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At the Interface of Makers, Matter, and Material Culture: Techniques and Society in the Ceramics of the Southern British Later Iron Age

Doctor of Philosophy

Department of Archaeology

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DECLARATION

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

A.D. Sutton
December 2017

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ABSTRACT

Changing pottery production methods are one of numerous significant developments in the archaeological record of Later Iron Age southern Britain. Previous studies of ceramic technology in this period (e.g. Rigby & Freestone 1997; Hill 2002) suffered from a lack of empirical data with which to characterise technological change, and only sparingly engaged with material culture theory. Our understanding of the social significance of changing technology has therefore remained largely obscured.

Clay is a plastic medium upon which numerous traces of technological practices leave their mark. These practices yield valuable information pertaining to how people interacted with the material world in socially-constructed ways, and how this changed during periods of upheaval. On this basis, this study provides the first attempt to empirically characterise the nature of ceramic technological change in two study-regions: Berkshire and northern Hampshire; and Hertfordshire. Petrographic and SEM analyses were used to characterise technological properties of Middle and Late Iron Age ceramic fabrics from the two regions; and radiographic analysis of 428 vessels revealed details of forming methods employed. Elements of continuity are identified for the first time: for example, in patterns of clay preparation or the use of coil-building; as well as in the continued production of flint-tempered pottery in Hampshire. Novel technology was variably employed alongside this continuity: for example, in both regions the potter's wheel was employed in at least two different ways - wheel-coiling, and throwing. Results point to a Middle Iron Age characterised by numerous localised systems of technical practice, from which emerged a Late Iron Age that saw technical knowledge flow more freely between groups of producers. This enriched technological background provided the means for the constitution of new forms of identity, and the reconfiguration of what it meant to be a craftsperson in a rapidly changing society.

CHAPTER 1: SOCIETY AND TECHNOLOGY IN LATER IRON AGE SOUTHERN BRITAIN

1.1 INTRODUCTION

Technologies are ways of doing things: methods for achieving a given end through the application of worldly understanding and practical know-how. Technology, when archaeologically accessible, is therefore a window into the kinds of knowledge and abilities that people had in the past. More than this, archaeological correlates of technology are important signifiers of past behaviour. Technological choices, as they are commonly called (e.g. Lemonnier 1992; 1993; Sillar & Tite 2000), offer us insights into the internal logics of past communities, allowing us to theorise upon the kinds of values, priorities, beliefs, and desires that may have influenced the decision to use one technique over another, or to create a specific kind of object rather than a different one.

In the context of the southern British Later Iron Age, there is evidence for large-scale change both in terms of the ways in which people made things – particularly ceramics – and the ways in which people were living their lives and experiencing the world. Iron Age specialists have in recent years developed a plurality of approaches to the study of society (e.g. Garrow & Gosden 2012; Hamilton 2007; Haselgrove 1995; Hill 1989; 1995; 1997; 2007; 2011; Joy 2012; 2014; Moore 2007; Sharples 2007; 2010), some of which have involved technology (Hingley 1990; 1997; Ehrenreich 1995; Hill 2002; Giles 2007). However, the few recent synthetic works on ceramic technology (Freestone & Rigby 1988; Rigby & Freestone 1997; Hill 2002) interact with concepts to do with society only sparingly (Hill's paper being the key exception). This study seeks to address this conceptual divide.

Clay is a plastic medium. It is manipulated in various ways that in aggregate produce objects that survive in plentiful amounts on sites of Later Iron Age dates throughout southern Britain. The various acts of manipulation and modification of this plastic medium often preserve themselves in the finished objects: wheel marks, 'tempers', and fire clouds are all examples of such technological traces. Therefore, pottery, by virtue of the preservation of these traces and the quantities in which it is found, offers archaeologists a potent resource for the analysis of past techniques.

This study utilises various analytical methods to characterise the chaînes opèratoires of large numbers of ceramic vessels from Middle (c.400/300-150/50 BC) and Late (c.150/50 BC-AD 43) Iron Age sites in two predefined ‘study regions’. The outcome is hoped to provide a robust basis for the characterisation of technological change in these two areas during the Later Iron Age, with the intention of contextualising this evidence within the regional archaeological background at large. As Chapter 3 details, a regional approach was deemed appropriate in order to balance the necessary depth of the analytical programme devised, with a concern over the potential for localised variability in the kinds of techniques being used and the past behaviours/processes that they signify. ‘Region 1’ was defined as the areas of the modern counties of Berkshire and the northern part of Hampshire, selected on the basis of the excavation of numerous well-known assemblages, an established ceramic sequence, and an interesting settlement pattern that is the subject of current research (the Silchester Environs project). ‘Region 2’ was defined as the modern county of Hertfordshire – Thompson’s ‘zone 7’ (1982, pp.15–16). While the ceramic sequence here is less clear for the earlier part of the period under discussion, recent work has served to clarify the nature of Middle Iron Age pottery (Thompson 2015, pp.119–122). The nature of the finds from Late Iron Age contexts is far better known (Thompson 1982, pp.15–16), as is the settlement pattern of this period (Bryant & Niblett 2001). Specifically, this region has some of the best collections of Late Iron Age ‘Belgic’ pottery in the country, and the extensive occupation that this reflects appears to have emerged from relatively sparse occupation. This presents a far different picture to that for Region 1, and yet out of these different backgrounds similar technological traditions appear to have developed. Analysis of these two very different regions was considered to be valuable to the overall approach of investigating the extent to which social change and technological change were intertwined.

The rest of Chapter 1 begins the study by surveying the literature on Later Iron Age societies and technologies, drawing out the precise nature of the conceptual divide between these two areas of study. Chapter 2 looks for a way forward, discussing ways in which recent theoretical trends enable us to fruitfully consider technology as a component of society, and vice-versa. Specifically, practice theory is identified as a key methodological tool in conceptualising and structuring analysis of the kind conducted here: technologies, in their roles in ‘doing’ things to materials and objects, are analogous to practices. From this, the notion of ‘techniques’ is derived as the core object of analysis.

Chapter 3 details the application of a practice framework to the analysis of ceramic technology. The regionalised approach is established, as are the methods that contribute to the database. These include ceramic petrography, point-counting, SEM microanalysis, and x-radiography. Chapters 4 and 5 detail the findings from each of the two study-regions, establishing the technological characteristics and major industrial groupings for each period, as well as the extent of change and – significantly – variability in each case. Chapter 6 expands consideration in conducting an in-depth analysis of selected techniques, establishing the kinds of social and economic significance that these techniques may have had, based upon consideration of how they are identified as having been used in the preceding two chapters. Chapter 7 then builds upon this bottom-up approach to techniques by considering how processes of social and technological change may have been interrelated. Key aspects discussed include the nature of technical innovation and knowledge circulation during the Late Iron Age, and how this is similar to/differs from Middle Iron Age patterns; how technical knowledge and practice may have acted as identity-markers, and how these patterns change through time; and how changing economic circumstances appear to have been implicated in variable and localised patterns of technological change. A final chapter summarises the results and interpretations, reflects upon the successes and limitations of the project, and makes recommendations for further work.

1.2 THEMES IN THE STUDY OF IRON AGE SOCIETY

The earliest work on the British Iron Age, characterised by culture-history and dominated by colonialist thinking and notions of migration (Allen 1944; 1961; Bushe-Fox 1925; Cunnington 1932; Hawkes 1959; Hawkes & Dunning 1930; 1932), was succeeded by thinking shaped largely by core-periphery modelling, functionalism, and economics. In particular, these later works emerged from the numerous heated debates surrounding the identification of the material correlates of Belgic invasion(s) (invasion being referred to in Caesar's *De Bello Gallico* (V.12): for debates see Mulvaney 1962; Birchall 1965; Hawkes 1968; Rodwell 1976; Champion 1975; 1979; 1985; Hodson 1975; Hachmann 1976; Stead 1976; Collis 1981). This attested invasion (or invasions) had previously been used to explain the material changes associated with the second and first centuries BC (e.g. Evans 1890; Hawkes & Dunning 1930; 1932; Cunnington 1932; Allen 1944; 1961; Hawkes 1959), and under this model the notion of social change was effectively unnecessary: material culture changed as a result of the movement of population groups, not because any particular group(s) had changed their behaviour.

It would be excessive to repeat the well-rehearsed arguments for and against the notion of a Belgic invasion here (for discussion in the context of the pottery, see Thompson 1982, pp.2–3; Tyers 1981, pp.398–416); suffice to say that, while there have since been numerous occasions on which evidence has been reported that is suggestive of the movement of individuals or groups from the continent (e.g. Fulford 2000, pp.563–564; Partridge 1981, p.351; Crummy et al. 2007, p.456), following the debates of the 1960s and '70s the idea of a Belgic invasion as a lone explanatory force in the case of Later Iron Age social change has been out-of-fashion, there being general agreement that the evidence for continental contact in this period was part of far more complex historical, economic, and social dynamics.

As such, by the 1980s and 1990s traditional approaches to Iron Age archaeology had begun to be challenged. Subsequent to the vigorous debates over the evidence for Belgic invasion, and following Cunliffe's pioneering excavations at Danebury, debate began to centre on the nature of 'hillfort-based' societies. Cunliffe's work on Iron Age societies had been heavily based upon the testimony of ancient and early medieval historical sources, and the development of a form of central-place theory based around the role of hillforts (principally Danebury) and oppida at the apices of their respective social hierarchies. Key in this was the model of socio-economic structure developed for the Danebury reports (Cunliffe 1984a, pp.552–561). Cunliffe utilised four main strands of evidence to construct his hypothesis. First, he asserted that the size and elaboration of the physical remains of different sites – which consisted of a variety of larger and smaller hillforts of variable dates, and larger and smaller enclosures – lent themselves to the interpretation of a settlement hierarchy in the region of central-southern Britain surrounding Danebury, at the social 'core' of which lay Danebury itself. The larger 'developed' hillforts would have each controlled their own territory, encompassing a number of the smaller sites and accompanying parcels of agricultural land. Secondly, economic considerations were used to suggest that Danebury acted, at least in part, as a redistribution centre, with evidence for commodities such as salt and smelted iron having been moved to the hillfort for further working and/or movement on to members of the surrounding community. Thirdly, evidence for social status as expressed through material culture is considered, with the size and placement of certain, larger roundhouses within the hillfort being suggested – very tentatively – to have been of higher social status than those around them. Crucially, Cunliffe admits on p.559 that there is little ground in terms of artefactual evidence upon which to base the notion that any of the roundhouses at Danebury was of higher status than any of the others, or indeed to show that Danebury was itself of higher status than any nearby 'subordinate' sites. Finally, Cunliffe utilises the testimony of Irish 'Celtic' sources to suggest a model in which hillforts were host to a nobility of some form – possibly a monarch, aristocrats, and/or skilled craftsmen.

Much criticism has been levelled at Cunliffe's hypothesis. Cunliffe himself is cautious with the evidence provided by material culture, and leans heavily on historical sources that are divorced in both time and place from that being discussed. Hill (1995a, pp.45–49) also provides detailed analysis to further justify the point that there is little material evidence (other than size and scale) to suggest that hillforts such as Danebury and Winklebury (Smith 1977) were any different in status to sites in their 'hinterlands', even suggesting that in terms of the occurrence of elaborate metalwork hillforts showed a pattern that would – in a traditional reading – be better-associated with a low-status settlement. Earlier, Stopford (1987, pp.70–71) presented similar arguments, also arguing that the evidence of roundhouse sizes presented by Cunliffe is not supportive of status distinctions within the hillfort community. Indeed, the redistributive character of hillforts has also proved difficult to reliably substantiate: Morris (1996, p.44) notes that the production and/or distribution of pottery at hillforts is uncertain; although (*ibid*. p.51; 1981) salt is likely to have been redistributed via a hillfort in the case of the Droitwich industry. Addressing the archaeological nature of hillfort ditches, Collis (1996) provided a contribution suggesting that the functions and significance of boundary ditches may have been many and varied, and was not necessarily related to the exercising of "coercive power" or defence (contra Cunliffe 1984a, p.560). More recently, Sharples (2007) has suggested that monument creation in cases such as hillforts was not necessarily related to coercion, but may have been to do with a form of 'potlach' in which workers received compensation for their (non-mandatory) efforts, or undertook these as a form of communal service. These developments, both theoretical and evidential, have contributed towards newer ideas of Iron Age social structures

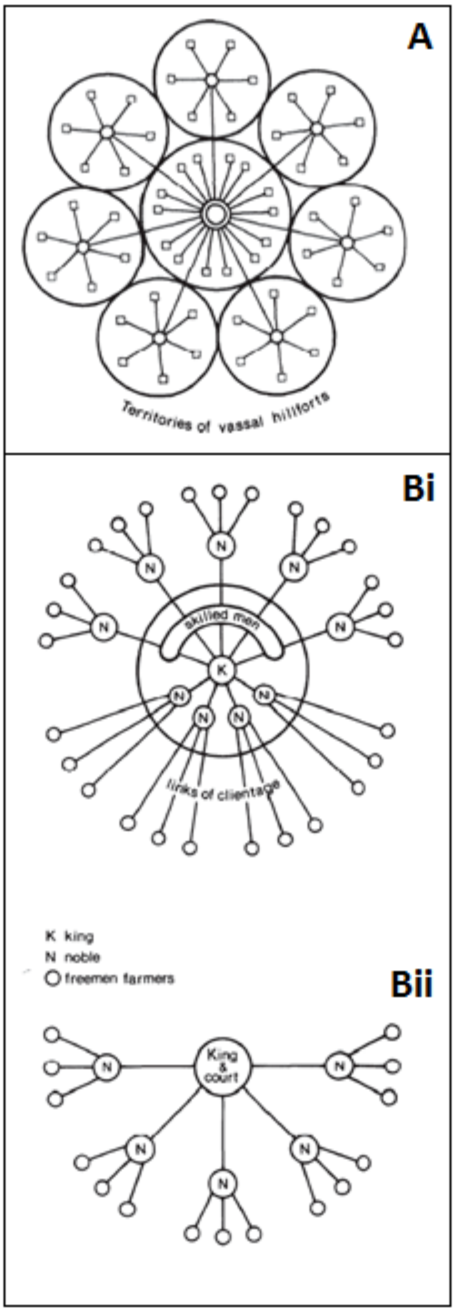


Figure 1.1. Three of Cunliffe's models of hillfort society, based upon the Danebury excavations. A: Territorial relationships between stratified hillfort communities (from Cunliffe 1984a, fig.10.4); Bi & ii: Network maps of social structures proposed to have been associated with Danebury (from idem., fig.10.5). Images © Barry Cunliffe/Council for British Archaeology.

which are both regionally-variable, and also formally egalitarian (Hill 1995a, pp.49–56; Sharples 2010; 2014).

