 212).

The terra sigillata

The Culip IV TS consignment seems to be 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 Drag 29 bowls were signed by four potters, 80 per cent of the Drag 15/17 dishes were stamped by only one potter, as were 97.7 per cent of the Drag 18 plates. Furthermore, two companies of potters are represented on 60.3 per cent of stamps on the Drag 27 cups, two stamps are present on 94.1 per cent of the Drag 27B cups, while only one stamp appears on 82.6 per cent of the Drag 24/25B bowls (Nieto Prieto *et al* 1989: 203). These proportions are considerably higher than those from Pudding Pan where, for example, two potters stamped 51 per cent of Drag 79 plates; four potters stamped 53 per cent of Drag 31 cups and five potters stamped 62.5 per cent of Drag 33 dishes.

These figures are still significant bearing in mind that the Pudding Pan assemblage currently comprises approximately one quarter of the TS assemblage from Culip IV. Moreover, the total number of potters represented at Pudding Pan and at Culip IV is identical. If Pudding Pan reflects this pattern 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 also part of a production set. It is interesting to note that the Culip IV assemblage also included solitary examples of some vessels (Nieto Prieto *et al* 1989: 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 9.6 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) 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 (see 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. This suggests that the mixing of consignments occurred further down the supply chain.

However, like the New Fresh Wharf assemblage which had a low ratio of stamps to potters, there is considerable internal variation with twenty-three of the potters represented on just one or two examples but four potters occurring more than one-hundred 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 (1993: 418) 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. Perhaps the latter represents residual stock or could 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 that 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 cognomen 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 Drag forms 18A, 18B, 15/17, 27A, 27B, 24/25A, 24/25B. Thirty-four different potters had stamped the remaining 391 vessels. The fact that forty-five 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 no.s 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. Eight potters produced the second batch of 30,350 vessels where 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 only limited, presumably with prior agreement, 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' (Nieto Prieto *et al* 1989: 204-5; Hermet 1934). The limited evidence from Pudding Pan seems to contradict this, as the most common forms produced together were Drag forms 31 an 33 which seem to be a cup and bowl 'set'. Indeed, the widest range of forms at Pudding Pan were made by Saturninus whose stamps are found on five forms 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 (Nieto Prieto *et al* 1989: 204-5; Hermet 1934). 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 (1989) hypothesis 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 Roman times 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).

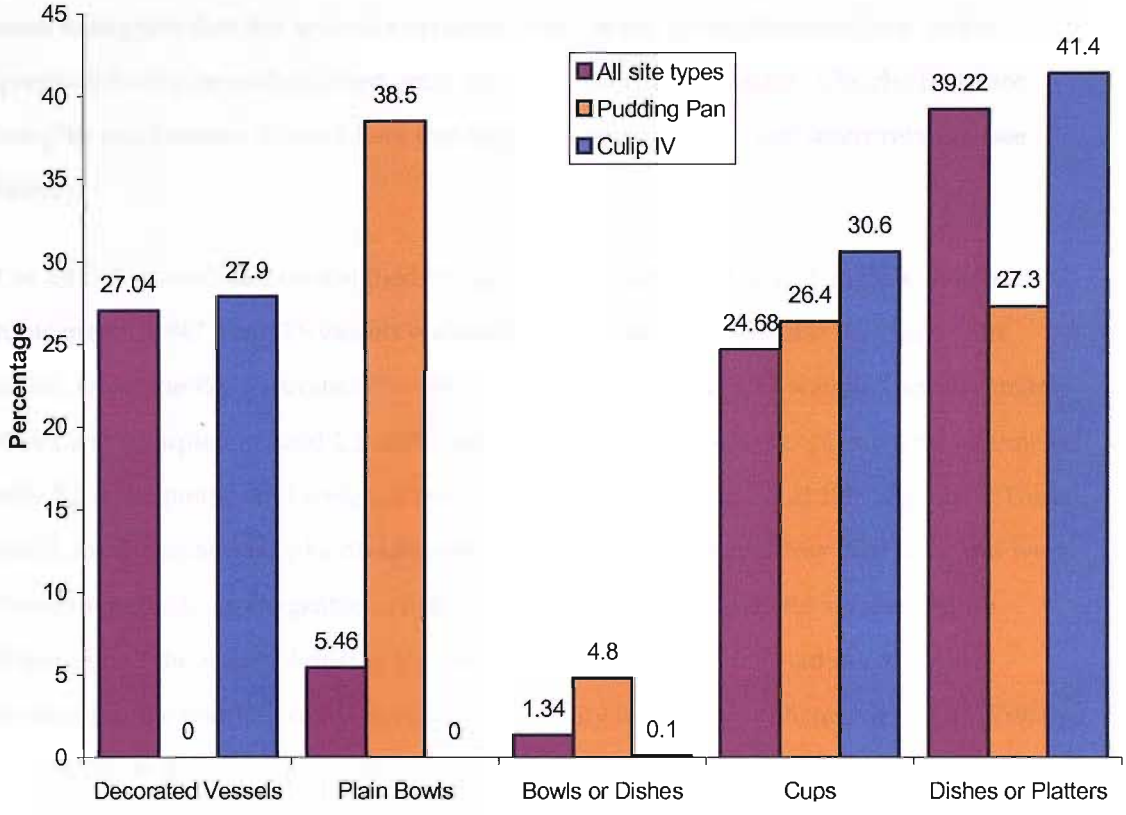


Figure 83 Comparison of the characteristics of the TS assemblage from Culip IV with those from Pudding Pan and the average (mean) from a variety of Romano-British terrestrial site types

Although the stamps and forms of the Culip IV TS assemblage are very different to those from Pudding Pan, reflecting a temporal separation of some one-hundred years, a comparison of the generic forms produces a quite unexpected result (Figure 83). The characteristics of the TS 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, i.e. wrecks, 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. 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 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 TS 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).

The 1,475 fine-wall vessels weighed 93.3kg and occupied a volume of slightly over one cubic metre, 1,947 plain TS vessels weighed 379.7kg and occupied less than one cubic metre, while the 729 decorated TS vessels of Drag forms 29 and 37 weighed approximately 375kg and occupied around 1.5 cubic metres. Thus these wares occupied a total volume of only 3.5 cubic metres and weighed less than 900kg (Nieto Prieto et al 1989: fig. 156). These could, for example, easily be divided into fifteen packages each of less than 60kg and were therefore 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 (Nieto Prieto *et al* 1989: 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 (Nieto Prieto *et al* 1989: 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 requires further investigation. As stated previously, the most common

ships from all periods were small vessels carrying *c* 75 tonnes of cargo (Pomey & Tchernia 1978; Parker 1992a: 26).

Consequences for Pudding Pan

This places the recovered Pudding Pan assemblage of *c* 450 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 TS 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/TS 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 TS vessels, the need to protect the glossy finish, and the near-pristine condition of many that have been recovered from the archaeological record suggests 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 as 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 Figure 83).

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 20). The layer thickness represents the vertical space occupied by one vessel in a stack and is based upon the mean footring 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 Drag 36 bowls to 2,754 small Drag 33 cups. Thus the figures presented in the Culip IV report are very much site specific depending on the composition of the particular TS consignment.

If, for example, a consignment included the equivalent of one cubic metre of each of the forms listed below this would represent a total consignment of 17,195 samian/TS vessels occupying a space of thirteen 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 above, it has been calculated that the main consignment of seventy-six Dr 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/TS could be transported in relatively confined spaces thus supporting the notion of a purely 'piggy-back' trade.

Samian Form	Mean diameter (mm)	Pots per square metre	Mean height (mm)	Mean footring height	Layer thickness (mm)	Number 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 20 Estimation of the number of pots per cubic metre based on the mean dimensions of the most common samian forms from Pudding Pan

Livy (XXI.63.3-4) records that the *lex* Claudia passed in 219-8 BC, "...was designed to render illegal the possession by a senator, or the son of a senator, of any sea-going vessel of more than 300 *amphorae* capacity, the size that was deemed sufficient for carrying the produce of an estate, any form of trade being considered beneath a senator's dignity...". A ship of 300 amphorae capacity was small, capable of carrying the yield of one *iugerum* (less

than one acre) of vineyard (Varro, De Re Rustica 1.2.7) while the normal capacity of a cargo ship seems to have been at least 2,000 *amphorae* (Cicero, Epist. 12.15.2). Various estimates have been made of the capacity of a 300-amphora ship of between 3 and 7.5 tons (Evans 1981: 525).

The size of ancient ships from preserved remains corresponds well with those identified from inscriptions and papyri and appears to remain broadly constant from the fifth century BC to the twelfth century AD. The largest ships date from the first century BC to the first century AD with a slight decline in average size during the Roman period. Three classes of vessel can be distinguished; the smallest and most common vessel found in all periods carried less than 75 tons of cargo or 1,500 amphorae. The medium-sized vessel carried between 75-200 tons of cargo or 2,000-3,000 *amphorae* from the first century BC to the third century AD. The largest vessels, mostly of the late Republican period, carried over 250 tons or more than 6000 amphorae. The typical ancient merchant ship was a sailing vessel between 8 and 40m long (Parker 1992: 89; see also Hopkins 1983a: xvii).

In actuality, so few wrecks containing significant quantities of TS have been discovered, and even fewer published in any substantial detail, that it neither accounts for the massive trade in TS nor confirms the predominance of either primary or secondary cargoes of TS. 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 challenges 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 second century, 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 points. 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 that 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, Dr 1 *amphorae* probably from central southern Italy, and Baetican Dr 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 is 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, increased the risk of accident and loss of his capital, was unfamiliar with local market conditions and was at a disadvantage 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, that had sufficient infrastructure to handle and store great quantities of merchandise that could be re-sold 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 Piazzalle della Corporazione of Ostia facilitated the storage and commercialisation of products. However, a complex infrastructure was necessary for this type of commercial activity that required, for example, shipyards for the repair of ships, an administration service, and *urinatores* etc.

However, the concept of grandiose port works is 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 pre-requisite for the port (Millett 1990: 89; cf Rickman 1988: 259). Moreover, given the extensive evidence for transhipment 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. These 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 comprised 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 homogenous 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, the first bringing products to the main port from its zone of influence. These products were then stored until in the second phase another ship loaded this 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 zone 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 it could have been redistributed from there (Nieto Prieto *et al* 1989: 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 Dr 20 *amphorae* and fine-wall ceramics direct from Baetica and also received ships from Italy that transported, among other products, the oil lamps stamped OPPI (Nieto Prieto *et al* 1989: 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 homogenous 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 its 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 4. 180-1). The decline occurred primarily because Massilia was separated from the Rhone valley that was the main artery through Gaul used by the Romans. Even though it was located about 20km from the sea Narbonne's position, on a waterway connecting the river Aude to the Mediterranean, commanded one of the great routes through southwest Gaul providing access between the Mediterranean and the Bordeaux district on the Atlantic coast.

However by the mid-second century there are signs of decline primarily owing to an eastward shift of political and economic emphasis but also possibly due to siltation problems. Arles then became the dominant port of southern Gaul through to the late Empire, even though it was further inland than Narbonne with difficult links to the sea. This was undoubtedly due to its position on the river Rhone, which provided access via the waterways to all parts of Gaul particularly 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 take 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 second century 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 extensive use of beaching and transhipment.

The emphasis of archaeological research has now moved away from extant remains and technological developments, and focussed 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 & 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. Thus, 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 TS assemblage from Culip IV was produced at La Graufesenque in the third quarter of the first century and was found at the core of the Empire. In contrast, the TS from Pudding Pan was made at Lezoux a century later and was found on the periphery of the Empire. Thus, the mutual exclusivity of the TS forms and potters' stamps was anticipated. However, analysis of the generic characteristics of the two TS assemblages revealed a striking similarity between Culip IV and British consumer sites, quite different to those of Pudding Pan. This was completely unexpected because recent research (Willis 2005) has highlighted the similar characteristics displayed by similar type-sites. Once more this highlights 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 that the two ships were performing. 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 at which 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 TS assemblages; one would expect a bulk consignment *en route* between two principle ports but a mixed consignment with TS as a supplementary cargo on a vessel travelling between a principle port and its hinterland. This could explain the predominance of wrecks containing secondary cargoes of TS, as these operations would have been more frequent than bulk consignments travelling between principle ports.

However, the comparatively small volume occupied by this not inconsiderable assemblage supports the notion that TS was transported as a secondary cargo but does not prove that this was always the case. Indeed, the fact that it occupied such a small space may have encouraged this piecemeal, supplementary trade but does not confirm that this was the only method by which it was conveyed. As stated, the relatively few maritime sites that include significant quantities of TS 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 TS. Thus it may be that vessels engaged in the principle 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 eigteenth 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)

> ...other 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 north-west Europe and from the Mediterranean for the maritime transportation of bulk pottery consignments in the Roman era. This has serious implications for the interpretation of the later second century Pudding Pan assemblage that appears to represent a pottery shipment (*contra* Fulford 1987: 60-1). Rather than reflecting an aversion to this activity in antiquity due to economic expedience, this study has presented compelling evidence that the scarcity of pottery cargoes in the maritime archaeological record 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 TS 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 that 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 inevitably 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 (Fulford 1987: 60-1), 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 the only known Roman assemblage from a maritime context in British waters. More significantly, empire-wide only one other wreck containing a TS cargo (Culip IV) has been rigorously investigated and fully published, but no cargo displaying similar characteristics to Pudding Pan has ever been discovered. Moreover, this later second century 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 uncontextualised artefacts have made a significant contribution to our understanding of the nature, location and condition of the sources, and to our understanding of the trade in utilitarian pottery which has serious implications for 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 not only on current theories of trade but also on the maritime archaeology of the Roman era as it is currently practised.

The significance 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 uncontextualised artefacts about their provenance, the nature of the original consignments and the location of the sources

on the seabed. As stated, in a sense these artefacts are contextualised 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.

This study has identified and clarified many of the myths and misconceptions that have arisen about the site of Pudding Pan over the last 300 years as well as considerably advancing our knowledge of the recovered assemblage and the sources from which it came. This analysis has confirmed the existence of three discretely dated groups from the first, second and third centuries, although there is insufficient evidence to determine the nature and location of the latter. The confusion between Pudding Pan and Pan Sand has obscured the locations from which the various samian groups have been recovered. However, the first century samian probably came from the same source as the *mortaria* and *amphorae* dated *c* 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 second century samian represents a bulk consignment of plain samian wares from a ship that sank between 175 and 195 *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* 170-180, this not only refines the date of the sinking still further but also indicates the likely destination of the Pudding Pan cargo.

This study has included several season's of fieldwork using sophisticated geophysical techniques in conjunction with diver surveys and controlled dredging to locate the shipwreck. This is the latest in a series of attempts to find the famed later second century site that began with Thomas Pownall's efforts in the late eighteenth century. Although the site has not been found this project has considerably narrowed the area in

which the wreck is believed to lie by collating the results of these surveys in conjunction with recent finds locations using GIS. One of the goals of this research was to prove that the assemblage had tremendous potential despite our inability to locate the site.

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 almost 500 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 second century samian groups, probably as a result of the lack of interest in the site throughout much of the twentieth 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 destinations. It is clear that a significant proportion of the vessels recorded in 1909 form part of an unquantifiable contingent that remain 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. These biographies provided sufficient TAQs and TPQs of individual vessels to enable analysis of the rate and nature of the recoveries over time. This analysis 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, which also provided some indication of the goods that probably accompanied samian imports. The damage sustained by the footrings 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 comprise 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 between 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.

The comparison between Pudding Pan and Culip IV, the only other significant maritime samian/TS assemblage to have been rigorously investigated and extensively published, produced similar results. Although no direct comparisons between the two assemblages was 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 can be explained by 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 Gaul to a main entrepôt, in this case London. Hence, unlike the unadulterated Pudding Pan consignment, the Culip IV consignment comprised 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. The rarity of similar cargoes implies a special consignment although 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.

Besides the obvious greater visibility of *amphorae* cargoes there is evidence that pottery cargoes are more prone to colonisation by heavy concentrations of seaweed that camouflage the deposits and thus prevent their detection (Nieto Prieto *et al* 1989; Parker 1980: 47). 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 ersatz 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 underwater 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 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 is our inability to detect a particular class of cargo; on the other 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-emphasised as wrecks engaged in redistributive trade have been misinterpreted. The above model proposes a primary trade conveying homogenous cargoes between major ports and a secondary redistributive trade conveying heterogenous cargoes assembled at the main entrepôt with 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 homogenous 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 contain 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 then 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 comprised 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 focussing 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 prejudging 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; although in some cases this can be attributed to the actions of looters, the quality of many maritime publications leaves a lot 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 north-west Europe, from areas of the Mediterranean with less well developed tourism industries, and from

deep-water sites that until recently remained inaccessible (see McCann & 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 only survive 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 (1987: 60-1) comments, quoted above, that the identification of pottery cargoes merely represents a misinterpretation of the archaeology. Thus, prior to this study the absence of pottery cargoes was explained by the existence of a parasitic pottery trade. This study has now demonstrated the flaws in this argument, which is central to the interpretation of the assemblage recovered from Pudding Pan. 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 has serious implications as our concept of the trade in more significant but archaeologically invisible commodities is so dependent upon it.

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 utilised 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 pro-active 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 like the Solent have been methodically surveyed (see Tomalin 199?). A comprehensive survey

of England's coastal heritage revealed considerable but patchy coverage (Fulford *et al* 1997) although recent changes to English Heritage's remit should impact on the range and quality of coastal, inter-tidal and underwater data. Without primary evidence for trade in the form of ports, quays and harbours and the watercraft that conveyed goods between them, it is impossible to fully comprehend the true nature of north-west European trade. This research has shown how liaisons with various local groups can add substantially to our knowledge of a 'known' site and can therefore 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-utilised and requires similar detailed reassessment. It was originally intended as part of this research to conduct additional surveys throughout southern England. However once the scale of the task became apparent a more fundamental approach to the problem was deemed more pressing and seemed more appropriate. In addition, the enhanced assemblage from Pudding Pan 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 our knowledge of maritime finds are, but also the tremendous potential of continuing this work in other areas of Britain.

Further work of this nature needs to be done 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 so they are 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. But should these difficulties 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. Thus, 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, some of them including spices, hazelnuts, grape stalks and a 'dense sludge' but sadly the site was looted and dispersed without study (Parker 1992a: 91). 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 6,000 olive pits recovered from Pudding Pan bodes well for future discoveries and provides much needed impetus for us to redouble our efforts.

If a whole body of evidence for the maritime transportation of pottery is missing, either as a result of our inability to detect this type of wreck or because of limited efforts to find them rather than an absence either 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 novel approach to the study of an uncontextualised 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 contextualised and can produce academically rigorous results without the need to find the shipwreck.

As shown the assemblage has challenged some pre-conceived notions of trade from terrestrial contexts. This approach 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 (see 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 ARS (Hayes 1972) but maritime archaeological papers in mainstream peer-reviewed academic journals are still rare. For example, not a single maritime paper has been published in the main Romano-British academic journal, Britannia, in the last ten years. This could reflect the bias of the journal editor but more likely reflects the absence of Romano-British maritime research. A number of maritime-related papers have been published but predominantly relating to the army's invasion and authored by terrestrial archaeologists (Frere & Fulford 2001; Black 2000; Rippon 2000; Allen and Fulford 1999; Cotterill 1993).

Similarly there has been only one maritime-related paper in the Journal of Roman Studies, discussing Britain in the context of Tacitus' Agricola (Clarke 2001). Any publications relating to maritime archaeology should be applauded but these papers are written from a decidedly terrestrial rather than maritime perspective. From the opposite perspective, the International Journal of Nautical Archaeology has published very few papers associated with or involving Roman Britain in the last ten years, and then of dubious quality (eg Roberts 2002). In fact surprisingly few published articles in that journal cover either the classical period or British archaeology. Several maritime-related monographs have been published (although few in recent years) but this only serves to exacerbate the isolation of maritime archaeology.

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, barring a few notable exceptions, Mediterranean maritime archaeology is even less well developed, particularly from a theoretical perspective (see 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 'uncontextualised' assemblage can still have a significant impact. If we are to fully understand the nature of ancient trade we cannot ignore other assemblages from maritime contexts. Moreover, as stated maritime archaeology comprises far more than just shipwrecks and their cargoes and there is no reason why these aspects could not be developed more effectively. The investigation of the full range of evidence for maritime and maritime-related activities, which played such a key role in trade particularly with this island, and the comprehensive adoption of the seamless approach between terrestrial and maritime archaeologies would then imbue terrestrial archaeology with a maritime perspective.

Appendix 1

Catalogue of samian recovered from the Kentish Flats

Key to samian catalogue

Form	r	Rouletting decoration
Vessel	C	Vessel largely intact with miniman damage that may include a missing footring
	B	Vessel broken but repaired and largely intact where >50% of vessel survives
	F	Fragment of vessel where >50% of vessel survives (rim, base or body sherd)
Rim/Foot	mf	Missing footring
	br bf	Broken rim or broken footring
	wf	Worn footring (rims are generally worn)
	cr cf	Chipped rim or chipped footring
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 break
	P	Pitting caused by salt crystallization
	G	Heavy growth obscuring evidence of tilt
	S	Pre-firing stacking mark caused by footring of adjacent vessel in stack
	W	Post-firing mark caused by footring of adjacent vessel in stack
Marine Growth	oys	oyster
	m	mould/saw dust
	w	worms
	b	barnacles
	p	polo
	r	removed growth

Assemblage catalogue number	Museum or private collection	Museum accession number	Form: Dragendorff Walters Curle Ludowici	Bet & Delor (2000) equivalent no.	Potter's stamp	Vessel: complete broken fragment EVE	Rim/Foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear inc. diameter of footring impression	Marine growth	Rim Dia	Hgt	Hgt *minus* Foot Ring	Ft Ring Dia	Dia at Top of Ft Ring	Stamp W	Stamp L
1.001	Liverpool Mus.	M7524	18	058	No stamp	C		3 P	1	m	165	42		79			
1.002	Canterbury Mus.	??	18	058	OF..... ??	C	wf	3	0	hy	155						
1.003	Jewry Wall, Leic.	AIII.1927	18/31	058	CI	C	wf				65	24					
1.004	Maidstone Mus.	Box RB21A	18/31	058	V\CV.I...EA?	C	cr bf wf	3	1		102						
1.005	Manchester Mus.	37423 R868	31	054	AESTIVI M	C											
1.006	Whitby Museum	M0185	31	054	AESTIVI M	C	cr cf wf	3	2	w	186			106			
1.007	Whitby Museum	M0186	31	054	AESTIVI M	C	br mf	3 T=w	3 W	hy b m	181				98		
1.008	Folkestone Mus.	F875	31	054	AESTIVI. M	C											
1.009	Whitstable Mus.	Box 25 (30)	31	054	AESTIVI. M	C	wf	3	2 T=w	oyster	181	55	46	92		3	32
1.010	Whitstable Mus.	Box 27 (57)	31	054	AESTIVI. M	B	mf	3	2	oyster	188		44			4	32
1.011	Whitstable Mus.	Box 27 (59)	31	054	AESTIVI. M	B	wf	3	2	b	188	59	50	90		3	32
1.012	Whitstable Mus.	Box 27 (60)	31	054	AESTIVI. M	C	bf wf	2 T=35°	1	oyster	187	62	53	95		3	33
1.013	Guildhall, Roch.	917	31	054	AIISTIVI M	C	bf wf	3 T=w	1		188						
1.014	British Museum	1735-1907	31	054	AIISTIVI.M	C	wf	3	1	p w s	181						
1.015	British Museum	1910.10-25 26	31	054	AIISTIVI.M	C	wf	2 T=w	1 W	m	189	61	53	90	85	2.5	32
1.016	British Museum	1910.10-25 25	31	054	AIISTIVI.M	C	bf	2 T=w	0 S=80mm	b	187	61	52		88	3	32
1.017	British Museum	1920.11-23 33	31	054	AIISTIVI.M	C	wf	2 T=w	2 T=w	none	184			94			
1.018	Liverpool Mus.	M6425	31	054	AIISTIVI.M	C	cr bf wf	1	3 W	none	188	62.5	56	93			
1.019	Liverpool Mus.	M7470	31	054	AIISTIVI.M	C	bf wf	3	0	b m rem.	187	69	61	87		2.7	33
1.020	Mus. of London	81.164/S	31	054	AIISTIVI.M	C	bf wf	2	1		185			94			
1.021	Whitstable Coll.	RA	31	054	AIISTIVI.M	C	bf	2 T=10°	1	oyster	190	58	49			3	33
1.022	Whitstable Mus.	Box 1 Wallace	31	054	AIISTIVI.M	C	bf	2 T=5°	1		185	59	48			3	33
1.023	British Museum	Unnumbered	31	054	ALBVCIANI	C	bf	1	1		178		36	93			
1.024	Liverpool Mus.	M7444	31	054	ALBVCIANI	C	mf	3 T=w	2 W	none	185		54		90	2.2	24
1.025	Liverpool Mus.	M7446	31	054	ALBVCIANI	C	wf	3	1 W	b bry rem.	177	66	55	87		2.5	37
1.026	British Museum	2000 1-1 75	31	054	ALBVCINI	C	cr bf wf	0	1 W		180	67	53		88	3	27
1.027	British Museum	M1643	31	054	ALBVCINI	C	mf	2 T=w	1 S=80mm	p s rem	177		55		86	4	26
1.028	Herne Bay Mus.	H1194	31	054	ALBVCINI	C	mf	3	1	r	189		56			4	26
1.029	Maidstone Mus.	Box RB21A	31	054	ALBVCINI	C	cr	1 T=w	1	m w	186						
1.030	Swansea Mus.	A908.11.33	31	054	ALBVCINI	C	bf wf	2	1	b hy rem.	188	58	51		91	4.5	33
1.031	Swansea Mus.	A908.11.44	31	054	ALBVCINI	C	mf	2	1	w b	195		59		96	4.5	33
1.032	Whitstable Mus.	Box 1 Wallace	31	054	ALBVCINI	C	C	2 T=30°	1	oyster	181	62	53	90		3	26