Similar developments may be seen in the case of Late Iron Age societies, and particularly in relation to the interpretation of imported material culture. Since the fall of the culture-historical paradigm, studies have considered a chronologically-discrete 'Late' Iron Age (henceforth 'LIA') as demonstrably distinct from the preceding 'Middle' Iron Age (henceforth 'MIA'). Many works produced in the 1970s and 1980s, in particular, conceived of the changes associated with the transition between these two periods as resulting primarily from renewed contact with communities on the continent following a period of insularity during the MIA (Cunliffe 1974, pp.144–148; 1978, pp.152–159; 1991, pp.424–443; 2005, pp.460–484; Bradley 1984, pp.460–484; Darvill 1987, pp.157–158; see Webley 2015 for a review). The role of the expanding Roman Empire in stimulating economic growth and social development loomed particularly large in many works of this period, and particularly in the work of Barry Cunliffe. Cunliffe's models of change, in particular, were heavily influenced by the testimony of classical history, providing essentially narrative accounts of historical processes that were reflected in archaeological evidence (Cunliffe 1974; 1978; 1982a; 1982b; 1984b; 1984c; 1988). A particular hallmark of studies of this period was the development of social hierarchy – argued *contra* Cunliffe's model – to not be in evidence in MIA contexts but being emergent in the LIA as a result of the aggrandising role of imported material culture and the influence of Roman imperialism (e.g. Haselgrove 1982; 1984; Millett 1990, pp.29–35; Trow 1990).

In more recent studies there remains a very strong case to say that a formal social hierarchy had developed by the end of the first century BC in many places (Creighton 2000). However, the traditional notion – that an influx of imported material culture from the continent (wine in amphorae, fine tablewares, certain items of metalwork, etc.), itself predicated by economic expansion in the Roman Mediterranean, was a causal factor in changes in the expression of power, in the structure of society, and in the development of *oppida* as trading centres (e.g. Cunliffe 1982c; Haselgrove 1982; 1984; Millett 1990; Trow 1990; Champion 1994) – has been scrutinised in recent years. In particular, Andrew Fitzpatrick (1989a; 1989b; 1993; 2001; 2003) has been vehement in his criticism of this 'orthodoxy', which he sees as based upon externalising causes at the expense of possible internalised dynamics for social change, and upon the notion of an archaeologically-invisible 'balance of trade'. Fitzpatrick's criticism has served to open the way for considerations of imported material culture which do not necessarily invoke social élites, formal economics, or externalised causality.

As a result of these developments in the latter part of the 20th century, scholarly attention to the nature of Iron Age society has largely turned away from model-building or the discussion of historical processes, in recent years producing a plurality of approaches to various social spheres. J.D. Hill's work has been pioneering in this, for example in his studies of toilet instruments (1997), structured deposition (1995b), and pottery making (2002). A multitude of studies have found utility in the concept of 'identity', and in this way British Iron Age studies have mirrored developments in the post-processual archaeological discipline as a whole. Later Iron Age regional identities have been explored on several occasions (Hamilton 2007; Hill 2007; Moore 2007), the study of such localised, communal identities having been argued to be fundamental to modern approaches (Hill 1997, pp.96–7). High-status identities have been explicitly theorised in the study of the settlement at Ditches, Gloucestershire (Trow et al. 2009, pp.64–71) and in Creighton's study of the coinage (2000, chap.7). Contrastingly, however, it has been noted (Haselgrove & Moore 2007a, chap.11) that low-status or 'class-based' identities have not been the subject of explicit study, the interactions between non-elites and material culture rarely being given attention. Sex and gender have been approached on a few occasions (e.g. Pope & Ralston 2012; Joy 2012). Importantly, Joy's recent study of mirrors (2012) has served to highlight the possibility of non-binary conceptions of gender in the burial record (pp.474-6); and the study by Pope and Ralston concludes that the mortuary evidence does not support the notion of either sex-based hierarchy, or of hierarchy in general, in many areas of Britain during the MIA.

Ideas around the social roles of imported material culture have also seen reformulation in recent years: for example, in Haselgrove's consideration of the role of Roman and continental material culture, burial and settlement types in LIA societies (1995; 2001), Carver's work on feasting (2001), and Fitzpatrick's study of grave-goods (2007). Such studies have integrated 'internalising' causal factors into the study of Later Iron Age change alongside the traditional 'externalising' explanations (Thurston 2009, pp.377–384), and moved away from the privileging of historically vocal communities (i.e. Romans and, to a lesser extent, 'Celts') over those which are historically non-vocal (the inhabitants of Britain, for example: Haselgrove & Moore 2007, pp.7–8; Moore & Armada 2012, p.48). This permits indigenous British communities a level of agency in social change with which they have not been provided previously.

Acknowledgement of significant elements of continuity between the Middle and Late Iron Age (resulting in the notion of a unified 'Later Iron Age': e.g. Haselgrove &

Moore 2007b) are also important in recent reformulations of social change and continuity, highlighting that changes in material culture, settlement pattern, burial rites, politics, etc. were all embedded amongst *longue durée* processes not immediately apparent in the short-term (Haselgrove 1989; 1995; 2002; Hill 1995c; Champion 1994). More recently still, spatial boundaries have also found themselves challenged in an effort to reinvigorate the discussion of communities living in Britain by casting them as part of the wider context of Europe as a whole. The recent volume *Continental Connections* (Anderson-Whymark et al. 2015) focused on just this issue, with papers by Webley and Joy contributing discussions of the Iron Age. Webley's paper, in particular, is vocal in the opinion that the insularity traditionally associated with the MIA needs to be reassessed (2015, pp.137–138). Meanwhile, the notion of 'Atlantic Europe' has recently become popular, being discussed in multiple volumes and by numerous authors (Cunliffe 2001; Henderson 2007; Moore & Armada 2012; see also Haselgrove 2001). Although this is not entirely new (see, for example, Collis' pan-European discussion of *oppida* (1984)), the poignancy of the integration of these European communities has been successfully re-emphasised on both theoretical (e.g. Moore & Armada 2012) and evidential (e.g. Webley 2015) grounds.

1.3 TECHNOLOGY

The previous section has served to highlight some of the themes in the development of the study of British Iron Age societies. It can be seen that there has been a distinct development in thought in the past thirty years which has led to the consideration of a variety of different social modes, the expression of these in terms of different forms of identities, and reconsideration of the significance of change and continuity. This section will now consider the study of technology in the Iron Age, and particularly the study of ceramic technology, which can be seen to have benefitted only very slightly from these developments in social theory.

1.3.1 Function & Use

Ceramic technology can be divided into two conceptual parts: that of the production and subsequent distribution of ceramic objects; and that of the use of those objects (i.e. consumption or, on a more material level, function). These two parts are inextricably interconnected, although – as will become clear – the literature on production and distribution is of far more relevance to this discussion than that on function and use. As such, function and use shall be dealt with here first, before an extended commentary on production and distribution is used to highlight the strengths and weaknesses of approaches to Later Iron Age technological change to date.

It is well-known that there is a differential between the intended and actual function(s) of a ceramic vessel (cf. Skibo 1992; 2012), and considering the *intended* function of a vessel is able to provide information on the technological choices made by the potter. Numerous works have been conducted on British Iron Age pottery that permit consideration of intended function. In the case of Early and Middle Iron Age vessels, Woodward's study of vessel morphologies (1997) was highly informative of the general typological character of pottery from south-central England. The study showed (a) that it is possible – with the types of vessels in question – to use rim diameters as a proxy for overall vessel size and volume; and (b) that the data resulting from analysis of size via rim diameter supports the conclusion that vessel size – and not type – is the defining feature of relevance to vessel function. This conclusion has subsequently been backed up by the results of a large programme of lipid residue analysis on related material (Copley, Berstan, Dudd, Straker, et al. 2005; Copley, Berstan, Dudd, Aillaud, et al. 2005). In the LIA, however, typological diversity is a clear indicator of specialised functions in the case of many vessels: platters, beakers, flagons, and pedestal jars, for example. These functions have been discussed in particular depth by Cool (2007, chap.16), whilst Pope (2003) has devised a typological scheme based upon vessel morphology as a proxy of function in order to take account of this variety in the context of LIA Dorset. Crucially, Hill (2002) attributes the introduction of such functional and morphological diversity to increased social emphasis on the meal in the region of East Anglia, and sees this diversity as an operative factor in promoting technological change. Much headway has therefore been made in recent years with regard to understanding the functional roles of different types of Iron Age ceramics. Importantly, function and use have begun to be acknowledged as features of socially-embedded material cultures, and therefore their changing nature at the interface of the Middle and Late Iron Age periods is understood to be an index of wider social change being expressed through the everyday practices associated with food and drink. Unlike the work on contemporary production and distribution (see below), these studies tend to be upfront about the restricted geographical relevance of their conclusions – Hill's study being concerned specifically with East Anglia and Woodward's with 'Wessex', for example. More work of this kind, with explicit acknowledgement of the social significance of changing pottery function, would be of great benefit to the study of regionalised interactions with social change during the Later Iron Age.

1.3.2 Production & Distribution

Much of the most commonly-cited work on Iron Age ceramics concerns distribution. Fundamental papers by David Peacock (1968; 1969) and Elaine Morris (1981; 1982; 1994a; 1996) have established the great utility of petrographic analysis in sourcing certain categories of pottery and mapping their distribution from the source. In particular, Morris' work on the Severn Valley (1981; 1982) showed the operation of multiple scales of distribution, all proposed to represent different forms of social interaction surrounding the movement and exchange of pottery. Similarly, work concerning the large ceramic assemblage from Danebury (Cunliffe 1984a, pp.244–259; Morris 1995) has shown the utility of conclusions derived from work on pottery supply in discussing the roles of sites and – by extension – hypothesising upon the social significance of those sites and their inhabitants. In the case of the work on Danebury, these methods were heavily based upon ideas of processual modelling, and were an important component in the establishment of Cunliffe's model of hillfort-based societies.

While petrographic analysis for provenancing has experienced some success in the Early and Middle Iron Age periods of several regions in southern Britain, this has not been the case for much Late Iron Age pottery, and particularly the 'Belgic' pottery of the south-eastern and south-central counties. While petrographic analysis continues to be routinely done on these wares – e.g. most recently at Elms Farm, Heybridge, Essex (Williams 2016) – this work is almost always small-scale, and is always inconclusive with regard to provenance. Larger projects have either de-emphasised the aim of provenancing (Freestone & Rigby 1988; Freestone 1989) or acknowledged the general homogeneity of the fabrics and implicitly admitted that there is little in the way of distinctive mineralogical evidence available within them (Thompson 1982, p.20). An important exception are the Kentish greensand fabrics identified as a feature of Thompson's 'zone 4' (*ibid*. pp.11-12). Understanding of the distribution of these vessels therefore remains relatively poor, although Thompson does establish (on the basis of typology) the existence of multiple production locations responsible for the overall distribution of 'Belgic' wares throughout her south-eastern study area (*ibid*. p.20).

Many studies have therefore investigated ceramic provenance and distribution, and on the basis of these data some conclusions regarding the social nature of production and exchange have been made. Such work has been less successful in the LIA in many areas due to difficulties establishing distributions, and this is of severe detriment to our knowledge of artefact movement and economics during this period.

Only rarely has such work been conducted in the light of more modern, postprocessual ideas of material culture relating to, for example, identity or the practice-based implications of technical behaviours. Exceptions are Moore's paper on exchange in the Severn-Cotswolds region (2007) and Hill's paper on the LIA pottery of East Anglia (2002), both of which suggest that pottery may not always be best seen as a chronological marker, but that ceramic distributions may have implications as reflections of localised identities.

Efforts to directly understand the arena of ceramic production are similarly under-theorised. Important amongst these are the experimental approaches conducted by Ann Woods (1983; 1984; 1989; see also Gibson & Woods 1997, pp.26–59). Woods' work builds on a lot of far earlier, often piecemeal work which took as its subject of interest aspects of prehistoric technology in general; for example, Stevenson's brief paper on 'pot-building' in prehistoric Europe (1953). Woods' work is also accompanied by roughly contemporary studies interested in the rare examples of direct evidence for Iron Age pottery production: i.e. the kiln structures and associated features dating to the final years of the LIA and early years of the Roman period (Woods 1974; Swan 1984). These works are generally simply descriptive, aiming to reconstruct as best as possible a single version of Iron Age pottery technology that fits with the available evidence. This has built up a notion of prehistoric potting as relatively unsophisticated and unspecialised, being based around long-lived craft traditions and a particular absence of geographical variation. For example, Woods' work on firing technology (1983; 1989) sought to experimentally explore the kinds of techniques that could have been used to fire pottery in prehistory; this is not accompanied by any systematic assessment of the archaeological evidence, but by generalised statements of the character of prehistoric ceramics (e.g. uneven colouration; fire-clouding; characteristics of generally low firing temperatures) that appear to have formed the basis for informing the methods subjected to experimentation. This methodology results in both chronological and geographical generalisation to the extent that one would be forgiven for assuming, on the basis of the work done, that all British prehistoric pottery was fired in basically the same way, from the Neolithic to the first century AD. Whether or not this may be true, the possibility of variation is never explored.

Such generalisation is symptomatic of more general attitudes towards technology in studies of the British Iron Age. Ceramic production, like exchange, is only very rarely explored as an area in which choice and agency played a role in defining material outcomes. Concepts such as Cunliffe's 'style zones' (1974: Appendix A) implicitly acknowledge that regional and chronological variation in form and decoration existed, and that these may have played a part in defining localised communities (and this, by extension, implies that the production of pottery was a medium for the expression of social values). However, this notion is rarely extended to other areas of the ceramic production sequence. Crucial in this regard is Gibson & Woods' discussion of technology in *Prehistoric Pottery for the Archaeologist* (1997, pp.26–59), in which technology is discussed in almost purely materials-based, functional terms, with minimal acknowledgement of the role of techniques as socially-embedded media. The lack of any consideration of technological choice in an introductory textbook such as this is particularly alarming. It is worth noting that consideration of the social aspects of production have been very influential in the study of ironworking in recent years, with concepts such as symbolism (Hingley 1990; 1997; Giles 2007) and the socially-embedded nature of industrial organisation (Ehrenreich 1995) proving fruitful avenues of analysis alongside a long and continuing line of materials-science-based approaches.

Publications dealing specifically with ceramic technology in the Late Iron Age are worthy of discussion in isolation. This is a period in which the progressive increase in complexity of ceramic production is well-known, and this provides a contrast with preceding periods. As a result of this contrast, archaeologists from many different backgrounds have been attracted to the study of these developments. Following the decline of the culture-historical paradigm, the first comprehensive study of a variety of LIA pottery came in the form of Isobel Thompson's work on the 'Belgic' wares of the south-eastern counties (1982). Here, six pages (pp.20-25) are provided to the consideration of technology. Observations are made on fabric, forming technology, and firing (including an extended comment on the 'red-surfaced' wares, said to exhibit a greater degree of control over firing in order to produce evenly oxidised surfaces: *ibid.* pp.22-3). Following this, Ian Freestone's work on 'Belgic' vessels from King Harry Lane, St. Albans, offered the first materials-science-oriented analysis of LIA ceramic technology (Freestone & Rigby 1988; Freestone 1989). Much data were presented pertaining to technological change during the first century AD, allowing for a consideration of the commencement of 'Roman' production practices. A later – albeit brief – publication (Rigby & Freestone 1997), in which the results of several studies were summarised (e.g. Freestone & Rigby 1982; Rigby & Freestone 1986, as well as the studies of King Harry Lane), would expand upon this, putting the beginnings of Romano-British styles of potting in their place as part of a lengthy process involving multiple discrete technical developments that began at the end of the MIA, and which took place over the course of at least a century. J.D. Hill's study of the introduction of the potter's wheel (2002) built upon references in Rigby & Freestone's paper to the social importance of technological change, innovation, or the lack thereof; for example, in commenting on industrial organisation, and in the potential for changing gender roles in pottery production (Rigby & Freestone 1997, pp.60–61; Hill 2002, pp.152–153). Importantly, Hill also acknowledges the role of social values in shaping technological change and the selective adoption or rejection of new innovations. In this case he identifies the feast as an important element of LIA social discourse in his East Anglian study region that prompted developments in the typology and technology of ceramic vessels (*ibid*. pp.158-159). Previous to this, the question of adoption or rejection of new technology seems to have been broadly a question of economics – for example, Rigby & Freestone attribute the uptake of the potter's wheel to population growth and the availability of the *oppida* as market centres (1997, p.61), whilst Green explains the technological anachronism of his East Sussex wares as a result of their production in a relatively impoverished area of southern Britain, the inhabitants of which were not able to provide the investment of economic capital necessary to stimulate technological improvement (1980, pp.82–85).

It is noteworthy, in the light of increasing recognition of the utility of technology for discussions of later Iron Age societies that so little attention has been paid to the discussion of techniques as an aspect of production. As will be expanded upon in Chapter 2, techniques are a fundamental component of the technological sphere, representing the physical processes by which technologies are done, and therefore being the nexus of all technological action. Technological developments – the potter's wheel, grog tempering, kilns, etc. – have all been discussed and noted on several occasions to be of significance due to their changing natures in some areas during the Later Iron Age. However, I would argue that these have all been discussed in ways that are analogous with the treatment of artefacts: i.e. they are regarded as objects that have been preserved in the material traces that come down to us in the form of artefact design. While the studies commented upon above show that such approaches are often fruitful, in considerations of technology it should not be forgotten that technologies are 'verbs' and not 'nouns' - technologies cease to be technologies when they cannot be seen to be doing anything (cf. Dobres 2000, pp.80–85). As such, only when artefacts and the traces of their manufacture are considered alongside the techniques of manufacture, can a full understanding of 'technology' – and a far richer knowledge of the processes behind its continuity/change – be achieved. Contingent with this is the desire to understand the conceptual aspects of technologies and techniques – how technologies and practices were understood by their adherents and those encountering them; and how meaning was thereby built up around technologies and techniques.

1.4 SUMMARY

In summary, it can be seen that there has in recent decades been a conceptual divorce between the study of pottery and – in particular – ceramic technology, and the study of Later Iron Age societies. This may have developed from the establishment of archaeological ceramics as a specialised sub-discipline in the context of British archaeology, and has resulted in very different approaches having been taken to ceramic technology compared to those utilised in considerations of society in general. In particular, while Iron Age studies generally have developed into a plurality of approaches with a keen acknowledgement of the utility of both scientific and theoretical methodologies, pottery studies have engaged only with the scientific end of this, neglecting – with a few exceptions – the relevance of the theoretical tools that are at our disposal. The result appears to be a perception that is based around the term 'technology' as referring only to the mechanistic, functional aspects of how things were made in the past, these being largely disconnected from social forces going on around them. Commentaries on technology thereby become relatively dry works; reports of findings that are provided with little in the way of interpretation that can tie them in to larger questions about the ways in which people in the past lived and worked. The few efforts made to deal with the relevance of technology to wider society (e.g. Ehrenreich 1995; Hill 2002; Moore 2007; Giles 2007) serve to demonstrate the potential of studies of this kind. More specifically, the Later Iron Age is a period of emergent status distinction: elements of discernible 'high status' groups becoming progressively more visible in the archaeological record. In this context it is appropriate to assess the roles and experiences of non-elites, to consider the extent to which such groups were involved in social change, and what their roles in change may have been (cf. Haselgrove & Moore 2007a, p.11). Potters were arguably an element of such non-elites, and thus their roles as craftspeople are both important and accessible sources of information.

The Prehistoric Ceramics Research Group has recently acknowledged the potential of these approaches by codifying two aims related to manufacture and ceramic technology in their updated research priorities (PCRG 2016). Section 3C of this document (p.11) specifies the following aims:-

(i) To identify and promote methods available to characterise variations in technology and practice in the manufacture of ceramics throughout the prehistoric period;

(ii) To explore the mechanisms driving the invention and adoption of ceramic innovations, such as the Beaker package or later Iron Age wheel-made pottery.

These aims provide specific acknowledgement of our lack of understanding in these areas and, in particular, acknowledge the need to assess and analyse technological variation and interpret this in the context of innovation research. These aims very much lie behind this study, which tasks itself with providing both (a) a robust database for the characterisation of ceramic technological change; and (b) a theoretically-informed account of how technological and social change were related to-one another during this period of upheaval. It is hoped that this work will, in part, demonstrate that a thorough and thoughtful approach to technological change can provide a substantial contribution to our understanding of the wider social processes surrounding Later Iron Age society.

CHAPTER 2: THEORETICAL BACKGROUND: TECHNOLOGY, TECHNIQUES, AND MATERIAL CULTURE

2.1 INTRODUCTION

The previous chapter has examined the existing literature on Later Iron Age society and ceramic technology and found that there is little acknowledgement of up-to-date thinking on technology and technological change, and sparse attention paid to the integration of technology into the setting of wider society. Where such studies have been done the results have been revealing, and this includes both examples from within Iron Age studies and those conducted in other areas of archaeology. This chapter will look in detail at the different schools-of-thought that have developed around technology and technological change in recent decades, focusing on approaches utilised in the archaeological literature on these topics. In addition, comment will be made on select theories used in other disciplines – particularly in anthropology, sociology and history – which are of use in considering the current case-study of ceramic technology in Later Iron Age Britain.

2.2 SOCIAL CONSTRUCTIONISM

2.2.1 Introduction to Social Constructionism

The study of technology incorporates an expansive and variable literature. In the case of archaeology, however, much work on technology conducted in the past thirty years can be seen as variation around a single theme. Killick (2004) identifies a large body of work within the disciplines of archaeology and anthropology that can be described as 'social constructionist'. Killick identifies the key tenet of social constructionism in these cases as being based around the notion that technologies are (a) selected from amongst multiple options that may result in the same or similar ends (e.g. the choice between making a pot using coil-building or slab-building); (b) that the choice of a particular technology always involves influence by sociocultural factors; and (c) that models of technological choice or change should not invoke any "unseen hands", such as a deterministic progression from simplicity to complexity (*ibid.* pp.571-572). Much of this work is derived heavily from a post-processual understanding of technical knowledge, whereby decision-making in pre-industrial (and indeed, post-industrial: cf. Lemonnier 1989)) societies is influenced by social factors that may have little-to-no relation to the functional characteristics of a material, technique, or tool. This reading is based heavily upon the ideas of philosophers such as Mauss (1936) and

Heidegger (1977). This can all be seen as related to the inherent subjectivity of technical knowledge: (particularly) in the absence of a detailed empirical understanding of technological processes, the cause-and-effect relationships between productive acts and outcomes are understood using concepts and symbolism that are derived from a socially-mediated understanding of the world, this providing the opportunity for technical acts to be expressions of social and cultural conditions and concepts. As well as being based upon Maussian and Heideggerian philosophy, coming down to us through work in the areas of technological choice and practice theory in particular, the archaeological expression of social constructionism owes a significant debt to Science and Technology Studies, and in particular the SCOT (Social Construction of Technology) movement, exemplified in the works of Weibe Bijker and others (e.g. Hughes 1986; Bijker et al. 1987; Bijker 1995; 2010). These works deal almost exclusively with socially-oriented considerations of technological change (cf. Edgerton 1999), seeing innovations as being subjectively ('flexibly') interpreted by those seeking to utilise them, and technology in general being part of a 'seamless web' in which technology and society, economics, politics, etc., are all mutually-constituted and reliant upon one-another in their trajectories of development.

2.2.2 Technological Choice

Unquestionably one of the most influential theories of technology to be utilised in archaeology and anthropology, the concept of technological choice is the notion, already described by Killick (2004, p.572; see above), that aside from in the case of insurmountable environmental or physical factors, there are always numerous ways to achieve a given technical outcome. This concept is referred to by Sillar & Tite (2000, p.3) using the idiom "there's more than one way to skin a cat", following which the questions of significance become, "why would one wish to skin a cat that way?" and (more prominently) "why would one wish to skin a cat at all?". This allows us to be open to the specific internal logics of a past society by trying to understand the influences that lay behind their decision-making processes (cf. Dobres 2000, p.650). Conceptualising technologies as the result of decision-making allows us to appreciate the true depth of technical processes and the knowledge-base that lay behind them by asking why such choices were made in the ways that they were, rather than simply assuming that they represent the state-of-development of technical knowledge, or by dismissing them as 'culture'.