Assemblage catalogue number	Museum or private collection	Museum accession number	Form: Dragendorff Walters Curle Ludowici	Bet & Delor (2000) equivalent no.	Potter's stamp	Vessel: complete broken fragment EVE	Rim/Foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear inc. diameter of footring impression	Marine growth	Rim Dia	Hgt	Hgt *minus* Foot Ring	Ft Ring Dia	Dia at Top of Ft Ring	Stamp W	Stamp L
1.033	Whitstable Mus.	Box 25 (28)	31	054	ALBVCINI	C	mf	3	1	w	188		52			3	25
1.034	Whitstable Mus.	Box 27 (27)	31	054	ALBVCINI	B	wf	3	1	oyster	178	62	52	88		3	26
1.035	Whitstable Mus.	W.1988.1000.17	31	054	ALBVCINI	C	mf	2 T=18°	1	w	181		52			3	25
1.036	British Museum	1735-1901	31	054	ARICI. MA	C	mf	3	1	b m w	182		55		93	2	34
1.037	Folkestone Mus.	F876	31	054	ARICI. MA	C											
1.038	Whitstable Coll.	RA	31	054	ARICI. MA	C	C	3	1	oyster	183	56	46	94		3	33
1.039	Soc. Of Antiq.s	574.3 (C.30)	31	054	AT[RVCI]AI	C	wr mf	3	1 W		186		53	90		3	24
1.040	N M Scotland	1911.292	31	054	ATILIANI. M	C	bf wf	3	1	w, oyster rem.	187	57			98	2.7	33
1.041	British Museum	1734-1901	31	054	ATRVCIA.F	C	cf wf	2	1 P W=85mm	rem	184	61	52	91	85	4	25
1.042	Fisherman B	JM	31	054	ATRVCIANI	C	bf wf	3	1	oyster							
1.043	Whitstable Mus.	Box 27 (8)	31	054	ATRVCIANI	B	wf	3 T=5°	1	m w	185	64	56			4	25
1.044	Liverpool Mus.	M7445	31	054	CALETI. M	C	mf	3	0 W		181		57			3.6	22
1.045	Maidstone Mus.	Box RB21A	31	054	CALETI. M	C	wf	2	1	oyster	178						
1.046	Whitstable Mus.	Box 24 (75)	31	054	CALETI. M	F base	mf									3	25
1.047	Whitstable Mus.	Box 25 (26)	31	054	CALETI. M	C	mf	3	1	oyster	178		49			3	22
1.048	Whitstable Mus.	Box 26 (?)	31	054	CALETI. M	B	wf	3	1	oyster	175	62	53	89		4	24
1.049	Whitstable Mus.	Box 27 (10)	31	054	CALETI. M	B	mf	3 T=w	1 P	m w	180		55			3	23
1.050	Whitstable Mus.	Box 27 (10)	31	054	CALETI. M	C	bf wf	3 T=30°	1	m w b	176	60	52	87		3	20
1.051	Whitstable Mus.	Box 27 (4)	31	054	CALETI. M	B	wf	3	1	w m	182	56	47			4	24
1.052	Pitt Rivers, Oxf.	1884.37.30	31	054	CAR[ETI].M	C	cr wr mf	3 T=w	1 S W=70mm	w p	180		50			3	24
1.053	Herne Bay Mus.	H1195	31	054	CARETI. M	C	mf	3 T=16°	2	r	179		50			4	24
1.054	Herne Bay Mus.	H1195	31	054	CARETI. M	C	mf	3	1	r	181		49			4	22
1.055	Whitstable Coll.	RA	31	054	CARETI. M	C	mf	3	1	oyster	179		49			4	23
1.056	Whitstable Coll.	RA	31	054	CARETI. M	C	mf	3	1	oyster	176		53			3	25
1.057	Swansea Mus.	A908.11.36	31	054	DECMI. M	C	mf	2 T=w	1 W	oyster hy rem.	185		54.5		99	4	25
1.058	Whitstable Mus.	Box 27 (2)	31	054	DECMI. M	C	wf	2 T=30°	1	m w	191	62	53	92		3	25
1.059	Whitstable Mus.	Box 27 (3)	31	054	DECMI. M	C	mf	3	2	w	186		44			3	28
1.060	Whitby Museum	M0192	31	054	GENITOR	C	bf wf	2 T=w	2 W	w p	182			108			
1.061	Canterbury Mus.	??	31	054	Illegible	C	wf	3	0	hy	190						
1.062	Whitby Museum	M0193	31	054	Illegible	C	mf	3	1	w p b	184						
1.063	Fisherman C	SG	31	054	MACCALI. M	F base	bf wf			b					90	3	25
1.064	Herne Bay Mus.	H1196	31	054	MACCALI. M	C	mf	3 T=15°	1	r	182		50			3	26

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1.065	Maidstone Mus.	Box RB21A	31	054	MACCALI. M	C	bf wf	2	1	m	180						
1.066	Whitstable Mus.	Box 27 (11)	31	054	MACCALI. M	C	bf wf	3	1	m w p	185						
1.067	British Museum	M1660	31	054	MAIORIS.M	C	bf wf	3 T=w	1 S=85mm	oyster w	183	59	46		88	5	27
1.068	Whitstable Mus.	Box 25 (29)	31	054	MATERNIANI	C	bf wf	3	1	oyster	175	48	41			2	29
1.069	Pitt Rivers, Oxf.	1884.37.29	31	054	MI.....AF	C	cr wr wf	3 T=w	1 W=75mm	p	182	60	52	89		4	c. 24
1.070	Fisherman A	AR	31	054	Missing	F rim											
1.071	Fisherman C	SG	31	054	Missing	F rim 22%		3	3	p							
1.072	CUMAA	1883.414	31	054	NI.....VS												
1.073	Folkestone Mus.	F879	31	054	OF.VITALIS?	F											
1.074	Guildhall, Roch.	915	31	054	PATT.OF	C	bf wf	3	1	w	189			90			
1.075	Swansea Mus.	A908.11.38	31	054	PATT.OF	C	mf	3	1 W		190		57		95	3	23
1.076	Whitstable Mus.	Box 27 (6)	31	054	PATTO. F	C	wf	1 T=10°	1	m w b	187	64	55	91		3	25
1.077	Whitstable Mus.	Box 27 (61)	31	054	PATTO. F	C	wf	2 T=20°	1	oyster	192	62	49	95		3	22
1.078	Whitstable Mus.	Box 25 (33)	31	054	PATTOF	C	bf wf	2 T=20°	1	w m	187	69	58			3	22
1.079	British Museum	1920.11-23 31	31	054	QVINTI.M	C	bf wf	1	1	s	183			96			
1.080	Whitstable Coll.	RA	31	054	QVINTI.M	C	bf	2 T=5°	1	oyster	182	58	49			4	23
1.081	Ashmolean Mus.	1909.1159	31	054	SATVRNINI	C	wr cr mf	3 T=w	1	b w p	183		51			3	32
1.082	British Museum	1920.11-23.32	31	054	SATVRNINI	C	bf	3	0	m b	180	59	54		89	3	34
1.083	Collector B	PS	31	054	SATVRNINI	C	wr wf	2 T=w	1		191	64	52	95			
1.084	Guildhall, Roch.	916	31	054	SATVRNINI	C	bf wf	2 T=w	1		190						
1.085	Liverpool Mus.	M7440	31	054	SATVRNINI	C	mf	3 T=w	0 W		186		56		103	1.5	33
1.086	Maidstone Mus.	Box RB21A	31	054	SATVRNINI	C	bf wf	3	1	oyster	186						
1.087	Soc. Of Antiq.s	574.2 (C.30)	31	054	SATVRNINI	C 88%	br wr mf	3 T=w	1	w p	183		55		c 90	3	32
1.088	Swansea Mus.	A908.11.35	31	054	SATVRNINI	C	mf	3	1	none	186		52		94	2.8	31.5
1.089	Whitby Museum	M0184	31	054	SATVRNINI	B 70%	br wf	1	2 P	hy w	178			101			
1.090	Whitstable Coll.	RA	31	054	SATVRNINI	C	mf	2 T=10°	1	oyster	189		56			3	31
1.091	Whitstable Coll.	RA	31	054	SATVRNINI	C	cf	3	1	oyster	189	62	51	95		3	33
1.092	Whitstable Mus.	Box 25 (25)	31	054	SATVRNINI	C		3 T=w	1	oyster	185	57	51	94		3	32
1.093	Whitstable Mus.	Box 27 (1)	31	054	SATVRNINI	C	wf	3 T=w	2	m	187	64	54	96		3	32
1.094	Whitstable Mus.	Box 27 (12)	31	054	SATVRNINI	C	wf	3	2	oyster	189	59	46	92		3	
1.095	Whitstable Mus.	Box 27 (31)	31	054	SATVRNINI	C	bf wf	3	1	oyster	182	62	52	90		3	31
1.096	Whitstable Mus.	Box 27 (62)	31	054	SATVRNINI	C	mf	3	1	oyster	187		48			3	33

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1.097	Whitstable Mus.	Box 27 (7)	31	054	SATVRNINI	C	mf	3	1	oyster	190		50			3	31
1.098	Whitstable Mus.	Box 27 (9)	31	054	SATVRNINI	C	bf wf	3	1 P	w	191	64	53	92		3	33
1.099	Herne Bay Mus.	H1197	31	054	?? MARnIn	C	bf wf	3 T=25°	1	r	183	56	48			3	29
1.100	Herne Bay Mus.	H406/2	31	054	?? PATTO	B	wf	3 T=20°	1	m							
1.101	Whitstable Mus.	W.1988.1000.17	31	054	??.....F	C	bf wf	3 T=20°	1	r	188	63	50			2	23
1.102	Controlled dredge	MW	31	054	Worn away	F base	bf cf wf			p				97		2	22
1.103	Fisherman C	SG	31	054	Worn away	F base	bf wf		3	b p					85		
1.104	Fisherman C	SG	31	054	Worn away	F base	bf wf			p w					85		
1.105	Fisherman C	SG	31	054	Worn away	B 65%	br mf	3	1 W=80mm	w b p	184		49		90	3	33
1.106	Whitstable Mus.	Box 25 (74)	31	054	Worn away	F		3	1	oyster				89			
1.107	Dr. M. Redknap		31	054	??	F rim		3	0 W		146						
1.108	Dr. M. Redknap		31	054	??	F body		3	3 W								
1.109	British Museum	1908 7-27 5	31	054	??	C	wf	0	0 W=80mm	w	189	63	52.5	96	91	3.5	30
1.110	British Museum	M1641	31	054	??	C	bf	1	1	none	178			93			
1.111	CUMAA	1951.324B	31	054	??												
1.112	Fisherman A	AR	31	054	??	F 50%	bf wf	3	1	w							
1.113	Whitstable Mus.	Box 24 (?)	31	054	??	F rim											
1.114	Whitstable Mus.	Box 24 (?)	31	054	??	F rim											
1.115	Whitstable Mus.	Box 24 (?)	31	054	??	F rim											
1.116	Whitstable Mus.	Box 24 (?)	31	054	??	F rim											
1.117	Mus. of London	3149	31?	054	??						c140	c51					
1.118	British Museum	1920 11-23 29	31r	056	CINTVS.M	C	wf	1	1	none	243	79	67.5	106	99	2.8	27
1.119	British Museum	M1650	31r	056	CINTVS.M	C	bf	0	0 W	oyster	240	75	61		101	4	25
1.120	Fisherman C	SG	31r	056	C[INTVS]M	B 70%	cr mf	3	1	oyster w p b	235		64		92	3	25
1.121	Ashmolean Mus.	1912.58	31r	056	CRISPINI	C	wr bf wf	3	1 S	w p	243	73	62	102		4	c. 25
1.122	British Museum	1706-1901	31r	056	CRISPINI	C	mf	3	1	none	248		72		94	4	28
1.123	Fisherman B	JM	31r	056	IVSTI. MA	C	bf wf	2 T=w	1	w							
1.124	Guildhall, Roch.	921	31r	056	IVSTI. MA	B>50%	bf wf	3	1		282						
1.125	British Museum	1920 11-23 30	31r	056	IVSTI. MA	C	cr	3 T=w	1	none	276	73	57		110	3	28
1.126	Liverpool Mus.	M7433	31r	056	IVSTI. MA	C	wf	1 T=w	1		249	67	54	101		3.2	30
1.127	British Museum	1937 3-16 5	31r	056	MACCALI. M	C	bf wf	2 T=w	0	w	242	74	63.5		99	4	26
1.128	Liverpool Mus.	M7467	31r	056	MACRIANIA	B>50%	wf	1 T=w	1 W	none	220	50					