The theory of technological choice was introduced to anthropology by the French scholar Pierre Lemonnier, most prominently in the key work *Elements for an*

Anthropology of Technology (1992), and in a subsequent edited volume which expanded the concept into archaeology (1993; see particularly van der Leeuw 1993). Crucially, Lemonnier's work acknowledges the key role played by society in shaping trajectories of technological development, and does not lean on the notion of a differential between pre- and post-industrial conceptions of science and knowledge as an explanation for these social influences. Lemonnier's approach was based heavily on Leroi-Gourhan's concept of the *chaîne opèratoire* (1964), which looms large in both the socially-oriented theory as well as in its methodological applications, being borne out of a frustration with deterministic and functionalist approaches that were prevalent in archaeology during the 1980s (frustrations echoed by, e.g. Pfaffenberger 1988; 1999; Dobres 2000, chaps.1–2; Loney 2000).

2.2.3 Technological Style

The concept of 'technological style' is somewhat older than that developed by Lemonnier, and has intellectual origins that are far more directly related to archaeology. The key works on technological style were published by Lechtman (1977; 1984a; 1984b). These can be seen to shun key aspects of the dominant processualist school of the day, in favour of the discussion of technologies as representative of the value systems that underlay them in a given cultural context: specifically, that of textile manufacture and metallurgy in the prehistoric Andes. The key contention of the idea of technological style is that 'style' does not lie only in the purely artistic aspects of design, but in all features of design and production. This opens up the possibility of different interpretations of how to achieve similar ends in terms of the manufacture of a given object-type, and in this sense is basically related to the notion of technological choice. Where the technological style paradigm differs is that it is based less on the idea of choice on the part of the producer or user ('agency', in practice-theory terms) and more on the symbolic and cultural variables that affect how groups of producers make things ('structure' in practice-theory terms).

Numerous subsequent works can be found to demonstrate that a Lechtman-style conception of technological style is still being fruitfully applied. The work of Olivier Gosselain (1992; 1998; 1999) feeds directly off such a reading of style and demonstrates its relevance in the more up-to-date context of ethnography and identity studies. Meanwhile, Dietler & Herbich (1998) use the concept in concert with the idea of *habitus*, showing that Lechtman's original concept can be integrated into practice-based approaches to technology (also see references to Lechtman's work in Dobres 2000, chap.4).

2.2.4 Practice Theory

The basic tenet of practice theory in relation to technology is that technologies are about 'doing' as opposed to 'being'. Although wide-ranging and abstract, this idea makes sense: technologies and techniques are not justifiably described as such when they cannot be seen to be 'doing' anything; in this case they are better described as 'tools', 'machines', 'bodies', or 'artefacts'. Here, therefore, it is the practices associated with the use of technologies that are of the greatest significance, feeding into a wider body of work that acknowledges the significance of the performativity of material culture in social contexts. In particular, this allows us to see technologically-based practices as a fundamental arena in which the dialogue between 'agency' (i.e. individual or collective action, along with conscious and/or subconscious decision-making, motivated by the surrounding social, political, and economic contexts as well as by personal free will) and 'structure' (i.e. sociocultural rules customs, and learned behaviours that variously enable and constrain human action) can be seen to be being played out. While this notion feeds directly from the key general works on practice theory (Bourdieu 1977; Giddens 1979; 1984), it – similarly to technological choice – has its intellectual roots in the ideas of socially-informed philosophers and anthropologists (Mauss 1936; Leroi-Gourhan 1964; Heidegger 1977).

The work of M.A. Dobres is of the greatest significance to practice-based approaches to technology in archaeology. Her book *Technology and Social Agency* is easily the most thorough discussion of a practice-based approach to technology, and includes emphasis on methodological considerations that are often lacking in hard theoretical works of this kind. Her work with C.R. Hoffman in the 1990s is also widely-cited (1994; 1999), and included an edited volume on the subject of practice and technology (1999). Dietler & Herbich's (1998) paper on '*habitus*' (a crucial component in the dialogue between structure and agency) has already been mentioned as a good example of the integration of practice theory with other schools-of-thought.

2.3 MATERIALITY

A very popular development in material culture theory to have come about over the past two decades, 'materiality' or 'material agency' is a philosophically and methodologically complex concept borne out of the works of scholars such as Bruno Latour (1993; 2005) and Alfred Gell (1992; 1998). Prominent archaeological publications on subjects related to materiality include Meskell (2005), Knappett & Malafouris (2008), and Hodder (2012; also see Knappett 2012 for an introduction to the background and key themes). The notion of materiality is based upon an extended critique of Cartesian philosophy, which implies a distinction between humans and non-humans so far as a capacity for action or agency is concerned. Proponents of materiality theory see this Cartesian notion as an operative factor in the construction of much processual and post-processual theory, such as the social-constructionist approaches described above, and in particular the concept of 'agency' as it is discussed in the context of practice theory (e.g. Miller 2005; Knappett 2012). In these interpretations the notion of 'agency' as formulated by Bourdieu is too narrow, only incorporating human actors, i.e. individuals or groups of people (i.e. 'society') and thus marginalising non-humans (including artefacts and materials as well as animals, plants, landscape features, etc.) to the role of symbols through which social forms are expressed. This has, in turn, influenced standard archaeological methodologies, which now seek to recover information on past human behaviour through these material symbols. In order to redress the perceived imbalance between human and non-human agency which has therefore pervaded much of the archaeological literature since the 1970s, much materiality theory proposes that non-humans can be agents too (or at least that non-humans are capable of exerting influence on human agents), and that the conceptual barrier between the human 'subject' and the non-human 'object' can therefore be broken down, the two spheres being intermingled. It is argued that non-humans – either in terms of inherent properties, or of socially-constructed properties that are regarded by the agent(s) as absolute – are worthy of analysis in their own right: as media that are capable of having effects upon the actions of people around them.

Crucial in this reading of material culture is the idea of object 'histories' (cf. Ingold 2007, p.15). This is the notion that the nature of an object and the practices surrounding it will be conditioned by the way similar objects have been made, made to look, and used, previously. Gosden describes this so:-

> *"As material culture is relatively long-lasting, people are socialized into particular material worlds which exist prior to their birth. The nature of social being for people will be structured by the education of their senses by the objects surrounding them in childhood, giving them a series of stances and presuppositions towards the world derived from local material culture."* (2005, p.197)

Individuals' formative experiences of material culture will therefore influence how they think of related material culture in their own lives, and will condition what they believe to be appropriate when making and using objects. While this is a general principle of the materiality framework, much work has now been done specifically on the cognitive basis of this material conditioning (e.g. Renfrew & Scarre 1998; DeMarrais et al. 2004; Malafouris 2004; 2013; Knappett 2005), with the work of Malafouris and Knappett, in particular, regarding objects as a physical extension of the architecture of the human mind. This idea of material culture as 'historical' has also found utility in the work of scholars such as Astrid Van Oyen, whose work on *terra sigillata* has emphasised the agency of the pottery in constructing historical narratives, rather than the objects simply being representative of them (Van Oyen 2016a; 2016b).

In considering the role of materiality theory specifically in reference to the study of technology it is important to acknowledge the inherent processual nature of the theory. Some proponents of materiality see this newer theory as a wholesale replacement for social theory (cf. Miller 2005); however I would argue that materiality is served best when explicitly acknowledging that it can be integrated into the existing framework provided by practice theory. This is consistent with the arrangement proposed by Reckwitz (2002, p.210), wherein the comment is made that Latour's original vision would indeed have been for an anthropocentric theory that acknowledged the symmetry of the human/non-human divide and attempted to integrate the two, rather than for a model of material culture that side-lines the social.

What is more, it seems clear that the tenets of the materiality agenda do not invalidate the notion of social constructionism; indeed, in many cases they implicitly *rely* upon it. Key in this regard is the idea of 'design' as discussed by, e.g., John Robb (2015). Here, Robb attempts to make materiality accessible by using the concept of 'design' as a way of considering how agents' interactions with the materialities of different objects influences the way new objects are made. Agents' experiences of objects are said to influence how a given, related object will be made and/or used, with this being included in the objects themselves in the form of "encoded knowledge, cues, and prompts" (*ibid*. p.168). Notably, Robb's version of materiality theory is couched in an appreciation of the social as well as of the material, with objects such as decorated pottery and polished stone axes being analysed on the basis of their natural and socially-constructed material properties, as well as in their 'representational' roles as objects through which people related to one-another. This provides a basis for a theory in which objects are placed within a direct historical lineage, with actors, social structures, materials and objects all interacting around the process of design and production. However, Robb's notion of design is based on direct, down-the-line influences from objects of the same type as that being produced; this by necessity emphasises continuity. Where there is evidence of change in the material categories represented in the archaeological record this implies related changes in object design within which it is useful to conceptualise social and material actors as separate entities with different properties and capacities for action. A change in social values to a structure that emphasises the value of exoticism, for example, may both be prompted by the materiality of imported objects and also translate into a situation in which imported objects circulate more widely, therein prompting producers to engage with their materiality in manufacturing imitations – the role of social values in this example is therefore integral to the chain of events being described. The implication of materiality theory is, therefore, that in no case is either part of the dichotomy between 'subject' and 'object' able to act independently of the other; society and materiality being mutually-constitutive of one-another in a constantly-unfolding web of historical events.

2.4 FUNCTIONALISM, TECHNOLOGICAL EVOLUTION, AND BEHAVIOURAL ARCHAEOLOGY

Since the 1970s a large body of work has developed which sees material culture variability and technological change explicitly in terms of a material extension of evolution by natural selection. This typically involves acknowledgement of evolutionary principles as a metaphor by which technological development can be usefully discussed, and includes two stages. The first is a phase of invention/innovation, in which new technologies or technical principles appear as a result of processes analogous to genetic mutation – i.e. individuals are cited as the locus of inventions, with those inventions found to be of practical utility in the context of use going on to be termed 'innovations' (Roux 2010, pp.223–224). Following this comes a phase of selection, wherein various external pressures are applied (for example, environmental or social pressures) that influence the developmental and use trajectories of the new technology, including whether it will achieve widespread adoption or be cast aside (Roux 2010, pp.225–230; Basalla 1988, chaps.5 & 6). In aggregate, this results in a picture of technological development that involves increasing complexity through time, owing to the cumulative and continuous nature of innovation and adaptation.

Within archaeology specifically, one particularly popular school-of-thought that is related to both evolutionary thinking and archaeological processualism is termed 'behavioural archaeology' (though see Schiffer et al. 2001 for an argument that behaviouralism and evolutionism are distinct theories). This body-of-work has been based primarily on the work of North American scholars such as Michael Schiffer (e.g. Schiffer & Skibo 1987; 1997; Schiffer et al. 2001; Schiffer 2004). Extensive consideration of experimental and materials-based research characterises behaviouralism, which primarily seeks to explain artefact variability in terms of the ‘techno-function(s)’, ‘socio-function(s)’, and ‘ideo-function(s)’ of objects (Schiffer & Skibo 1987, pp.598–599; Schiffer et al. 2001, p.731). The basic principle behind the theory is that artefact functions will be best suited to the socioeconomic and (particularly) environmental conditions in which they are found.

While the demands of the behavioural school have vastly improved our understanding of the technical aspects of ancient artefacts – and ceramics in particular (e.g. Bronitsky & Hamer 1986; Bronitsky 1989; Feathers 1989; Courty & Roux 1995; Hoard et al. 1995; Roux & Courty 1998) – the theoretical emphasis that many proponents of behaviouralism place on functionalism severely curtails much of its utility in modern archaeology. Pfaffenberger (1988, pp.493–495), and Loney (2000) have provided detailed critiques of some of the assumptions inherent in evolutionary, determinist or functionalist conceptions of technological development, with Loney’s paper levelling particular criticism at what she perceives as evolutionary thinking as embodied by behavioural archaeologists working in American ceramic analysis. While it is clear that behaviouralism has provided a useful theoretical framework for many studies in both America and elsewhere (Schiffer et al. 2001, pp.729–731), I do not believe that the ‘core concepts and principles’ of the programme (*ibid.* 731-733) provide the same level of analytical utility as do social constructionist or materiality-based methodologies. In particular, the tripartite division of ‘techno-‘, ‘socio-‘ and ‘ideo-‘ functions is crude compared to the ‘seamless web’ notion proposed by social constructionists (cf. Hughes 1986; Bijker 1995), or the basic tenets of practice theory. It is also clear that some prominent behavioural archaeologists see their role as analysts as being to *explain* technologies and change, rather than to *interpret* it. This is implicit in, for example, Kuhn’s comments on the respective ease and difficulty of ‘proving’ evolutionary/environmental explanations for technological change, compared to justifying social explanations (2004, p.563).

2.5 TECHNIQUES: AT THE INTERFACE OF MAKERS, MATTER, AND MATERIAL CULTURE

It can be seen from the above review that several different theoretical perspectives have been offered on the study of technology in archaeological contexts in recent years. This review has attempted to draw out some common themes, strengths, and weaknesses of the different theoretical programmes, and it can be seen that each has its own benefits that allow different forms of analytical questions to be pursued. Based on this, this summary will now synthesise the theoretical approach to be taken forward in this study.

The basic theoretical position taken up in this study is that technology is fundamentally about practice, all technologies being united by the fact that they *do* something in relation to the transformation of materials and/or objects, in which objects (tools, bodies, machines, etc.) are processually involved. The 'doing' quality of practice with respect to technology is best expressed in the term 'technique', in so far as this notion acknowledges that a single technical artefact, whatever it might be, may be used in different ways and/or for different ends. Dobres (1999; 2000; see also Dobres & Hoffman 1994) has provided ample consideration of the relationships between techniques/technological practice and society, these avenues proving highly fertile in expanding our understanding of past technical and social processes (cf. Dobres & Hoffman 1999). The methodological approach taken in this study therefore also acknowledges the crucial contribution to be made by thinking around social constructionism, this being founded in the subjective interpretation of technologies, objects, phenomena, and practices, and therein offering the potential to discuss the symbolism, meaning, and specific internal logics that will have been crucial components of the lived experiences of past craftspeople.

One glaring issue that is presently facing the study of technology is the utilisation of materiality theory. The study of technology has prospered under the social constructionist movement since the early 1990s, and the nuanced and varied approaches that this school-of-thought offers should not be cast aside, as is seemingly advocated by Miller (2005). In addition, it has already been noted above how materiality theory has, at its core, a basis of social theory; an integral component of materiality in many cases being the socially-mediated (as well as materially-mediated) nature of their conceptual and physical constructions, and the continuing re-negotiation of these through the historical process of practice. At the same time, materiality provides a grounded way of integrating the significance of non-human influences such as materials, artefacts, natural processes, and the knowledge associated with these, into models of ancient technology and innovation: its significance is therefore considerable. In the context of the arguments for the symmetrical treatment of human and non-human 'agents' discussed above, in considering technology it is useful to clearly conceptualise the mutually-reliant constitutions of all components of the social and material world that comprise a technological system (identity, production organisation, material properties, functions, technical practices, environments, etc.). This is an aspect of technology that social constructionism – and in particular the SCOT school-of-thought, with its notion of the 'seamless web' – did not initially integrate (cf. Hughes 1986; Bijker 1995), but which materiality allows us the opportunity to re-integrate into discussion. Technology, therefore, continues to be best-served by an analysis of practice as the interface between all of these components, this following on from the notion that technologies are fundamentally about 'doing' rather than 'being'. This methodological observation indeed complements materiality: the 'doing' quality of technology imparts an 'animacy' (Knappett 2005, chap.2) to objects in their roles as parts of the system of biological, psychological, social and material components that surround a craftsperson. Maintaining practice as the object of analysis allows us to interrogate all of these features of technical behaviour.

Emphasising techniques as the object of analysis has numerous benefits for a study such as this. An ideal situation for analysis of technical practice would involve consideration of a full array of evidence pertaining to: objects utilised in production; techniques employed in their use; materials worked; and details of the people and social groups involved, as well as their testimony with regards to their intentions and perceptions of technical acts. Clearly, while a more recent case-study (such as those found in Bijker's *Of Bicycles, Bakelites and Bulbs*) may be able to reach closer to this ideal by mobilising both material and historical evidence (and potentially interviews with technicians in some cases), the evidence with which we are provided by the archaeological record has severe limitations. Additionally, as will be detailed in the next chapter, the evidence-base for ceramic production in Later Iron Age Britain has its own peculiarities which hinder the analysis of technology; chief among these being the lack of direct artefactual evidence of technologies, and a lack of production sites for much of the period. In purely archaeological contexts, social groups are always obscured: accessible to varying degrees through identity-centric analyses but always requiring induction from contextualised patterns in material culture. Nevertheless, we are fortunate to be left with a wealth of the manufactured artefacts themselves – pottery vessels and sherds. Analysis of these using various methods is able to inform us of manufacturing techniques to varying levels of detail. Several decades of materials-science-based research also allows us to consider details of the materials used in technological processes, while research into the functions and uses of vessels allows insight into the intended functions of objects. This provides a powerful database compared to, for example, a situation in which a tool survives without any direct evidence of the practices within which it played a part.

To summarise: the theoretical basis of this study has its origins in practice theory, practice being acknowledged under this paradigm as the nexus between various social and material components within which technological behaviour comes about. It is also furnished with highly-developed analytical methodologies (cf. Dobres

2000), which will be expanded upon in the next chapter. In the context of this study it is also augmented with consideration of more recent object-based approaches. Social and material concerns will be discussed in the analysis of practice following the establishment of basic trends in the data in chapters 4 and 5, while practice/technique (being the explicit object of analysis to which the database caters) is invoked as a key methodological concept in Chapter 3. It is hoped that this theoretical background will provide an intellectual framework that is sufficiently broad, detailed, and robust to exploit the evidence for ceramic technological change in Later Iron Age southern Britain to the best possible extent.

CHAPTER 3: METHODOLOGY: IN PURSUIT OF PRACTICE

3.1 INTRODUCTION – THE SCOPE AND SCALE OF THE STUDY

3.1.1 A practice-based approach

As described in the previous chapter, the theoretical basis of this study follows the assertion that the understanding of technology lies in the practices (techniques) associated with technological behaviour. As such, a key aim of this work is to assess the changes in technological practice in ceramic production between the MIA and the LIA, in order to consider both the causal factors behind technological change, and the wider social significance of this change. This chapter will detail the methodological approaches that have been taken in the light of this core goal.

As has been alluded to in the closing section of chapter 2, a crucial factor to consider in the case of Iron Age pottery production is the lack of any appreciable body of direct evidence for production. Unlike the succeeding Romano-British period, precious few pottery production sites remain for the Iron Age; these for the most part being limited to the rare examples of (possible) pre-conquest kilns and associated evidence (see Woods 1974; Swan 1984, chap.5 for synthetic work; more recent finds are also referred to in chapters 4 and 5 of this thesis). It is therefore impossible to attempt a detailed consideration of ceramic production through remains other than the pots themselves, which are widely found on occupation-sites throughout much of southern Britain during all phases of the Iron Age. As such, the data collected for this study are entirely based upon the analysis of ceramic vessels. Pots themselves are in many ways the best form of evidence for production, in so far as ceramics contain within themselves a wealth of evidence-traces that pertain to their initial manufacture, and that are therefore available for retrieval by archaeologists (e.g. Shepard 1956; Rice 1987; Velde & Druc 1999; Berg 2008; Quinn 2013; Albero-Santacreu 2014).

The approach taken here involves explicit acknowledgement of the ceramic *chaîne opèratoire* as a structuring concept. The basic notion is that each vessel can be assessed in the light of the numerous identifiable stages of its manufacture, with the data gathered from each stage being interpreted as an index of discrete forms of technological practice, choice, and style. Various analytical methods are required to analyse each stage, and these shall be detailed below. Due to the specific questions being asked of the material with regard to technological changes known to have occurred in this period, analysis of certain production stages has been emphasised

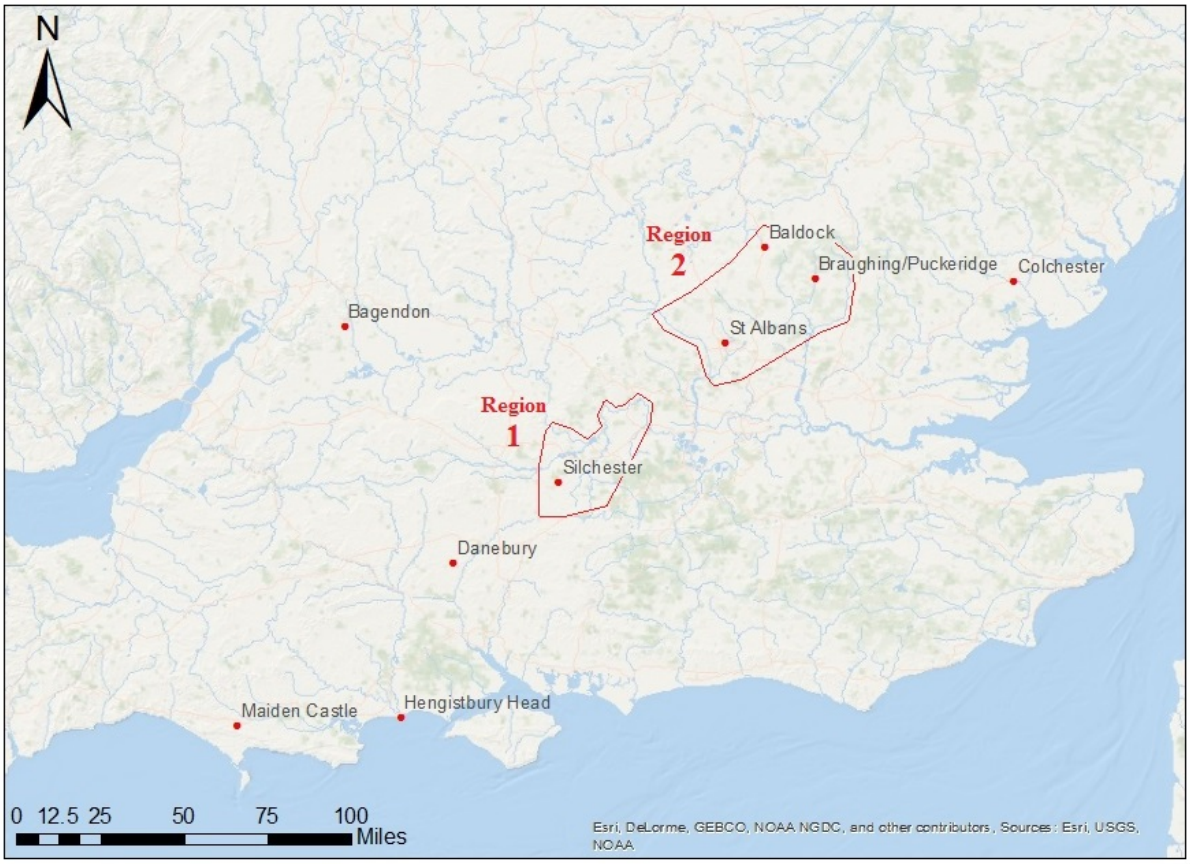


Figure 3.1. Locations of the two study regions within southern Britain.

over that of others: this being necessary due to limitations on time and resources. Nevertheless, methods have been utilised in such a way that data have been collected that can be used to comment upon all of the stages of the ceramic *chaîne opèratoire*: from raw material procurement through processing, combination, forming, surface treatment, decoration, and firing.

Analysis has been divided into two stages: fabric analysis, and analysis of manufacturing techniques. The former concerns the analysis of the ceramic paste in order to gather data on the nature and origins of raw materials (clays and tempers), and on the combination of these raw materials. The latter concerns the analysis of complete and semi-complete vessels, and substantial diagnostic sherds, in order to gather data on the forming, surface treatment, and decorative techniques used. Data on firing processes have been gathered using hand-specimen observations of both kinds of sample. Fundamental to the approach is the aim to compare the character of MIA and LIA ceramic technology, in order to evaluate the nature and extent of technological change/continuity between these two periods. As such, analysis has incorporated substantial numbers of vessels and fabric samples from each of these two periods.

3.1.2 A regional approach

Ceramic technological change going into the LIA can be observed in material culture from many areas across a broad swathe of southern Britain: the nine 'zones' defined by Thompson (1982, pp.8–17) in fact represent only a portion of the area within which evidence for technological change can be found. Evidence for the potter's wheel, for instance, is apparent in LIA phases at, e.g., Silchester (Hants.)(Timby 2000); Danebury (Hants.)(Cunliffe 1984a, pp.248–249); Bagendon (Gloucs.)(Fell 1961, p.212); and in Oxfordshire (Harding 1972, p.118): all of which lie outside Thompson's southeastern study area.

In order to cover the whole area within which there is evidence for ceramic technological change in the LIA, evidence from sites throughout much of southern Britain would need to be taken into account. Needless to say, when such an in-depth analytical programme is proposed this is not to be advised, as analysis would require either a prohibitive amount of time and effort, or take into account evidence that is so thinly-scattered as to be meaningless on anything more than the most localised level. It was therefore decided to structure the project around a series of regional analyses, in acknowledgement of the kinds of regional variability in pottery of this period identified by Thompson (1982, pp.8–17). Two study-regions were eventually decided upon: the area of the middle Thames Valley occupied by the modern county of Berkshire and the northernmost part of Hampshire ('Region 1'); and the area of Hertfordshire and the north Chilterns (roughly corresponding to Thompson's 'Zone 7': here termed 'Region 2')(fig.3.1).

It was felt that a regionalised approach would have the benefit of both taking into account any localised variations in the processes of technological change found to occur, whilst both avoiding the potential biases of focusing on one or two particular sites within a region, and also remaining able to contextualise the ceramic analyses by taking into account the specific nature of the settlement pattern and any other localised factors that may be of wider social, economic, political, or industrial relevance. At the same time, assessing multiple regions has the benefit that inter-regional comparisons may be attempted, enabling the identification of any similarities and/or differences in regionalised processes of change that may be of relevance in building up a more generalised picture of the nature and significance of technological change over a broader area.

Region 1		Region 2	
Site	No. samples	Site	No. samples
Grazeley Rd, Three Mile Cross	12	Baldock, 1968-72	15
Little London Road	10	Blackhorse Road, Letchworth	10
Marnel Park, Popley	11	Hare Street Road, Buntingford	16
Ructstall's Hill, Basingstoke	10	Leavesden Aerodrome	11
Silchester, Insula IX	41	Mayne Avenue, St Albans	6
Temple Lane, Bisham	11	Prae Wood, St Albans	21
Winklebury Camp	7	Wheathampstead	5
		Wheathampstead Bypass	3
Total	**102**	**Total**	**87**

Table 3.1. Fabric samples per site.