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1.129	Inst. Arch. Lon.	?	31r	056	MAINACNI												
1.130	Liverpool Mus.	M7435	31r	056	MAINACNI	C	bf wf	2 T=w	1 W	oyster	249	75	61	116		4	30
1.131	Maidstone Mus.	Box RB21C	31r	056	MAINACNI	C	br wf	1 T=w	1		268						
1.132	Soc. Of Antiq.s	574.4 (C.30)	31r	056	MAINACNI	C	cr wr bf	3 T=b	1 W	w p	243	69	57	101		3	30
1.133	Swansea Mus.	A908.11.29	31r	056	MAINACNI	C	bf wf	3 T=g	1 W	b rem.	247	89	78		101	4	31
1.134	Whitby Museum	M0182	31r	056	MAINACNI	B 85%	br wf	3 T=w	3	b w	234			113			
1.135	Whitstable Mus.	Box 24	31r	056	MAINACNI	C	bf	2 T=15°	1		244	76	61	105		4	29
1.136	British Museum	1908 7-27 4	31r	056	MAINACNI	C	wf	1 T=w	1	b m w	243	75.5	62	105	94	4.5	30
1.137	Fisherman C	SG	31r	056	MA[INAC]NI	B	br cf wf	2 T=20°	1 P W=114mr	min.	287	84	71	116	110	3	30
1.138	Maidstone Mus.	Box RB21C	31r	056	MA[INAC]NI	C	bf wf	3	1	b	288						
1.139	Fisherman C	SG	31r	056	[MAI]NCNI	F r/b 13%	mf	3	1	oyster p w			76			4	
1.140	Maidstone Mus.	Box RB21C	31r	056	MAIORI. F	C	mf	3	1	oyster	248						
1.141	British Museum	1733-1901	31r	056	MAIORIS	C	bf wf	1 T=w	1	oyster w s	251						
1.142	British Museum	1920 11-23 25	31r	056	MAIORIS	C	cr wf	3 T=w	1 T=w	m	240			88	81	2.5	23
1.143	British Museum	1920.11-23 28	31r	056	MAIORIS	C		2 T=w	1	oyster	254			100			
1.144	Controlled dredge	MW	31r	056	MAIORIS	B 75%	cr br wf	2 T=60°	1 W=94mm	p b w	c.238	73	59	94	88	3	24
1.145	British Museum	1937 3-16 6	31r	056	MAR.....M	C	mf	3	1	oyster w	251	64	58		98	2	29
1.146	British Museum	1920.11-23 26	31r	056	MARCI	C	bf wf	1 T=w	1 W	none	235						
1.147	Prof. D. Peacock		31r	056	MATERNNI. M	C	bf wf	3	1	m							
1.148	Whitstable Coll.	RA	31r	056	PAVLLI. M	C	mf	3	1	oyster	248		64			3	33
1.149	Whitstable Mus.	W.1988.1000.17	31r	056	PRI[MA]NI	C	wf	3 T=18°	1	m	251	77	65	105		3	30
1.150	British Museum	1950 5.2 10	31r	056	PRIMANI	C	cr bf wf	1	1	w b m	245	83.5	71.5		91.5	2.5	35
1.151	Guildhall, Roch.	923	31r	056	SATVRIO?	C		1	1		247			107			
1.152	British Museum	1776 12-6 1 (M1670	31r	056	SATVRNINI	C	cf	2	0 W	b	260	84	71		197	3	31.5
1.153	British Museum	1910 10-25 24	31r	056	SATVRNINI	C	wf	0	0 W		272	80	64		103	3	32
1.154	British Museum	1920 11-23 24	31r	056	SATVRNINI	C	wf	1	1		262	81	73		101	3	32
1.155	British Museum	1920.11-23 27	31r	056	SATVRNINI	C	bf wf	3	1	s	241			105			
1.156	British Museum	M1669	31r	056	SATVRNINI	C	bf wf	1 T=w	1 S		235	74	61		103	3	32
1.157	British Museum	M1670	31r	056	SATVRNINI	C	bf wf	2 T=w	1	p	268			113			
1.158	British Museum	M1671	31r	056	SATVRNINI	C	bf	2 T=w	0 W	rem	268		71		112	2.5	35
1.159	British Museum	Unnumbered	31r	056	SATVRNINI	C		1	1	p	233		46	104			
1.160	Guildhall, Roch.	918	31r	056	SATVRNINI	C	bf wf	2 T=w	1	w p b	234			102			

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1.161	Herne Bay Mus.	H1188	31r	056	SATVRNINI	C	wf	2 T=25°	1	m	238	72	63	102		3	32
1.162	Kelvingrove Mus.	1903.269.h	31r	056	SATVRNINI	C	bf wf	1 T=w	0	none	270	84			110	3.3	33
1.163	Liverpool Mus.	M7436	31r	056	SATVRNINI	C	cr bf wf	1 T=w	0	none	234	68	59	103		2	33
1.164	Liverpool Mus.	M7466	31r	056	SATVRNINI	B	wf	3 T=w	1	removed	280	86	65	119			
1.165	Maidstone Mus.	Box RB21C	31r	056	SATVRNINI	F	bf wf			oyster	279						
1.166	Swansea Mus.	A908.11.30	31r	056	SATVRNINI	C	mf	3	2	rem.	236		68		96	2	32
1.167	Swansea Mus.	A908.11.31	31r	056	SATVRNINI	C	bf	3 T=w	1 W	rem.	237	72	67		94	3	32
1.168	Swansea Mus.	A908.11.32	31r	056	SATVRNINI	C	mf	3	1	oyster hy w	251		79		96	2.4	31
1.169	Whitstable Mus.	Box 24	31r	056	SATVRNINI	C	mf	3	1	oyster	273		76			3	32
1.170	Whitstable Mus.	Box 24 (76)	31r	056	SATVRNINI	F base	_										
1.171	British Museum	M1672	31r	056	SAT[VR]NINI	C	wf	3	0	b	235	64	43		98	4	32
1.172	Fisherman C	SG	31r	056	SAT[VRN]INI	B 75%	br mf	3	1	w p b	279		77		107	3	32
1.173	Soc. Of Antiq.s	574.5 (C.30)	31r	056	Worn away	C 88%	br wr bf	3	2	b w p	272	73	61	103		2	29
1.174	Manchester Mus.	37420 R865	31r	056	??	C											
1.175	Guildhall, Roch.	unnumbered	31r	056	??	B>50%		3	1	oyster	282						
1.176	Guildhall, Roch.	unnumbered	31r	056	??	B>50%	bf	1	1		240						
1.177	Maidstone Mus.	Box RB21C	31r	056	??	F r/b	bf			oyster							
1.178	Maidstone Mus.	Box RB21C	31r	056	??	F base	cr bf cf										
1.179	Maidstone Mus.	Box RB21C	31r	056	??	F rim											
1.180	Jewry Wall, Leic.	AIII.1927.67	31r	056	?? ...I>.....M	C	bf wf	3 T=w	1	m b rem.	235	67	57	100		4	27
1.181	Manchester Mus.	37431 R879	31r	056	No stamp												
1.182	British Museum	1937.12-10 2	31r	056	Missing	F				w s							
1.183	Controlled dredge	MW	31r	056	Missing	F base	bf cf wf	3	1	oyster p							
1.184	Drift dive	JA	31r	056	Missing	F rim	_	1	1	p w							
1.185	Fisherman C	SG	31r	056	Missing	F r/b 30%	cr bf wf	3	1	b w		67	78				
1.186	Fisherman C	SG	31r	056	Missing	F r/b 29%	bf	3	3	oyster b p		81	67				
1.187	Fisherman C	SG	31r	056	Missing	F rim 13%		3	1	oyster p							
1.188	Fisherman C	SG	31r	056	Missing	F rim 13%		3	1	oyster p w							
1.189	Fisherman C	SG	31r	056	Missing	F r/b 15%	mf	3	1	oyster w p							
1.190	Fisherman C	SG	31r	056	Missing	F rim 10%		3	1	p w							
1.191	Fisherman C	SG	31r	056	Missing	F body											
1.192	Whitstable Mus.	Box 24 (?)	31r	056	Missing	F r/b	_						72				

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1.193	Maidstone Mus.	Box RB21C	32	?	??	C	cr wf	1	1	r	254						
1.194	British Museum	1908 7-27 7	33	036	ARICI. MA	C	wf	3	1 W=45mm	b m w	133	70.5	64		48	4	30
1.195	British Museum	1920.11-23.34	33	036	ARICI. MA	C	bf wf	3	1 S=50mm	b rem.	138	73	62		51	2.5	28
1.196	Maidstone Mus.	Box RB21A	33	036	ARICI. MA	C	mf	3	0	m w b	137						
1.197	Maidstone Mus.	Box RB21A	33	036	ARICI. MA	C	mf	3	3 T=w	oyster	140						
1.198	Swansea Mus.	A908.11.24	33	036	ARICI. MA	C	mf	3	2	w	136		46		51	3.8	26
1.199	Whitstable Mus.	Box 24 (73)	33	036	ARICI. MA	F r/b	mf						62			3	27
1.200	Whitstable Mus.	Box 26 (15)	33	036	ARICI. MA	C	mf	3	2	m b	135		61			3	28
1.201	Whitstable Mus.	Box 26 (20)	33	036	ARICI. MA	C	mf	3	2	m w	136		60			3	28
1.202	Whitstable Mus.	Box 26 (21)	33	036	ARICI. MA	C	bf wf	3	1	m	136	67	62			3	28
1.203	Whitstable Mus.	Box 26 (22)	33	036	ARICI. MA	C	bf wf	3	1	oyster	136	72	64			3	27
1.204	Whitstable Mus.	Box 26 (23)	33	036	ARICI. MA	B	mf	3	2	m s b	136		60			3	27
1.205	N M Scotland	1911.287	33	036	ATILIANI. M	C	bf wf	1	1	hy m	138	62				3.4	27
1.206	N M Scotland	1911.288	33	036	ATILIANI. M	C	mf	1	1	hy m r	141		83			3.5	26
1.207	Ashmolean Mus.	1909.1156	33	036	ATILIANI. M	C	wr cr mf	3 T=w	1	b w p	143		72			3.5	29
1.208	British Museum	M1681	33	036	ATILIANI. M	C	mf	3	1 W		141		66		50	5	28
1.209	Canterbury Mus.	Box 2 (48)	33	036	CALETI. M	C		1	1	oyster	107						
1.210	Herne Bay Mus.	H1192	33	036	CALETI. M	C	bf wf	2 T=50°	2	r	103	53	43	47		4	25
1.211	Herne Bay Mus.	H1192	33	036	CALETI. M	C	bf wf	2 T=60°	2	r	103	54	43	45		4	23
1.212	Herne Bay Mus.	H1192	33	036	CALETI. M	C	bf	2 T=45°	3 T=w	r	105	55	44	46		4	22
1.213	Maidstone Mus.	Box RB21B	33	036	CALETI. M	B		2	2	m r	107						
1.214	Maidstone Mus.	Box RB21B	33	036	CALETI. M	C	wf	1	1	w b	103						
1.215	Swansea Mus.	A908.11.15	33	036	CALETI. M	C	bf(10% left)	3 T=g	1 W	oyster b	107	54	46		44	5	25
1.216	Whitstable Mus.	Box 26 (37)	33	036	CALETI. M	C	bf wf	3	2	w m	100	49	40			3	24
1.217	British Museum	M1694	33	036	CALETI. M	C	wf	0	0 W	b	103	50	43		41	3	24
1.218	Whitstable Mus.	Box 1 Wallace	33	036	CARETI. M	C	mf	2 T=25°	1		105		44			4	24
1.219	Whitstable Mus.	Box 1 Wallace	33	036	CARETI. M	C	cf	1	1		105	55	44	46		4	24
1.220	Whitstable Mus.	Box 1 Wallace	33	036	CARETI. M	C	mf	2 T=10°	1		107		44			4	25
1.221	Whitstable Mus.	Box 26 (53)	33	036	CARETI. M	C	mf	2 T=25°	2	w	107		46			3	23
1.222	Whitstable Mus.	W.1988.1000.17	33	036	CARETI. M	C	C	2 T=40°	1	r	105	53	43	48		3	24
1.223	Canterbury Mus.	1055	33	036	CINTVS. M	C	bf wf	3	1	m w	109						
1.224	Liverpool Mus.	M7458	33	036	CINTVS. M	C		3	1	m	108	68	51	43.5		5	29

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1.225	Maidstone Mus.	Box RB21B	33	036	CINTVS. M	C	bf wf	3	1	m	106						
1.226	Swansea Mus.	A908.11.17	33	036	CINTVS. M	B	wf	3	2	b m	111	56	48		40	4	26
1.227	Whitstable Mus.	Box 1 Wallace	33	036	CINTVS. M	C	C	3	1		107	58	49	46		4	24
1.228	Whitstable Mus.	Box 25 (39)	33	036	CINTVS. M	C	mf	3	2	w	106		47			4	29
1.229	Whitstable Mus.	Box 26 (50)	33	036	CINTVS. M	C	bf wf	3	3	m w	104	46	38	42		4	29
1.230	Whitstable Mus.	Box 26 (51)	33	036	CINTVS. M	C	bf wf	3	2	m	110		42			3	28
1.231	Whitstable Mus.	W.1988.1000.17	33	036	CINTVS. M	C	bf wf	3	1	oyster	104	49	42				
1.232	British Museum	1977 5-1 9	33	036	CINTVS. M	C	wf	3	1 W	b m	109	53		48	45	4.5	
1.233	Jewry Wall, Leic.	AIII.1927 SLC	33	036	CINTVS. M	C		3	1	w	106	53					
1.234	Whitstable Mus.	Box 24 (72)	33?	036	CINTVS. M	F base	_							42		4	27
1.235	Herne Bay Mus.	H1191	33	036	DECMI. M	C		2 T=75°	2 T=w	r	106	55	45	46		3	26
1.236	Herne Bay Mus.	H1191	33	036	DECMI. M	C		2 T=35°	3 T=w	r	103	53	45	47		4	26
1.237	Maidstone Mus.	Box RB21B	33	036	DECMI. M	B	br	2	2	m	104						
1.238	Maidstone Mus.	Box RB21B	33	036	DECMI. M	C		3 T=w	1 P		106						
1.239	Swansea Mus.	A908.11.12	33	036	DECMI. M	C	wf	3 T=w	1 W	m hy	105	56	48		44	3	25
1.240	Swansea Mus.	A908.11.13	33	036	DECMI. M	C	bf wf	3 T=w	1 T=g W	hy w	103	54	45		43	3.5	25
1.241	Swansea Mus.	A908.11.14	33	036	DECMI. M	C	wf	1 T=w	1	oyster	99	47	40		39	3.5	24
1.242	Whitstable Mus.	Box 26 (?)	33	036	DECMI. M	C	bf wf	2 T=10°	1	m	104	57	49			3	26
1.243	Whitstable Mus.	Box 26 (46)	33	036	DECMI. M	C	C	2 T=20°	1	oyster	104	49	41			4	25
1.244	Whitby Museum	M0191	33	036	DECMI. M	C	wr	2 T=g	2 T=p	w p	103			49			
1.245	Mus. of London	21964	33	036	DECMI. MA	C	wf	2 T=w	1		105			47			
1.246	British Museum	1937.3-16.2	33	036	DECMI. MA	C	cf wf	1 T=55°	1 S=35mm	m	104	53	44	44	39	4	17
1.247	British Museum	M1707	33	036	DECMI. MA	C	wf	2 T=w	0 W		104	50	42		43	5.5	25
1.248	Fisherman C	SG	33	036	DECMI. MA	B 85%	cr bf wf	3 T=break	1 P	oyster w p	105	50	43		45	3	
1.249	Whitstable Coll.	RA	33	036	DECMI. MA	C	C	2 T=30°	2 T=w	rem.	106	52	43	45		4	25
1.250	Whitstable Coll.	RA	33	036	DECMI. MA	C	C	2 T=35°	2 T=w	rem.	105	57	46	46		4	25
1.251	Whitstable Mus.	1986.17.1.1	33	036	DECMI. MA	C	C	1 T=w	1		107	52	43	48		4	26
1.252	Whitstable Mus.	Box 1 Wallace	33	036	DECMI. MA	C	C	1	1		103	52	41	44		4	26
1.253	Whitstable Mus.	Box 1 Wallace	33	036	DECMI. MA	C	C	2 T=45°	2 T=w		103	55	44	45		4	26
1.254	Guildhall, Roch.	64	33	036	MAINACNI?	C	wf	3	1	w s	101						
1.255	Canterbury Mus.	Box 2 (74)	33	036	MASCELLIO	C	bf wf	3	2	m w	106						
1.256	Ashmolean Mus.	1909.1157	33	036	MATERNI						105	62					

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1.257	British Museum	393.65	33	036	MATERNI	C	cf wf	3	1	b m	103	55	48	41	38	3	30
1.258	British Museum	M1721	33	036	MATERNI	C	wf	0	0 S=35mm		107	61	50		40	3.5	26
1.259	British Museum	M1722	33	036	MATERNI	C	bf	2 T=w	0 S	b	105	57	46		42	4	30
1.260	Liverpool Mus.	M7457	33	036	MATERNI	C		3	1	b m rem.	106	58	51	37.5		4	31
1.261	Maidstone Mus.	Box RB21B	33	036	MATERNI	C		3	1	b m	106						
1.262	Ashmolean Mus.	1909.1158	33	036	MATERNIANI	C	wr cr mf	3	1 W?	b w p	102		44			2.5	26
1.263	British Museum	1377.70 (M1724)	33	036	MATERNIANI	C	wf	3	2	b rem.	100	51	47	36	34	2.5	26
1.264	Liverpool Mus.	M7460	33	036	MATERNINI	C	bf	3	1 T=w W		104	53	48	39		2.4	26
1.265	Swansea Mus.	A908.11.2?	33	036	MATERNINI	B 50%	bf wf	3	1	b m	103	53	47		36	3.7	27
1.266	Swansea Mus.	A908.11.20	33	036	MATERNINI	C	bf wf	3	2 W	m w b	103	52	47		40	3.5	26
1.267	Swansea Mus.	A908.11.21	33	036	MATERNINI	C	wf	3	1	rem.	103	52	46		38	3	27
1.268	Swansea Mus.	A908.11.23	33	036	MATERNINI	C	cr bf wf	3	1 W	hy m	101	51	45		37	3	26
1.269	Maidstone Mus.	Box RB21B	33	036	MATERNNI. M	C	bf wf	3	1	m w	101						
1.270	Maidstone Mus.	Box RB21B	33	036	MATERNNI. M						100						
1.271	Whitstable Mus.	Box 25 (36)	33	036	MATERNNI. M	C	bf wf	3	1		100	50	46			3	25
1.272	Whitstable Mus.	Box 25 (38)	33	036	MATERNNI. M	C	mf	3	1	w	100		44			2	25
1.273	Whitstable Mus.	Box 25 (47)	33	036	MATERNNI. M	C	mf	3	1	r	104		46			2	25
1.274	Whitstable Mus.	Box 26 (42)	33	036	MATERNNI. M	B	mf	3	2	w	103		42			3	26
1.275	Whitstable Mus.	Box 26 (43)	33	036	MATERNNI. M	C	mf	3 T=w	1	b	99		45			3	26
1.276	Whitstable Mus.	Box 26 (45)	33	036	MATERNNI. M	C	mf	3	2	m	102		43			2	25
1.277	Whitstable Mus.	Box 26 (49)	33	036	MATERNNI. M	C	bf wf	3	2	m w	103		44			3	25
1.278	Whitstable Mus.	Box 26 (54)	33	036	MATERNNI. M	C	C	3	1		107					2	25
1.279	Whitstable Mus.	Box 26 (55)	33	036	MATERNNI. M	C	mf	3	1	w m	100		43			3	26
1.280	Whitstable Mus.	W.1988.1000.17	33	036	MATERNNI. M	C	mf	3	1	w b	102					2	26
1.281	Whitstable Mus.	Box 26 (56)	33	036	MAI[ERNNI]NI.	C	bf wf	3	2	m w b	102	51	45	39		2	25
1.282	British Museum	1937 3-16 8	33	036	NAMILIANI	C	mf	2	0 W	w	142		70		48	3	28
1.283	Whitstable Mus.	Box 25 (24)	33	036	NAMILIANI	C	mf	3	1	m	140		70			3	30
1.284	Whitstable Mus.	Box 26 (16)	33	036	NAMILIANI	C	mf	3	2	b m	137		56			3	32
1.285	Whitstable Mus.	Box 26 (18)	33	036	NAMILIANI	C	bf wf	3	2	m w b	137	80	68	54		3	31
1.286	Whitstable Mus.	Box 1 Wallace	33	036	NAMILIANI. M	C	mf	1	1		103		46			3	26
1.287	Whitstable Mus.	Box 1 Wallace	33	036	NAMILIANI. M	C	C	1	1		100	54	45	41		3	26
1.288	British Museum	M2144	33	036	PATT. OF	C	bf wf	3 T=w	1 W	m	106	57	54		39	4	23

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1.289	Whitstable Mus.	Box 26 (52)	33	036	PATTO. F	C	bf wf	3	2	m w	100	54	48	37		3	23
1.290	Whitstable Mus.	Box 25 (35)	33	036	?? PATTO	C	bf wf	3	1	w	106	58	52			3	22
1.291	Ashmolean Mus.	None	33	036	QVINTI. M	C	wr wf	3	1 W	p w	135	74	63	56		3.5	26
1.292	British Museum	M1737	33	036	QVINTI. M	F	bf wf		1								
1.293	British Museum	M1738	33	036	QVINTI. M	F	wf	3	1					51			
1.294	Maidstone Mus.	Box RB21B	33	036	QVINTI. M	C	bf wf	3	1	m b w	99						
1.295	Swansea Mus.	A908.11.23	33	036	QVINTI. M	C	bf wf	3	1 W	rem	135	75	63		51	4	38
1.296	Whitstable Mus.	Box 24 (71)	33?	036	QVINTI. M	F base	_							55		4	25
1.297	British Museum	M1740T	33	036	SATVRNINI	C	wf	3 T=w	1	m b	102	54	49		60	2.5	33
1.298	Maidstone Mus.	Box RB21B	33	036	SATVRNINI	C		3	1	w b	106						
1.299	Swansea Mus.	A908.11.18	33	036	SATVRNINI	C	bf wf	3 T=g	1 W	hy m	107	54	50	43	40	2	31
1.300	Whitstable Mus.	Box 26 (?)	33	036	SATVRNINI	C	bf wf	3	2	m	105	57	49			2	33
1.301	Whitstable Mus.	Box 25 (19)	33	036	SEVERIANI. O	C	mf	3	1	oyster	149		70			3	25
1.302	Ashmolean Mus.	1910.2	33	036	SEVERIANIO	C	wr bf cf	3	1	b w p	143	c 80	72			3.5	26
1.303	British Museum	1908 7-27 6	33	036	SEVERIANIO	C	mf	1	1 W=50mm	oyster w b	145		71		55	4	26
1.304	Liverpool Mus.	M7452	33	036	SEVERIANIO	C	wf	3	1		148			56			
1.305	Whitstable Mus.	Box 26 (14)	33	036	SEVERIANIO	C	bf wf	3	2	m w b	135	75	67	51		3	27
1.306	Whitstable Mus.	Box 26 (17)	33	036	SEVERIANIO	C	bf wf	3	2	oyster	148	75	66			4	27
1.307	Maidstone Mus.	Box RB21A	33	036	SEVERIANO	C	bf wf	2	1	m w p	148						
1.308	Whitstable Mus.	Box 24 (70)	33	036	?? PAC.....M	F 75%	bf			oyster		56	50	42		3	23
1.309	Whitstable Mus.	Box 25 (41)	33	036	??	C	bf wf	3	3	oyster	102	56	47	40		2	25
1.310	Ashmolean Mus.	1948.250	35	014	No stamp	B 85%	br cf wf	2 T=90°	2 T=w	w	120	45	33	51			
1.311	British Museum	1908 7-27 8	35	014	No stamp	C	mf	3 T=w	1	w	109		36		40		
1.312	British Museum	1920.11-23 12	35	014	No stamp	C	bf wf	2 T=w	1 S=50mm	s	119						
1.313	British Museum	1920.11-23 14	35	014	No stamp	C	wf	2 T=w	1 W	none	118						
1.314	British Museum	M2844	35	014	No stamp	C	mf	3	1 W	oyster b			55		85		
1.315	Canterbury Mus.	Box 2 (1172)	35	014	No stamp	C	bf wf	3	1	oyster	118						
1.316	Folkestone Mus.	F873	35	014	No stamp	C	?	?	?								
1.317	Herne Bay Mus.	H1193	35	014	No stamp	C	wf	1 T=w	2		117	44	34	50			
1.318	Maidstone Mus.	Box RB21A	35	014	No stamp	C	mf	3	1		119						
1.319	Maidstone Mus.	Box RB21A	35	014	No stamp	C	mf	3	1		120						
1.320	Maidstone Mus.	Box RB21A	35	014	No stamp	C	mf	3	1		118						