3.2 FABRIC ANALYSIS

3.2.1 Sampling

Appendix C contains a list of the pottery assemblages consulted, while table 3.1 presents a summary of the numbers of fabric samples analysed from each site in each region. Assemblages were viewed – usually at the museum, local authority, or unit stores where they were kept – and details of fabric (using a x10 hand lens) and form types represented considered in an initial consultation. Only contexts that had been dated to the Middle or Late Iron Age were considered. Where appropriate and possible (in accordance with local authority and/or unit guidelines and permissions), destructive fabric samples were taken, to be analysed further at the Department of Archaeology, University of Reading. Fabric samples were selected in order to encompass the full range of more common fabrics, as well as examples of some of the rarer fabrics encountered. Effort was also made to incorporate fabrics that were representative of the full range of MIA and LIA pottery represented at each site. This totalled one-hundred and two samples from seven sites in Region 1; and eighty-seven samples from eight sites in Region 2. Details of hand-specimens were recorded according to PCRG guidelines (PCRG 2010) using observations made with a x10 hand lens, and thin sections prepared of all fabric samples. Combined analysis of hand specimens and thin sections were used to group the samples into the individual fabrics and higher-level 'fabric groups' that are reported upon in chapters 4 and 5. Full fabric records can be found in Appendix D.

3.2.2 Thin-section petrography

Preparation

In order to prepare thin sections, one surface of each fabric sample was cut, ground, and polished before being mounted on a glass slide. Some of the more friable samples also required impregnation with epoxy resin prior to cutting, in order to allow them to survive the thin sectioning process. Mounted samples were then cut and lapped on a Logitech precision lapping machine using an abrasive of 30μm aluminium oxide suspended in ethylene glycol, to a thickness of 30μm, before finally being polished, cleaned, and cover-slipped ready for analysis.

Qualitative analysis

The key aim of the qualitative petrographic analysis was to establish a fabric series that could be used to both categorise the fabric samples, and to structure further analysis. A single fabric series was devised for the two regions, with determination of the fabrics being achieved on the basis of both macroscopic and microscopic analyses so that – in the majority of cases – petrographic fabrics could be identified in hand-specimen (i.e. without the need to prepare thin sections). This was crucial in the analysis of manufacturing techniques, wherein many substantially-complete vessels were analysed, in which cases it was not appropriate or permissible to undertake destructive testing.

Once the fabric series had been finalised, each fabric was recorded using a modified version of the recording system published by Quinn (2013, pp.237–244). These petrographic descriptions were also placed alongside records derived from the PCRG recording system (2010). These records comprise Appendix D1. Each fabric was also provided with a photograph of a fresh break, and a photomicrograph illustrating diagnostic petrographic features. Hand-specimen and microscopic images can be found in Appendices D2 and D3, respectively.

Features of particular technological significance were noted as part of the recording process, and these analysed further using one of the more in-depth methods described below. Parallels for the rock-and-mineral assemblages found in each fabric were sought in the local geology, as well as further afield where appropriate.

Region 1 clay sampling

In addition to the one-hundred and eighty-nine archaeological fabric samples, thin sections were prepared of fifteen clay samples dug from local clay sources within

Region 1. The intention of the programme of clay sampling was to provide a rough 'control' for what was to be expected of a variety of local clays that had been prepared and fired to convert them to ceramic under known conditions. Specific geological outcrops were targeted within the study-region in order to get as broad a cross-section of the available clay deposits as possible given the constraints of the landscape. Some deposits – most prominently much of the Bracklesham Group – could not be accessed due to extensive occupation of the landscape by modern features. Fieldwork involved collecting clays from at-or-near the surface at each predetermined point-of-acquisition, with an auger being used where necessary to bore through topsoil. Clays were then returned to the laboratory at the Department of Archaeology, University of Reading, where they were minimally processed in order to remove the largest particles of organic matter and rock fragments, before being hand-formed into small bricks. These bricks were then fired in a muffle-furnace at a temperature of 800˚C for six hours under oxidising conditions. Finally, the bricks were impregnated with epoxy resin and submitted for the same process of thin-sectioning as the archaeological ceramics.

Clay sample thin sections were kept for reference to archaeological specimens as another method of identifying provenance by reference to particular clay formations. Three clay samples were also analysed using quantitative petrographic procedures in order to control for the addition of temper to the archaeological specimens. A record of clay samples collected can be found in Appendix K.

Quantitative analysis

Quantitative analysis was conducted on a subset of the fabrics that it was felt would benefit from more detailed analysis of fabric composition. Quantitative analysis was conducted using the PETROG point-counting software in conjunction with a Conwy Valley Systems automated stepping stage. Data collection involved recording – using the 'single-intercept' method (Quinn 2013, p.109) – at least three hundred compositional ('modal' – see Quinn 2013 pp.105-6) points (i.e. allocation of each point to a type of inclusion, matrix or void) and at least ninety-five textural measurements (i.e. long-axis measurements of inclusion grains only) per sample. In each sample a pre-set area of interest with step sizes between points of 0.594mm (x-axis) and 0.571mm (y-axis) was analysed in order to ensure analytical consistency between samples. Data collected were processed in order to generate statistics to be used in combined textural-modal analysis (Quinn 2013, p.106). Percentage-by-area statistics were also produced (Quinn 2013, pp.105–106). The quantitative petrographic data is presented in Appendices F and G.

3.2.3 SEM microanalysis

Select samples were submitted for SEM microanalysis. This analysis was conducted at the Centre for Advanced Microscopy at the University of Reading using an FEI Quanta FEG 600 Environmental Scanning Electron Microscope (ESEM) fitted with an energy-dispersive x-ray spectrometer (EDX). All EDX data was collected via the Oxford Systems INCA software package. The standard analytical protocol for EDX analysis involved the taking of 60-second spectral determinations capable of yielding semi-quantitative results suitable for basic chemical analysis of clay matrices and inclusions. Data processing included standardless ZAF corrections applied automatically by the INCA software, and conversion of the raw spectral counts to weight-percentage of oxides by stoichiometry (again achieved through the INCA software).

The data collected by SEM for this study principally pertain to the analysis of inclusions of grog found in certain of the fabrics, in order to conduct firing-temperature estimations on these grains and compare these to the estimated firing temperatures evident in the surrounding clay matrices. This was achieved using the method devised by Maniatis and Tite (1981), involving the imaging of ceramic microstructures in the SEM and qualitatively assessing the degree of vitrification achieved in the case of each image. Semi-quantitative chemical determinations are required as part of this method in order to assess the proportion of calcite (CaO) present in the clay, as calcite has a marked effect on the development of vitrification and its appearance in ceramic microstructures (*ibid.*). Full details of this analysis are presented in Appendix H.

3.3 ANALYSIS OF MANUFACTURING TECHNIQUES

3.3.1 Sampling

Details of form types represented in MIA and LIA contexts were considered while undertaking initial viewings of assemblages. Where substantial numbers of diagnostic sherds were found to be present, details of numbers and types of vessels represented were recorded. Permission to be loaned a subset of the vessels was then sought. Selection of individual vessels was based on the desire to gather a cross-section of the more common types represented in each period, along with a selection of the rarer types. Fabric was also a consideration, with effort being made to select form types representative of the full range of fabric types encountered. This was not possible in the case of some of the rarer fabrics, which had been found as body-sherds only. In addition, some difficulty was encountered in receiving loan permission for some

Region 1		Region 2	
Site	No. samples	Site	No. samples
Park Farm, Binfield	14	Baldock, 1968-72	35
Brighton Hill South	54	Blackhorse Road, Letchworth	35
Kennel Farm, Site A	12	Hare Street Road, Buntingford	30
Riseley Farm, Swallowfield	16	Leavesden Aerodrome	40
Ructstall's Hill	11	Mayne Avenue, St Albans	9
Denton's Pit, Southcote	16	Prae Wood	67
Silchester, Insula IX	25	Turner's Hall Farm, Wheathampstead	1
Thames Valley Park	19	Verulam Hills Fields	2
Ufton Nervet	19	Wheathampstead Bypass	11
Viables Farm	5	Wheathampstead (Wheeler Excavation)	7
Total	**191**	**Total**	**237**

Table 3.2. Numbers of vessels from each site subjected to analysis of forming techniques.

material. This was particularly problematic in the case of the assemblage from Skeleton Green, Braughing (Region 2), held by Hertford Museum, permission for the loan proving impossible to come by. In the end, 191 vessels were analysed from Region 1 sites, and 237 from Region 2 sites.

Two Microsoft Excel spreadsheets were set up to record manufacturing data – one for each region. Basic data were recorded for each sample (section 3.3.2), as well as the results of detailed assessments of forming techniques found to have been used (section 3.3.3).

3.3.2 Recording

Basic data pertaining to each vessel analysed was recorded in two Microsoft Excel workbooks, one for each study-region (Appendices A & B). Each vessel was assigned a unique reference code structured as follows:-

[region no.]/[3-digit site code]-[numerical reference]

e.g.

2/PWD-042

=

(Region 2)/(Prae Wood)-(Sample 42)

Context and date information were recorded, as well as a reference to any published illustration(s) of the vessel. All dates recorded are those provided in the published report; these were used to allocate each vessel to one of the two chronological phases under discussion – 'MIA' or 'LIA'. Basic details of the specimens were also recorded, such as the condition of the vessel, rim and/or base diameter measurements, and wall-thickness measurements. Details of any surface treatment(s) and/or decoration were also recorded where appropriate. In the case of decoration, emphasis was placed on recording decorative techniques rather than decorative styles, as this is consistent with the analysis of technical practice as the object of this study. However, decorative style is referred to qualitatively in chapters 4 and 5.

In order to record details pertaining to the quality and nature of firing procedures, a 16-part series of firing sequence ‘types’ was devised (table 3.3). This may be seen as a purpose-made version of the kind of scheme devised by, e.g., Rye (1981, fig.104). While clearly not suitable for commenting upon firing temperatures or other quantifiable metrics, such a scheme provides the basis for basic interpretations of firing procedures and the quality of control over firing episodes.

Form types were recorded using the Thompson (1982) typology for all LIA types. Even in Region 1 – which is outside Thompson’s original study-area – the typology fits the material well. In the case of MIA vessels, for Region 1 the Danebury typology (Cunliffe 1984a, pp.259–307) has been used, while in Region 2 the Haddenham V typology (Hill & Braddock 2006) has been used. One additional form type was defined for Region 1 – the X1 type, i.e. the large, common Silchester ware everted-rim jar (Timby 2000, fig.127, nos. 496-506). The Haddenham V typology was used for the Region 2 wares as, although MIA pottery in this region is commonly referred to as being of ‘Little Waltham-type’ (cf. Thompson 2015a, p.119), it was felt that the Haddenham typology was able to encompass more variation due to its flexible structure, and that its use would better facilitate a functional analysis of the kind that was published in Hill & Braddock’s report. Fabric types were allocated according to the fabric series devised on the basis of combined thin-section and hand-specimen analysis (above, section 3.2.2).

All vessels were photographed following analysis. In addition, a selection of the form types represented in each region were illustrated.

3.3.3 Analysis of forming techniques – introduction to basic principles

Analysis of forming techniques consisted of two methodological components – hand-specimen observations (i.e. of features visible on the surfaces and in the morphologies of vessels); and x-radiography. Hand-specimen observations are not subject to a detailed methodological approach, aside from appreciation of features of relevance that are referred to in the descriptions of the different forming methods (section 3.3.4-3.3.6). Hand-specimen photographs are provided in Appendix M. However, it is appropriate here to refer briefly to the method of ceramic radiography

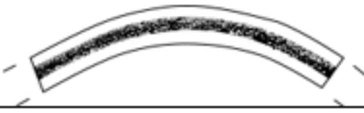
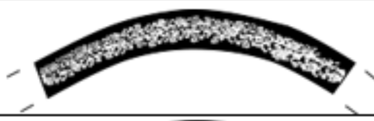
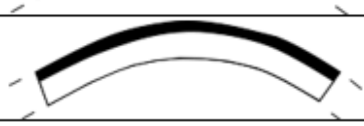
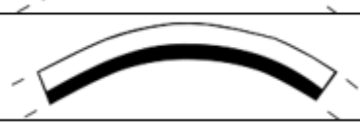
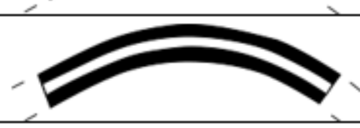
Sequence	Description	Illustration
R1	Completely reduced.	
R2	Predominantly reduced; external oxidation with diffuse boundary.	
R3	Predominantly reduced; internal oxidation with diffuse boundary.	
R4	Predominantly reduced; both surfaces oxidised with diffuse boundaries.	
R5	Predominantly reduced; external oxidation with sharp boundary.	
R6	Predominantly reduced; internal oxidation with sharp boundary.	
R7	Predominantly reduced; both surfaces oxidised with sharp boundaries.	
O1	Completely oxidised.	
O2	Predominantly oxidised; external reduction with diffuse boundary.	
O3	Predominantly oxidised; internal reduction with diffuse boundary.	
O4	Predominantly oxidised; both surfaces reduced with diffuse boundaries.	
O5	Predominantly oxidised; external reduction with sharp boundary.	
O6	Predominantly oxidised; internal reduction with sharp boundary.	
O7	Predominantly oxidised; both surfaces reduced with sharp boundaries.	
UR	Uneven; predominantly reduced.	
UO	Uneven; predominantly oxidised.	

Table 3.3. Firing sequence types. Black=reduced; white=oxidised.

and the particulars of its use in this study. All radiographs are provided in Appendix N.

Ceramic radiography has been an established technique for many decades (e.g. Rye 1977; 1981, chap.5; Carr 1990; 1993; Carr & Riddick 1990; Middleton 2005), although recent developments are seeing the technique experience a resurgence following increasing interest in the analysis of pottery forming methods in, in particular, Bronze Age Crete (e.g. Berg 2007; 2009; 2011; Jeffra 2013; Knappett 1999; 2004). In particular, Ina Berg has recently built upon the original systematic works of Owen Rye (1977; 1981) by experimentally verifying the radiographic features by which certain forming techniques may be identified (Berg 2008). Berg's work also builds upon previous studies that have sought to refine the methodological parameters for optimising radiographic images of ceramic artefacts (cf. Carr 1990; Carr & Riddick 1990).

The principle behind ceramic radiography is similar to that for conventional medical radiography. Ceramic artefacts are exposed to a limited dose of x-ray radiation: the resulting 'shadow' created by the partial and variable absorption of x-rays by different components/phases of the artefact is recorded on film, which is then developed and converted into a digital image. Digital images produced by this technique can be enhanced and modified (O'Connor & Maher 2001), or subjected to quantitative analysis (Pierret & Moran 1996; Pierret et al. 1996) as required by the interpretive demands of the study and/or the particulars of the ceramics. Images are typically analysed qualitatively, the analyst seeking to identify particular features that allow the inference of certain forming techniques. Berg (2009, p.140) lists three key advantages to ceramic radiography: first, that it is completely non-destructive; second, that it permits the investigation of both sherds and complete vessels; and third, that it can be done rapidly and cheaply. This means that radiographic analysis is feasible in a large number of situations, having minimal impact in terms of risk of damage to a collection, and being able to incorporate large sample-sizes that can be analysed with relative speed and ease. Meanwhile, numerous recent contributions (e.g. Berg 2007; 2011; Jeffra 2013; Knappett 1999; 2004; Roux 2010) show the significant utility of data derived from the analysis of forming methods in interpreting past technical behaviours, social dynamics, and processes of innovation.

In the current study, vessels were radiographed at the Department of Archaeology, University of Reading using a Hewlett-Packard Faxitron cabinet x-ray system (model 43855A) with a 0.5mm focal spot and 60cm focus-to-film distance.

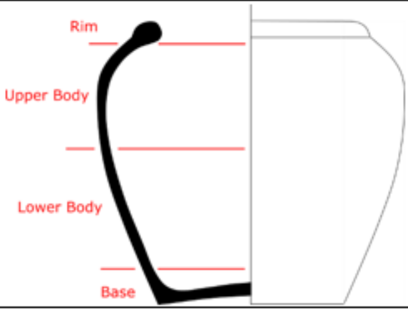
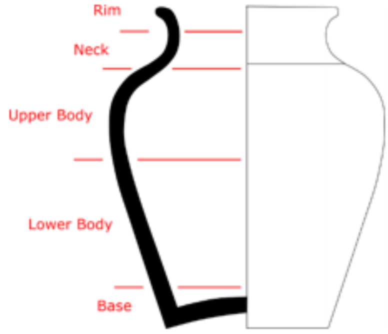
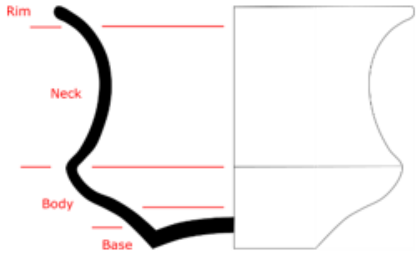
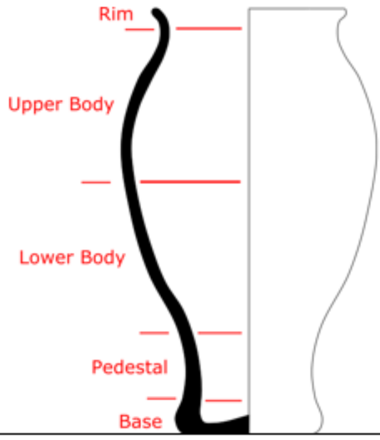
Morphological Class	Body-parts	Diagram
Simple jar/bowl	• Rim • Upper Body • Lower Body • Base	
Necked jar/bowl	• Rim • Neck • Upper Body • Lower Body • Base	
Carinated jar/bowl	• Rim • Neck • Body • Base	
Simple pedestalled jar/bowl	• Rim • Upper Body • Lower Body • Pedestal • Base	

Table 3.4. Morphological classes and their constituent body-parts. A full concordance table with form types can be found in Appendix E.

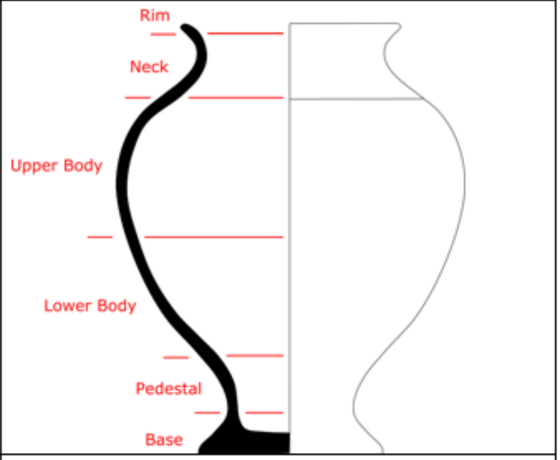
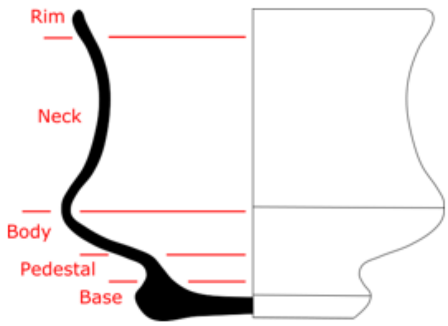
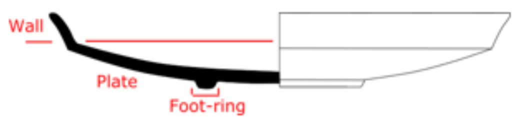
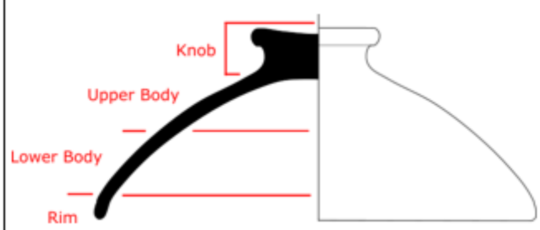
Necked pedestalled jar/bowl	• Rim • Neck • Upper Body • Lower Body • Pedestal • Base	
Carinated pedestalled jar/bowl	• Rim • Neck • Body • Pedestal • Base	
Platter/dish	• Wall • Plate • Foot-ring	
Lid	• Knob • Upper Body • Lower Body • Rim	

Table 3.5. Morphological classes, continued.

Complete and semi-complete vessels and substantial sherds were radiographed. Each exposure was conducted for three seconds at an energy-level between 40 and 80Kv with a 3mA current. Images were recorded on CareStream CR cassettes and digitised through a CareStream Vita CR system. Due to the speed with which images were able to be produced and digitised with this setup, trial-and-error could be used to ascertain the optimal Kv for each sample, judged on the basis of image clarity following initial enhancement with the CareStream Image Suite software. In order to account for the possibility of composite forming techniques, vessels were each allocated to a 'morphological class', with each morphological type being split up into different zones known as 'body parts' (tables 3.4 & 3.5). Each body-part of each vessel was provided with a determination as to its 'primary' and 'secondary' forming technique based on consultation of radiograph(s) and hand-specimens (cf. Rye 1981, chaps.66–89). A vessel's 'primary' forming technique is that used in the first stage of manufacture, employed in creating a 'roughout' or 'preform'. A 'secondary' technique is that used to thin, smooth, and/or shape the roughout into the final desired form (fig.3.2).

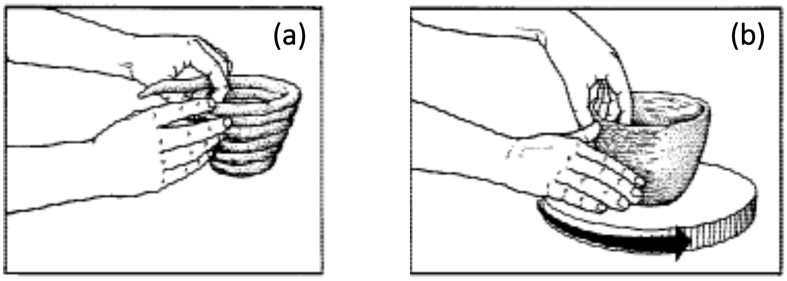


Figure 3.2. Illustration of primary and secondary forming of a simple bowl. (a) shows primary forming by the coiling technique; (b) shows secondary forming by wheel-shaping. Republished in edited form with permission of Academic Press/Elsevier, after Roux & Courty 1998, Fig.1; permission conveyed through the Copyright Clearance Center, Inc..

3.3.4 Primary forming methods and their identification

Coiling

Description*:* Forming begins with the production of 'coils' or 'rings' of clay, normally by clay being rolled out into a long 'sausage' shape. Coils or rings are then stacked atop one-another to form the preform. Coils or rings may be added to a preformed base, or the base itself may also consist of concentrically-arranged coils/rings.

Distinguishing features*: Hand-specimen*: Sometimes unsmoothed seams (where secondary forming has not obliterated them). Fractures commonly orient horizontally, along the plane of the seams. Wall thickness can vary markedly in the horizontal plane. *Radiograph*: In normal view, voids and inclusions will orient horizontally, commonly aligning with the rolling motion applied to coils; in section view, inclusions and voids orient concentrically, within individual coils. Horizontal variations in wall thickness will

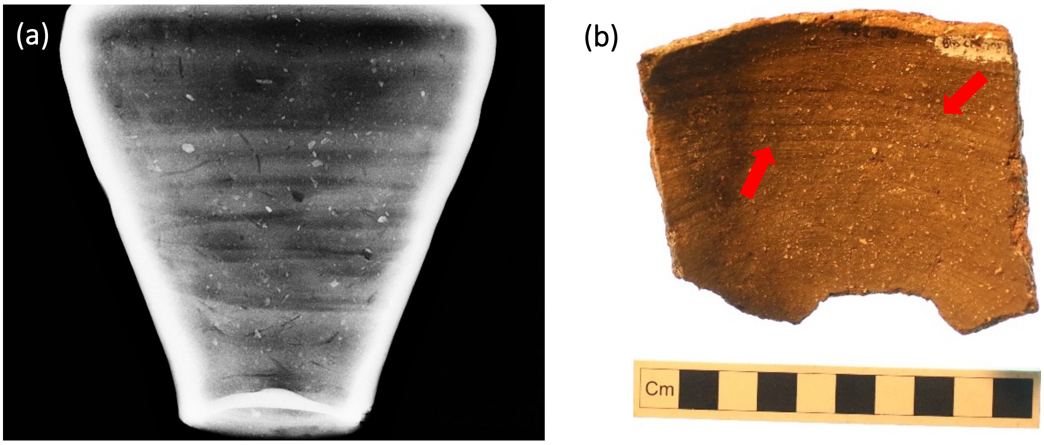


Figure 3.3. Evidence of coiling. (a) Dark bands representing coil-seams shown in radiograph; (b) partially-smoothed coil-seams (fine grooves) visible on the interior surface of a vessel.

be visible as alternating light- and dark patches. Coil seams will often be visible as distinct horizontally-oriented thin (dark) zones.

<u>Citations</u>*:* Rye 1981, pp.67-69; Berg 2008.

<u>Slab-building/Moulding</u>

<u>Description</u>*: Slab-building*: Flat slabs of clay are rolled out and then shaped into the desired form. Multiple slabs may be used for each vessel, and slabs may be of widely varying sizes and dimensions: from analogous to large coils, to smaller components stacked one on top of another like bricks in a wall. *Moulding*: Slabs or lumps of clay are pressed into/onto a pre-made mould. Moulds of multiple parts – or indeed moulds that only cover part of a vessel – may be used. Clay is normally left to dry out and shrink away from the mould slightly before being removed.

The two techniques can be difficult to distinguish, and as such they are discussed together here.

<u>Distinguishing features</u>*: Hand-specimen*: A dense, compact fabric may result from compressive forces applied during the forming of slabs or the pressing of clay into a mould. These forces may also result in laminar fractures when the wall is viewed in section. Cracks may also form along seams between slabs or separately-moulded components. A general observation is that there will be irregular variations in wall-thickness. *Radiograph*: In normal view, inclusions and voids will orient randomly; in section view, inclusions and voids will align strongly with the surfaces. Seams between slabs or moulded components may be visible as discrete thin (dark) patches.