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1.321	Maidstone Mus.	Box RB21A	35	014	No stamp						121						
1.322	Mus. of London	3151	35	014	No stamp						c114	c51					
1.323	Whitby Museum	M0187	35	014	No stamp	C	br wf	2 T=w	2 W	b	122	c26	c19	59			
1.324	Whitstable Coll.	RA	35	014	No stamp	C	C	3	1	rem.	120	44	32	49			
1.325	Whitstable Mus.	Box 24 (?)	35	014	No stamp	B	bf	3 T=w	1		120	44	32				
1.326	Whitstable Mus.	Box 24 (72)	35	014	No stamp	F base	_										
1.327	Whitstable Mus.	Box 25 (?)	35	014	No stamp	C	wf	3	1		115	32	22	49			
1.328	Whitstable Mus.	Box 26 (?)	35	014	No stamp	C	wf	1 T=w	1	w	113	43	34	46			
1.329	Maidstone Mus.	Box RB21A	36	015A	DATTI. FEC	C	br	1	1		162						
1.330	Ashmolean Mus.	1909.1160	36	015A	No stamp	C	wr mf	3	1		194		48				
1.331	Ashmolean Mus.	1925.630	36	015A	No stamp	C	wr bf wf	2 T=w	1 P	p	189	56	43	79			
1.332	Ashmolean Mus.	1961.255	36	015A	No stamp	C	wr cf wf	3 T=w	1	p	190	49	39	87			
1.333	British Museum	1920 11-23 10	36	015A	No stamp	C	cr mf	3 T=w	0	oyster w	190		46		77		
1.334	British Museum	1920 11-23 11	36	015A	No stamp	C	cr mf	1	0 S=80mm	oyster	194		42		79		
1.335	British Museum	1920 11-23 9	36	015P	No stamp	C	mf	3	0 S=110mm	w	271		57		96		
1.336	British Museum	1920.11-23 13	36	015P	No stamp	C	wf	2 T=w	2 T=w	p s	261			94			
1.337	British Museum	53.5-2.33 (M2404)	36	015A	No stamp	B 90%	br wf	1	1 P	none	196	54	39	84	81		
1.338	British Museum	53.5-2.34	36	015A	No stamp	B 95%	br wf	0	0 W=60mm	none	170	41	33	64	62		
1.339	British Museum	M2403	36	015A	No stamp	C	cr mf	2	0 W	b	195		42		84		
1.340	British Museum	M2405	36	015A	No stamp	C		0	0 W		186	39	36		56		
1.341	British Museum	Unnumbered	36	015P	No stamp	C	bf wf	3 T=w	2 T=w	oyster	240		44				
1.342	Collector A	LH	36	015A	No stamp	C	cr wr wf										
1.343	Collector B	PS	36	015A	No stamp	C	wr wf	3	2		184	54	42	86			
1.344	Fisherman A	AR	36	015A	No stamp	F rim		3	1	w p							
1.345	Fisherman C	SG	36	015A	No stamp	F base	mf	3	1	p w					88		
1.346	Fisherman C	SG	36	015P	No stamp	B 39%	br bf wf	2 T=20°	3 W=102mm	w	277	76	63		95		
1.347	Fisherman C	SG	36	015A	No stamp	F base	bf	2	0	w b					101		
1.348	Fisherman C	SG	36	015A	No stamp	F r/b 33%	bf wf	3	1 W	w b							
1.349	Fisherman C	SG	36	015A	No stamp	B 12%	br bf wf	3	1 W=102mm	w b			47		90		
1.350	Fisherman C	SG	36	015A	No stamp	B 10%	br bf wf	2 T=15°	3 W	w p		69	55		94		
1.351	Herne Bay Mus.	CANHB2001.1	36	015A	No stamp	C	bf wf	3	0	oyster m p	194	53	44				
1.352	Herne Bay Mus.	H1189	36	015A	No stamp	C	mf	2	2	w m	195		42				

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1.353	Herne Bay Mus.	H1190	36	015A	No stamp	C	bf wf	3	1	r	199	48	39	93			
1.354	Jewry Wall, Leic.	A853.1951(E261C)	36	015A	No stamp	C	cr cf	3 T=10°	1	oyster b m	187	50	39	83			
1.355	Kelvingrove Mus.	1903.269.m	36	015A	No stamp	C	cr wf	0	0 W	none	158	37			60		
1.356	Liverpool Mus.	M7448	36	015A	No stamp	C	bf wf	3	1	none	185	50					
1.357	Maidstone Mus.	Display	36	015P	No stamp	C					241						
1.358	Manchester Mus.	37424 R869	36	015A	No stamp	C											
1.359	Manchester Mus.	37427 R875	36	015A	No stamp												
1.360	Manchester Mus.	37430 R878	36	015A	No stamp												
1.361	N M Scotland	1911.291	36	015A	No stamp	C	wf	1	0 W	w	193	46			80		
1.362	Plymouth Mus.	4470	36	015P	No stamp	C					248	64					
1.363	Swansea Mus.	A908.11.6	36	015A	No stamp	C	wf	3	1	hy	194	74	53		89		
1.364	Swansea Mus.	A908.11.7	36	015P	No stamp	C	mf	3	1 W	w	274		62		90		
1.365	Swansea Mus.	A908.11.9	36	015P	No stamp	C	bf wf	2 T=w	1	oyster b w	252	63	52		78		
1.366	Swansea Mus.	A908.11.10	36	015A	No stamp	C	bf wf	2	0	rem.	196	53	44		79		
1.367	Whitby Museum	M0188	36	015A	No stamp	C	bf wf	3 T=w	0	oyster b w	194			90			
1.368	Whitby Museum	M0189	36	015A	No stamp	C	bf wf	2 T=20°	2 W	oyster b w p	188						
1.369	Whitstable Coll.	RA	36	015A	No stamp	C	cr bf	3	1	rem.	190	40	30				
1.370	Whitstable Mus.	Box 25 (?)	36	015A	No stamp	C	bf wf	2 T=w	1	m	194	50	38	81			
1.371	Whitstable Mus.	Box 27 (?)	36	015A	No stamp	C	mf	3 T=w	1	m w	197		39				
1.372	Whitstable Mus.	W.1988.1000.17	36	015P	No stamp	C	mf	3	1	w	279		58				
1.373	British Museum	Unnumbered	36	015P	No stamp	C	bf wf	2 T=w	1 T		264		42				
1.374	British Museum	2000 1-1 70	36?	015P	No stamp	C	mf	3	0		264		53		91		
1.375	Liverpool Mus.	M7453	38	088	ATILIANI. M	C	cr mf	3	1	b rem.	143		64		56	3.4	30
1.376	British Museum	1920.11-23.35	38	088	CINTVS. M	C	mf	3	1	rem	146		68		61	4	29
1.377	British Museum	1908 7-27 10	38	088	CINTVS.M	C	mf	3 T=w	0	w s	146		65		55	4	29
1.378	British Museum	1937.3-16.4	38	088	IVLLINI.M	C	mf	2	1	m rem.	141		66		53	3	27
1.379	British Museum	1950 5-2 9	38	088	IVLLINI.M	C	mf	1 T=w	0	w	140		68		51	3	28
1.380	Ashmolean Mus.	1910.1	38	088	NAMILIANI	C	wr mf	3	1 P	b w p	131		67			3.5	31
1.381	Whitby Museum	M0194	38	088	No stamp	C	cr wf bs	2	3	none							
1.382	British Museum	1908 7-27 9	38	088	SEXTI.MA	C	mf	3 T=w	0	m b	142		68		56	4	31
1.383	Liverpool Mus.	M7451	38	088	SEXTI.MA	C	wf	3	1		137	75		67			
1.384	Whitstable Mus.	Box 25 (58)	38	088	SEXTIMA	C	mf	2	1	w m	139		64			3	30

Assemblage catalogue number	Museum or private collection	Museum accession number	Form: Dragendorff Walters Curle Ludowici	Bet & Delor (2000) equivalent no.	Potter's stamp	Vessel: complete broken fragment EVE	Rim/Foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear inc. diameter of footring impression	Marine growth	Rim Dia	Hgt	Hgt *minus* Foot Ring	Ft Ring Dia	Dia at Top of Ft Ring	Stamp W	Stamp L
1.385	British Museum	1920.11-23.36	38	088	Worn away	C	wf	2	3	rem	136	52	39	65	60		
1.386	Whitstable Mus.	1986.17.1.2	38	088	……N	F 50%	bf	3	1		132	66	58	59			
1.387	Canterbury Mus.	Box 2 (1145)	46	042/4	Rosette 12 seg	C	bf wf	3	1	oyster	102						
1.388	Maidstone Mus.	Box RB21A	46	042/4	Rosette 12 seg	C	wf	3	1		103						
1.389	British Museum	1920.11-23 23	46	042/4	Rosette 12 seg	C		3 T=w	1 W=40mm	oyster s	102			44			
1.390	British Museum	Unnumbered	46	042/4	Rosette 12 seg	C		3	0	p w	104		27	44			
1.391	British Museum	Unnumbered	46	042/4	Rosette 12 seg	C		2 T=w	2 W=40mm		103		26	43			
1.392	Whitstable Mus.	Box 25 (69)	46	042/4	Rosette 12 seg	C	mf	3	1	w	106		36			14	
1.393	Whitstable Mus.	Box 26 (68)	46	042/4	Rosette 12 seg	C	bf wf	3	2	oyster	104	43	35	43		14	
1.394	British Museum	2000 1-1 71	46?	042/4	Rosette 12 seg	C	wf	3	1	br	103	43	36		40		
1.395	British Museum	2000 1-1 72	46?	042/4	Rosette 12 seg	C	wf	3	1	br	100	45	36		41		
1.396	Mus. of London	3185	46?	042/4	??						c89	c32					
1.397	British Museum	1737-1901	O&P LV13	042	Rosette 12 seg	C	cf wf	3	1	b m	106	41	33	43	41	14	
1.398	Jewry Wall, Leic.	A852.1951(E261B)	O&P LV13	042	Rosette 12 seg	C	cr bf wf	3	3	b m w	105	43	38	44		15	
1.399	Jewry Wall, Leic.	AIII.1927.66	O&P LV13	042	Rosette 12 seg	C	bf wf	3	3 W=38mm	m w rem.	105	45	38	44		15	
1.400	Folkestone Mus.	F872	79	032A	ATILIANI. M	C	wf	1 T=w	1	m	182						
1.401	Jewry Wall, Leic.	A851.1951(E261A)	79	032A	ATILIANI. M	C	cf	3	0 W=96mm	rem.	181	38	27	97		3	28
1.402	Kelvingrove Mus.	1903.269.I	79	032A	ATILIANI. M	C	wf	3	1 W	none	181	40			96	3.2	38.5
1.403	Liverpool Mus.	M7469	79	032A	ATILIANI. M	C	bf wf	1	1 T=w W	none	180	39	28	102		2.5	28
1.404	Maidstone Mus.	Box RB21B	79	032A	ATILIANI. M	B	bf wf	3 T=w	1	oyster	175						
1.405	Maidstone Mus.	Box RB21B	79	032A	ATILIANI. M	C	br bf wf	3	1		186						
1.406	N M Scotland	1911.289	79	032A	ATILIANI. M	C	wf	1	0 W	r	182	36			96	3.2	38
1.407	N M Scotland	1911.290	79	032A	ATILIANI. M	C	cr wf	0	2 P	none	181	42			94	3.4	38
1.408	N M Wales	02.18	79	032A	ATILIANI. M	C	cf	1 T=w	2 P		181	40	33	102	90	3.5	28
1.409	Swansea Mus.	A908.11.2	79	032A	ATILIANI. M	C	bf wf	3	1 W	m rem.	183	35.5	30		101	3.5	28.5
1.410	Whitstable Mus.	W.1988.1000.17	79	032A	ATILIANI. M	C	wf	3 T=w	1	r	183	38	30	104		3	28
1.411	Ashmolean Mus.	R 332	79	032A	ATILIANI. M	C	wr cf	3 T=w	1 W=95mm	none	182	38	29	100		3	28
1.412	Ashmolean Mus.	1920.229	79	032A	ATILIANI. M						172	38					
1.413	British Museum	M1752	79	032A	ATILIANI. M	C	bf wf	0	0 W		184	44	31		96	3.5	29
1.414	British Museum	M1753	79	032A	ATILIANI. M	C	bf	0	0 W		181	41	28.5		94	3	28
1.415	British Museum	M1754	79	032A	ATILIANI. M	C	bf wf	3	1 W		182	41	29		100	4	29
1.416	Mus. of London	34.285	79	032A	AT[ILIA]NI. M	C	wf	2 T=w	1		189			100			

Assemblage catalogue number	Museum or private collection	Museum accession number	Form: Dragendorff Walters Curle Ludowici	Bet & Delor (2000) equivalent no.	Potter's stamp	Vessel: complete broken fragment EVE	Rim/Foot: missing broken chipped worn	External wear inc. evidence of tilt	Internal wear inc. diameter of footring impression	Marine growth	Rim Dia	Hgt	Hgt *minus* Foot Ring	Ft Ring Dia	Dia at Top of Ft Ring	Stamp W	Stamp L
1.417	Whitstable Coll.	RA	79	032A	CA[RATIII]. M	C	bf	3 T	1	rem.	182	45	34			4	28
1.418	Herne Bay Mus.	H406/1	79	032A	CAMPANIO	B		3 T=w	1	m							
1.419	NMM, London	ARC 1979/6L	79	032A	CAMPANIO	C											
1.420	Swansea Mus.	A908.11.16	79	032A	CAMPANIO	C	cf wf	3	2 W	none	180	42	33	98	93	3.5	26
1.421	Whitstable Mus.	Box 26 (63)	79	032A	CAMPANIO	C	wf	3	1	oyster	177	31	18	93		4	26
1.422	British Museum	1920.11-23.17	79	032A	CARATIII. M	C	bf wf	1 T=w	1 W=100mm	m	183	44	34		103	4.5	30
1.423	Herne Bay Mus.	H1186	79	032A	CARATIII. M	C	bf wf	3	1		183	43	35	106		4	28
1.424	Whitstable Coll.	RA	79	032A	CARATIII. M	C	bf	3 T=w	1	rem.	182	43	32	102		4	30
1.425	Whitstable Mus.	Box 1 Wallace	79	032A	CARATIII. M	C	bf	3	1		180	43	31	109		4	28
1.426	Whitstable Mus.	Box 25 (65)	79	032A	CARATIII. M	C	bf wf	3 T=w	1	oyster	185	43	32	105		4	29
1.427	British Museum	M1755	79	032A	CARATIII. M	C	wf	3	0 W		185	46	36		105	5.5	29
1.428	Plymouth Mus.	4469	79	032A	CARATILI. M	C					178	45					
1.429	NMM, London	ARC 1979/7L	79	032A	CARATILLI. M	C											
1.430	British Museum	1920.11-23 16	79	032A	CARATILLI. M	C	bf wf	2 T=w	1 S=100mm	none	180			101			
1.431	Mus. of London	3295	79	032A	CARATILLI. M						c178	c45					
1.432	Whitstable Mus.	Box 26 (67)	79	032A	CATIANVS	B	wf	3	1	m	189	44	34			4	24
1.433	Maidstone Mus.	Box RB21B	79	032A	CRACINA. F	C	bf wf	3	1	oyster	175						
1.434	British Museum	1920.11-23.18	79	032A	MARTINI. M	C	wf	3	1 S=100mm	rem	191	47	32	105	101	3.5	27
1.435	Maidstone Mus.	Box RB21B	79	032A	MARTINI. M	C	br bf wf	3	1	m b	184						
1.436	British Museum	1937 3-16 7	79	032A	MERCATOR	C	mf	3 T=w	1	oyster b w	175		31.5		88	4.5	2.8
1.437	British Museum	1920.11-23.19	79	032A	OF. CAI	C	bf wf	3	3 T=w	oyster m p	191	45	30	95	90	3	26
1.438	NMM, London	ARC 1979/8L	79	032A	OF. GAI	C											
1.439	Ashmolean Mus.	1961.254	79	032A	PAVLLI	C	wr wf	3 T=w	1 W=92mm	none	188	45	33	101		4	24.5
1.440	British Museum	M1756	79	032A	PAVLLI	C	wf	3 T=w	0 W		186	43	32		93	3	26
1.441	Maidstone Mus.	Box RB21B	79	032A	PAVLLI. M	C	br bf wf	3	1	m b w	185						
1.442	Maidstone Mus.	Box RB21B	79	032A	PAVLLI. M	C	bf wf	3	1	m b w	183						
1.443	Whitstable Mus.	Box 26 (66)	79	032A	PAVLLI. M	B	wf	3	1	w m	191	44	30	104		4	24
1.444	British Museum	1920.11-23.20	79	032A	PAVLLI. M	B	bf wf	3 T=w	1 S=100mm	oyster m	184	45	35	100	95	5	26
1.445	Liverpool Mus.	M7447	79	032A	PAVLLI. M	C	wf	3 T=w	1		184	46	35	93		4	26
1.446	Whitby Museum	M0190	79	032A	PAVLLI. M	C	cr cf wf	3	1 W	p	182			101			
1.447	Mus. of London	3262	79	032A	QVINTI. M						c184	c57					
1.448	Fisherman B	JM	79	032A	SACRILLI. M	B	bf wf	3	1								

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1.449	Liverpool Mus.	M7434	79	032A	SACRILLI. M	C	bf wf	3	1 M=100mm	none	188	47	36	101		3	26
1.450	NMM, London	ARC 1979/9L	79	032A	SACRILLI. M	C											
1.451	Whitstable Mus.	Box 26 (64)	79	032A	SACRILLI. M	B	wf	3	1	m w b	183	44	29	104		4	25
1.452	Mus. of London	3261	79	032A	SATVRNINI						c267	c76					
1.453	Herne Bay Mus.	H1187	79	032A	?? MURIANI.M	C	bf wf	3	1	w m	185	45	32	102		6	26
1.454	Whitstable Mus.	Box 24 (?)	79	032A	??	F rim											
1.455	Folkestone Mus.	F871	79	032A	Worn away	C	bf wf	3 T=w	1	m	175						
1.456	Soc. Of Antiq.s	574.1 (C.30)	79	032A	Worn away	C	wr wf	1	3 P		176	45	33	103			
1.457	British Museum	1920.11-23 15	79r	032P	BELSA. ARVEI	C	cr	1	2 T S=140mm	none	277			140			
1.458	Manchester Mus.	37422 R867	79r	032P	BELSA. ARVI	C											
1.459	Whitstable Mus.	W.1988.1000.17	79r	032P	BELSA. ARVI	C	bf wf	2 T=15°	1 S	r	276	54	43			3	26
1.460	Fisherman A	AR	79r	032P	SATVRNINI	C	br bf wf	3	1 W	m							
1.461	Liverpool Mus.	M7439	79r	032P	SEVERIAN.M	C	cr mf	3 T=w	0	none	251		38		125	5.4	27.5
1.462	British Museum	1903.11-15.221	79r	032P	No stamp	C	cr wr bf	1 T=w	1 P	oyster b m	265	59	45	150	134		
1.463	British Museum	1908.7-27.1	79r	032P	No stamp	B 65%	br cf wf	2	1	rem	268	51	34	145	133		
1.464	Whitstable Mus.	Box 24 (?)	79r	032P	??	F r/b											
1.465	British Museum	1736-1901	80	031	CATIANVS	C	wf	3	1 W=50mm	b m	101	39	30	52	47	3	26
1.466	British Museum	1920.11-23 21	80	031	CATIANVS	C		3	1	s	97			51			
1.467	British Museum	M1750	80	031	CATIANVS	C	wf	3 T=w	0 W		100	49	26		46	2.5	25
1.468	Canterbury Mus.	1199	80	031	CATIANVS	C	bf wf	3	1	m	101						
1.469	Controlled dredge	MW	80	031	CATIANVS	C	bf wf	3	1 W=50mm	m hy	98	37	26	52	48	2.5	27
1.470	Maidstone Mus.	Box RB21C	80	031	CATIANVS	C	bf wf	3	1	r	100						
1.471	Liverpool Mus.	M7463	80?	031	CATIANVS	C					233						
1.472	British Museum	1937.3-16.3	80	031	FIRMIN. AREA	C	wf	2	1 W=55mm	w rem	100	40	29	55	51	3	39
1.473	Ashmolean Mus.	1938.362	80	031	PRIMANI	B 60%	br cf wf	0	0	w	103	36	25	53		4	Incomp
1.474	Manchester Mus.	R880	80	031	??												
1.475	Jewry Wall, Leic.	AIII.1927	80	031	??	C		1	1		90	32					
1.476	British Museum	1923 5-2 29	C15	045A	DOVIICCVS	C	wf	1	2	oyster	199	65	53	12	71		
1.477	British Museum	2000 1-1 73	C15	045P	Rosette 8 seg	C	bf wf	3	0 W	oyster br	240	67	52		98		
1.478	British Museum	2000 1-1 74	C15	045P	Rosette 8 seg	C		3	0 W 120mm		285	75	60		111		
1.479	British Museum	Unnumbered	C15	045P	Rosette 8 seg	C	bf wf	3	1 T=w	p	238		33				
1.480	British Museum	Unnumbered	C15	045P	Rosette 8 seg	C		2 T=w	1 W=110mm	w	285		55				

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1.481	Whitstable Mus.	Box 1 Wallace	C15	045P	No stamp	C	cf	3	1	oyster	220	62	51	90			
1.482	Whitstable Mus.	Box 25 (?)	C15	045P	Area damaged	C	bf wf	2 T=10°	3 P	b m	287	76	62	120			
1.483	Swansea Mus.	A908.11.26	C23	043A	Rosette 12 seg	C	wf	1 T=g	3	hy b rem.	105	43	33	46	43		
1.484	Swansea Mus.	A908.11.27	C23	043A	Rosette 12 seg	C	wf	1	1	little	106	43	33	47	44		
1.485	British Museum	1920 11-23 22	C23	043A	Rosette 12 seg	C	bf wf	2 T=w	0 W	w	195	54	41		80.5		
1.486	Manchester Mus.	37421 R866	C23	043A	No stamp	C											
1.487	Canterbury Mus.	??	C23	043A	??	C	wf	3	0	hy	187						
1.488	British Museum	1937.3-16.1	Lud Tf	029	CATIANVS	C	wf	1 P	1 P	w	109	39	28	54	47	3	25
1.489	Whitstable Mus.	Box 25 (13)	Lud Tf	029	CATIANVS	C	bf wf	3	1	w m	114	39	28	55		3	24
1.490	Canterbury Mus.	1123	Lud Tf	029	ASIASTICI. M	C	bf	1	1		144						
1.491	Liverpool Mus.	M6135	Lud Tf	029	PAVLLI.M			1	1								
1.492	CUMAA	1951.324B	Ritt1	?	??												
1.493	Dartford Museum	1939/87	Ritt83	?	Worn away	C	cr wf	1	1		131			66			
1.494	Jewry Wall, Leic.	AIII.1927	Cup	?	??												
1.495	Jewry Wall, Leic.	AIII.1927.234	Loes 8ab	?	??	C		1	1		76	48					
1.496	Graham, Billy	TV Evangelist	?	?	??	C											
1.497	British Museum	1937.12-10 1	?	?	Missing	F											

Appendix 2

Other Roman artefacts recovered from Kentish Flats

Cat No	Location	Accession No	Description	Identification
2.01	Fisherman C	SG	Amphora top, handles and stopper	Gauloise 4 (N. France, AD???, wine)
2.02	Fisherman C	SG	Amphora handle	Dressel 20 (?????Oil)
2.03	Wheelers Oysters		Amphora spike	Dressel 20 (Spanish, late 1st-mid 2nd C. AD, oil)
2.04	Fisherman F	DW	Amphora top with one and half handles	Dressel 20 (Spanish, late 1st-mid 2nd C. AD, oil)
2.05	Fisherman C	SG	Amphora top with one handle	Dressel 20 (?????Oil)
2.06	East Quay Restau.	JG	Amphora top with one handle	Dressel 20 (Baetica, late 1st-mid 2nd C. AD, oil)
2.07	Fisherman B	JM	Amphora top with two handles	Gauloise 4 (N. France, mid 1st-3rd C. AD, wine)
2.08	Folkestone Mus.	Unnumbered	Amphora: complete	Class 6 Dr. 1/Pascual 1? Spanish 1st-2nd C. AD (Wine)
2.09	Fisherman E	BT	Amphora: complete with 6500 olives	London 555 (N. France, AD55-85?, olives)
2.10	Fisherman D	PE	Amphora: complete, globular	Gauloise 1 or 5 (S. France, AD160?, wine)
2.11	Whitstable Mus.	Unnumbered	Complete large grey spouted bowl	Mortarium stamped Q. VAL
2.12	Whitstable Mus.	Unnumbered	Complete large grey spouted bowl	Mortarium unstamped
2.13	East Quay Restau.	JG	Fragment large grey spouted bowl	Mortarium stamped CAVARIVS
2.14	Whitstable Mus.	Unnumbered	Heavily abraded red slipped lamp	Samian lamp
2.15	Whitstable Mus.	Unnumbered	Heavily abraded red slipped lamp	Samian lamp
2.16	CUMAA	1922.896	Low two-handled bowl	Dr 9 'Sugar Basin'? Central Gaulish black slipped ware
2.17	Whitstable Mus.	Box 25 (?)	Black base fragment	Dr 9 'Sugar Basin' Central Gaulish black slipped ware
2.18	Maidstone Mus.	Box RB21C	Small red fine ware cup	Terra rubra form 56C unstamped
2.19	British Museum	1997.0912.33	Red slipped bowl with barbotine deco.	ARS 3B
2.20	Jewry Wall, Leic.		Plain red slipped bowl	ARS 39
2.21	Liverpool Mus.	M7576	2 handled red ware jar with vertical rim	143mm rim dia.
2.22	Liverpool Mus.	DP Temp 2696	Red coarse ware sherds, encrusted	Sherds - no stamps
2.23	Ashmolean	Unnumbered	Roof tile 420 x 270-310mm	Tegula
2.24	Ashmolean		Roof tile mm	Tegula
2.25	Maidstone Mus.	Unnumbered	Roof tile 420 x 360mm	Tegula
2.26	Maidstone Mus.	Unnumbered	Roof tile 420 x 360mm	Tegula
2.27	British Museum	1909 11-9 1	Roof tile 450 x 330-40mm	Tegula
2.28	British Museum	1909 11-9 2	Curved roof tile	Imbrex
2.29	Controlled dredge	MW	Curved roof tile	Imbrex

Appendix 3

Concordance of plain samian typologies

Common plain samian forms recovered from the the Kentish Flats

Bet & Delor	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 & 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' that have not been designated by Bet and Delor (2000). Bet and Delor (2000: 467) suggest that form 036 (Drag. form 33) forms a set with forms 054, 055, and 056 (Drag. forms 31/31r). It is also obvious from the new typology that the form Oswald & Pryce (O&P) LV 13 is actually a form 042.

Chronology

Phase 1: Phase not recognized; hypothetically placed at the time Augustus
Phase 2: End of Augustus' reign and the start of Tiberius' reign possibly continuing under Claudius.
Phase 3: Middle of 1st century until the Flavians.
Phase 4: Flavian period to the beginning of the 2nd century.
Phase 5: First half of the 2nd century.
Phase 6: Middle of the 2nd century.
Phase 7: Second half of the 2nd century and first third of 3rd century.
Phase 8: Second and third quarter of 3rd century.
Phase 9: End of the 3rd century until the middle of the 4th century.
Phase 10: Second half of 4th century and beginning of the 5th century (after Bet & Delor 2000: 463).

Appendix 4

Institutions contacted for this study

	Institution	Contact	Replied	Vessels	Visited
1	Alnwick Castle Museum	2004	n	?	No
2	Ashmolean Museum, Oxford	2002	y	16	2005
3	Birmingham City Museum	2002	y	0	N/a
4	Bristol City Museum and Art Gallery	2002	y	0	N/a
5	British Museum	2000	y	106	2000
6	Cambridge Univ Mus of Arch and Anth	2002	y	3	2003
7	Cantor Arts Centre, Stanford, CA, USA	2002	?	?	No
8	Cheltenham Museum and Art Gallery	2002	y	0	N/a
9	Chichester District Museum	1997	n	0	N/a
10	Christ Church Library, Oxford	2004	y	0	N/a
11	Classics & Ancient History, UW Swansea	2002	?	?	No
12	Corporation of London Records Office	2004	y	0	2004
13	Dartford Museum	1997	y	1	1998
14	Dept of Classics, Univ of Leeds	2002	n	?	N/a
15	Dorset County Museum	2004	n	?	No
16	Eton School	2004	y	0	N/a
17	Exeter Maritime Museum	1997	y	0	N/a
18	Fishbourne Roman Palace & Museum	1997	y	0	N/a
19	Folkestone Museum	1997	y	6	1998
20	Getty Museum, LA, California	2002	y	0	N/a
21	Glenbow Museum, Calgary	2004	y	0	N/a
22	Grosvenor Museum, Chester	2002	?	?	No
23	Guildhall Museum, Rochester	1997	y	9	1998
24	Haffenreffer Mus, Bristol, Rhode Island	2002	?	?	No
25	Harrow School	2004	y	0	N/a
26	Hastings Museum & Art Gallery	1997	y	0	N/a
27	Herne Bay Museum	1997	y	19	1998
28	Horniman Museum	2002	y	0	N/a
29	Hunterian Museum, Uni. of Glasgow	2002	y	0	N/a
30	Institute of Archaeology, London	2002	y	1	No
31	Jewry Wall Museum, Leicester	2002	y	11	2003
32	Kelsey Museum, Univ of Michigan	2002	?	?	No
33	Kelvingrove Museum, Glasgow	2002	y	3	2002
34	Kingston-upon-Thames Museum	2004	n	?	No
35	Littlehampton Museum	1997	y	0	N/a
36	Llandudno Museum	1997	y	0	N/a
37	Leicester City Museums	2002	y	0	2003
38	Liverpool Museum, Liverpool	2002	y	27	2003
39	Maidstone Museum	1997	y	41	2003
40	Manchester Museum	2002	y	9	2003
41	Margate Museum	1997	y	0	N/a
42	Marischal Museum, Uni. of Aberdeen	2002	y	0	N/a
43	Maritime Museum, Vancouver	2004	y	0	N/a

44	Michael Carlos Mus, Atlanta, Georgia	2002	?	?	No
45	Mill Hill School	2004	n	0	N/a
46	Mus of Art and Arch, Columbia, Missouri	2002	?	?	No
47	Mus. of Antiquities, Newcastle on Tyne	2002	y	0	N/a
48	Museum of London	2002	y	10	2004
49	National Gallery & Museum of Wales	2002	y	1	No
50	National Maritime Museum, London	1997	y	4	No
51	National Museum of Ghana	2004	?	?	No
52	National Museum of Scotland	2002	y	6	2002
53	Natural History Museum, London	2004	y	0	N/a
54	Old Fulling Mill Museum, Durham	2002	y	0	N/a
55	Peabody Museum, Harvard	2002	?	?	No
56	Phoebe Hearst Mus, Berkeley, CA	2002	?	?	No
57	Pitt Rivers Museum, Oxford	2002	y	2	2005
58	Plymouth Museum	2004	y	2	No
59	Poole Museum	1997	y	0	N/a
60	Portland Museum	1997	y	0	N/a
61	Portsmouth City Museum	1997	y	0	N/a
62	Provincial Museum of Alberta	2004	y	0	N/a
63	Ramsgate Museum	1997	y	0	N/a
64	ROM, Toronto, Canada	2002	y	0	N/a
65	Royal Albert Museum, Exeter	2002	y	0	N/a
66	Rugby School	2004	y	0	N/a
67	Sackler Museum, Cambridge, Mass	2002	?	?	No
68	School of Classics, Univ of Bristol	2002	?	?	No
69	Society of Antiquaries, London	2004	y	5	2004
70	Southend Museum	1997	y	0	N/a
71	Southampton Museum of Archaeology	1997	y	0	N/a
72	Sunderland Museum	2004	y	0	N/a
73	Swansea Museum	2002	y	29	2003
74	The Art Institute of Chicago	2002	?	?	No
75	The Red House Museum, Christchurch	1997	y	0	N/a
76	The Royal Museum, Canterbury	1997	y	10	1998
77	UCL, Institute of Archaeology	2002	?	?	No
78	Univ of Liverpool Archaeology Museum	2002	?	?	No
79	Univ of Pennsylvania Mus. Philadelphia	2002	?	?	No
80	Winchester School	2004	y	0	N/a
81	Whitby Museum	2003	y	12	No
82	Whitstable Gallery and Museum	1997	y	113	1998
83	York Museum	2004	y	0	N/a
	Collector A (LH)			1	
	Collector B (PS)			2	
	Controlled dredge			4	
	Drift dive			1	
	Fisherman A (AR)			4	
	Fisherman B (JM)			3	
	Fisherman C (SG)			23	
	Billy Graham			1	
	Prof D Peacock			1	
	Dr M Redknap			2	
	Whitstable collector (RA)			14	
	Total vessels			502	

Appendix 5

Summary of collection history

Location	No. of 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; Rev. E A Sydenham 1948
British Museum	106	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
Cambridge University Museum Of Archaeology and Anthropology	3	0	1892, 1951	Dubious provenance	2 purchased from MG de Courcy, Ireland 1951, provenance unknown; 1 from Cambridge Antiquarian Society (Renumbered R274 in 1892 Cat. Of Local Roman Pottery), provenance given as Upchurch; also 1 Dr. 9 'Sugar bason'
Royal Museum, Canterbury	10	0			No data
Controlled dredges	4	4	2001	2001	4 vessels/frags + 1 imbrex recovered by RSP in Dec. 2001; Dr. 80 sent to BM handling coll.
Dartford Museum	1	0			No data
Drift dive	1	1	2001	2001	Fragment recovered during RSP drift dive June 2001
Fisherman A	4	4	1982-2002	1982-2002	Dredged from Pudding Pan, 1 in 2001; 1 in 2002 and 2 in last 20 year
Fisherman B	3	3	1977-2002	Since 1977	Trawled from N of Pan Sand in last 20 years
Fisherman C	23	23	1982-2000	Since 1982	Dredged from Pudding Pan in last 20 year
Folkestone Museum	6	6		1920s	Donated by Sebastian Evans
Billy Graham, TV evangelist	1	1			Donated by Wallace Harvey - TBR - (Dr B Porter pers comm.)
Guildhall Museum, Rochester	9	0			No data
Herne Bay Museum	19	3	1884, 1948		1 acq. from Northampton Mus. 2001 inscribed 'dredged off the Reculvers 1884'. 2 don. by Dr T A Bowes. 1 don. by W J Tester 1948 1 'cleaned Maidstone Museum 1958'

Collector A	1	0			Bought at Sotheby's sale in 1993; previously owned by H Johnson employee of Sotheby's
Collector B	3	3			Collected by grandfather Alf Whorlow who was oyster dredgerman 1920-1950
Collector C	14	14	1930-1940	1930-1940	Sole survivor of last Whitstable shipbuilding firm Anderson, Rigden, Perkins. RA's uncle was William Holden the Whitstable jeweller who displayed PP pots in his shop window as mentioned by Smith. Holden had 84 vessels in his collection that were offered
Inst. of Archaeology, London	1	0			No data
Jewry Wall Mus, Leicester	11	6			3 Crowther-Benyon Collection. 3 Fernie Collection ex Hilton Price Collection
Kelvingrove Museum	3	3	1861-2	1903	Presented by City of London Guildhall Library; 1 found in 1861, 1 in 1862
Liverpool Museum	27	17	1750-76		2 formerly in collection of Rolfe; 17 formerly in collection of Rev. B. Faussett (collected between 1750 and 1776) purchased by Joseph Mayer in 1853
Maidstone Museum	41	22	1906, 1921		3 donated by Sir G Donaldson July 1906. 8 purchased in 1921. 18 Arnold Coll. 1 S Well
Manchester Museum	9	9		1926	Donated by W Sharp Ogden c1926 formerly in Goldney Collection (F Bennet-Goldney was Mayor of Canterbury in 1909
Museum of London	10	0	1934, 1960	1934-1981	1 registered 1934; 1 registered 1960 and 1 registered 1981
National Maritime Museum	4	0			On loan from British Museum
National Museum of Scotland	6	6	Pre-1911	1911	Formerly Hilton-Price Collection, sold at Sotheby's 1911 Lot 1484
National Museum of 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
Prof D Peacock	1	0			No data
Dr Mark Redknap	2	2	1986	1986	Marine Archaeological Survey
Society of Antiquaries	5	5			Donated by J E Price
Swansea Museum	29	29	Pre-1908	1908	39 vessels originally presented to Royal Institution of South Wales by Col W Ll Morgan on Sept. 8 1908 formerly in Silbert Saunders Coll., Springfield House recorded by Smith (1909)
Whitstable Museum	113	90	Pre-1908		9 donated by W Harvey a local historian involved with Whitstable Hist. Soc. 12 don. by family of Harvey after his death in 2001. Artefacts donated to museum by Harvey may have been donated to WHS by others. c 69 donated by W Holden
Total (as at Jan 2005)	503	347			

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