Citations: Rye 1981, pp.71-72, 81-83; Berg 2008.

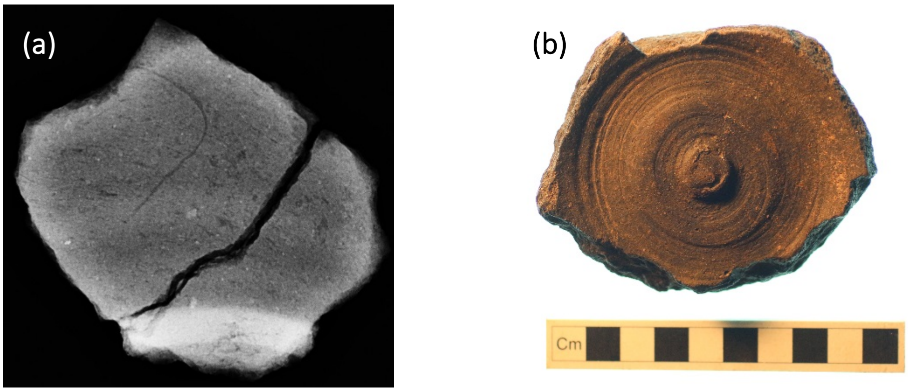


Figure 3.4. Evidence of wheel-throwing. (a) Diagonal void-orientations and horizontal thick/thin zones, evidenced in radiograph; (b) pronounced spiral-ridges on interior of a base sherd.

Wheel-throwing

Description*:* A lump of clay is centred on a potter's wheel and the wheel spun at speeds sufficient to generate rotational kinetic energy ("RKE": Courty & Roux 1995). The potter then uses their fingers, hands, and/or a range of tools and templates to lift and shape the clay into the desired form, utilising the RKE imparted by the rotation of the wheel-head. The resulting vessel will not normally require any secondary forming, as the walls of the pot will usually be uniform in the horizontal axis; walls will be smooth; and shaping can be achieved using tools and templates while the vessel is turning.

Distinguishing features*: Hand-specimen*: Spiral ridges ('wheel-marks'), particularly on interior surfaces, and most prominently at the base. 'Wire-cutting' marks on the exterior of the base. Fine horizontal or diagonal striations on all surfaces. Wall thicknesses will be uniform in the horizontal axis; thickness will often decrease from the base to the rim. Highly and consistently-smoothed surfaces. *Radiograph*: In normal view, voids and inclusions will orient diagonally (this is the key distinguishing feature between wheel-throwing and wheel-shaping); in section view, voids and inclusions will orient parallel with the surfaces. Any thick (light) or thin (dark) patches will be arranged rhythmically, in the horizontal axis.

Citations: Rye 1981, pp.74-81; Courty & Roux 1995; Berg 2008.

3.3.5 Techniques that can be used for primary or secondary forming

Paddle-and-Anvil

Description*:* Clay walls are thinned, smoothed and shaped by being repeatedly pounded between two hard surfaces – a 'paddle' and an 'anvil'. The anvil can be a static object or template (such as the body of another pot), or can be a hand-held object (such as a large stone held inside the vessel). The paddle is any tool used to beat the clay as it sits against the surface of the anvil. In its use as a primary technique, a lump of unformed clay is worked; as a secondary technique a pre-made preform is finished by beating.

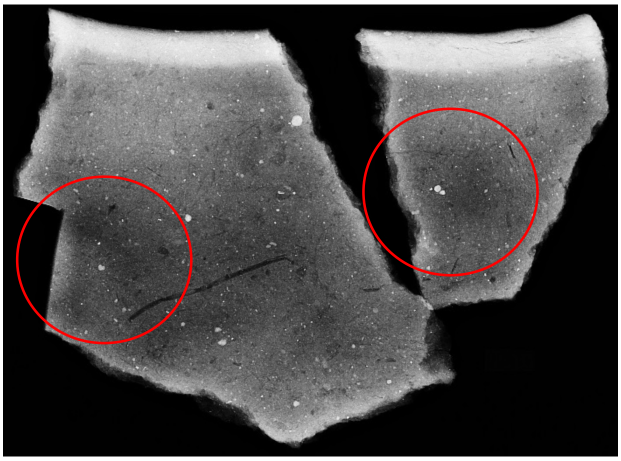


Figure 3.5. Evidence of paddle-and-anvil use. Radiograph showing rounded thin (dark) patches representing paddle-strikes.

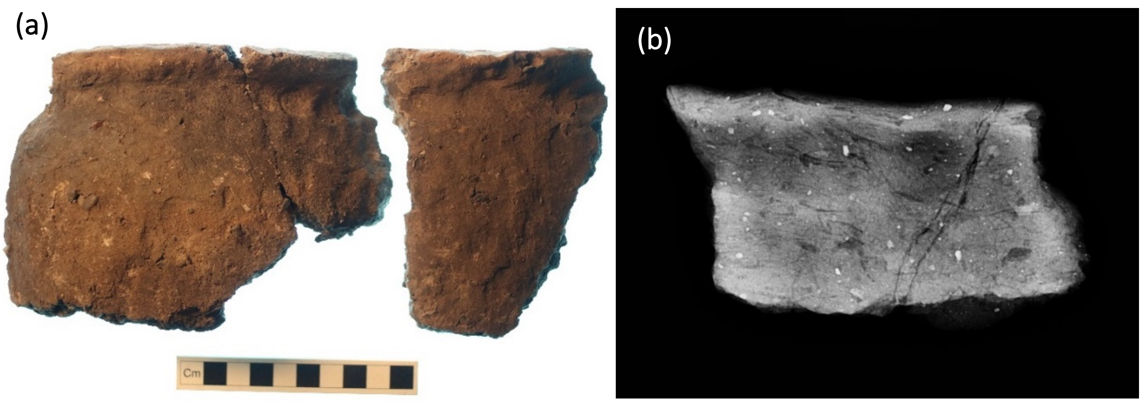
<u>Distinguishing features</u>*: Hand-specimen*: Repeated ‘casts’ may be left by the action of the paddle (exterior) or anvil (interior). A dense fabric may result from the compressive action of beating, perhaps also resulting in laminar fractures when the wall is viewed in section. Star-shaped ‘eruption’ cracks often form around large inclusions. *Radiograph*: Clearly-visible rounded thin (dark) patches corresponding to concavities. In section view, inclusions and voids will be aligned with surfaces; in normal view, voids and inclusions will be randomly-oriented. The secondary technique can obscure patterns left by any primary techniques used.

Citations: Rye 1981, pp.84-85; Berg 2008.

<u>Pinching/Drawing</u>

<u>Description</u>*:* In its most basic form, an unformed lump of clay is hollowed out with the fingers and pressed into the desired shape between fingers and thumb. The related technique of ‘drawing’ involves the application of more force, usually with both hands being used to compress the clay and to pull the walls into the desired shape. Both techniques can also be used in secondary forming, in order to shape a preform made using other primary techniques.

Figure 3.6. Evidence of pinching/drawing. (a) Rounded pinch-marks around a vessel rim, shown in hand-specimen; (b) the rounded thin patches of a pinched rim shown in radiograph.



Distinguishing features*: Hand-specimen*: Repeated shallow indentations, often moving upwards towards the rim (particularly where drawing has been used). *Radiograph*: In normal view, inclusions and voids will orient in the direction of the pinching force, or randomly where direct compressive pressure has been applied; in section view, inclusions and voids will orient parallel with surfaces. Small rounded thin patches will be in evidence for the pinching technique; elongated thin patches will be in evidence for the drawing technique.

Citations: Rye 1981, pp.70, 72-72; Berg 2008.

3.3.6 Secondary forming techniques

Hand-shaping

Description*:* A preformed vessel is thinned, smoothed, and shaped using discontinuous pressures, applied solely by hand or with very basic tools (e.g. wiping-cloths).

Distinguishing features*: Hand-specimen*: Smoothed surfaces. Where a cloth or similar has been used, this may leave parallel striations in the fired clay. Uneven wall thickness will result from small-scale compressive forces (no bigger than a hand). *Radiograph*: Uneven wall thickness will also be visible on radiographs.

Citations: n/a

Rim-folding

Description*:* A preformed vessel is modified by thinning the rim and folding the thinned portion back onto itself in order to round-off the rim form.

Distinguishing features*: Hand-specimen*: A seam will be visible on *one* of the surfaces, a short distance beneath the rim-top. Fractured surfaces may exhibit a texture wherein elongated features 'fold back' on themselves before reaching the rim. *Radiograph*: A seam may be visible immediately beneath the rim, but this will be indistinguishable from a coil-seam. All other features will be entirely dependent upon the other techniques used.

Figure 3.7. Evidence of rim-folding. Photograph of interior surface of a bead-rim jar, showing a seam resulting from folding clay from the top of the rim inwards.

Citations: n/a

Wheel-shaping

Description*:* The secondary version of wheel-use, which differs from wheel-throwing in that it does not make use of RKE in building up the vessel. A turntable may in many cases have been sufficient to facilitate the rotary speeds and control necessary for these operations. A preformed vessel will be centred on the wheel-head and the wheel set turning. The potter then uses their fingers, hands, and/or a range of tools and templates to thin, smooth, and/or shape the vessel.

Distinguishing features*: Hand-specimen*: Highly and consistently-smoothed surfaces – in the case of closed vessels this applies particularly to the exterior. Spiral-ridges ('wheel marks') are possible, particularly on interior surfaces and most prominently near the base (these will not be as prominent as they are in wheel-thrown vessels). Vessel walls may be of varying thickness, with the particular configuration of this conforming to the wheel-coiling method used (see below). Seams may also be present, this again being dependent upon the primary technique. *Radiograph*: Void orientations, wall thickness, and the existence of seams will be entirely dependent upon the primary forming technique. Berg (2008, pp.1180-1181) identifies wheel-shaping on the basis of a mismatch between evidence for wheel-use based on surface features, and evidence for a technique of hand-making based on radiographic interpretations.

Citations: Courty & Roux 1995; Roux & Courty 1998; Berg 2008, pp.1180-1181.

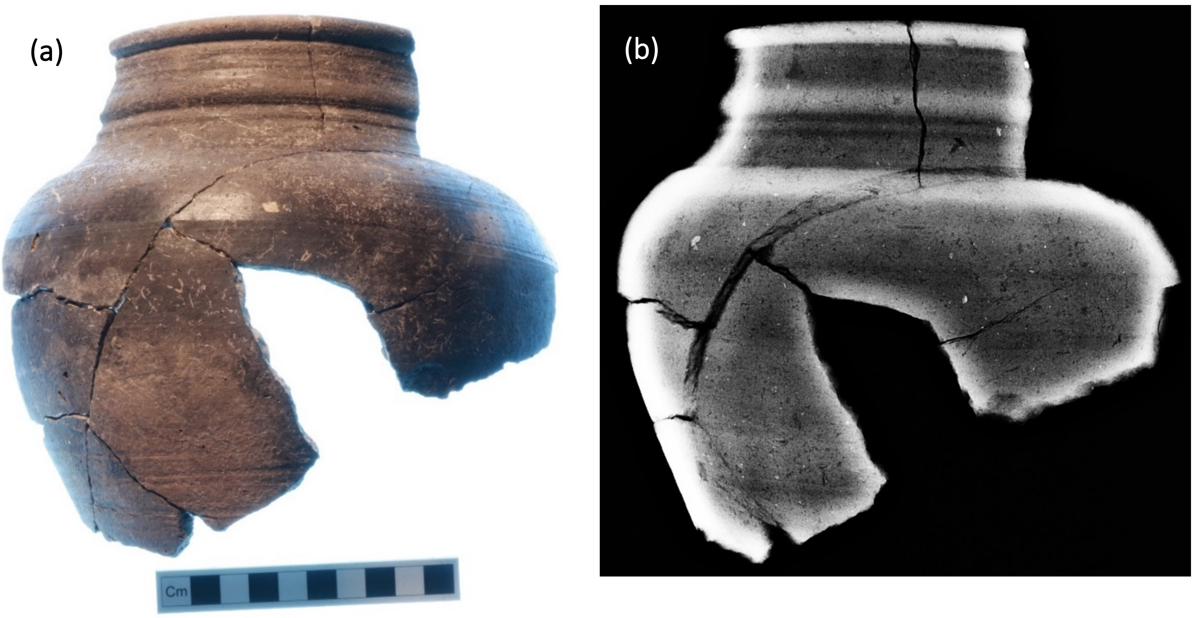


Figure 3.8. Evidence of wheel-shaping. (a) Photograph of exterior of a necked jar showing fine, evenly-tooled decoration on the neck and horizontal striations on the body; (b) radiograph of the same vessel showing coil-seams and horizontal void orientations.

3.3.7 Roux & Courty's wheel-coiling methods

Supplementary to the radiographic analysis, record was made in the case of all vessels found to be wheel-coiled (a hybrid method consisting of the primary 'coiling' and the secondary 'wheel-shaping' techniques) of the particular method of wheel-coiling utilised. This followed the methodology devised by Roux & Courty (1998; also see Courty & Roux 1995), in which four 'wheel-fashioning techniques' are distinguished (based upon the variable use of the potter's wheel at different stages of the *chaîne opèratoire* associated with forming) and provided with criteria for their identification (fig.3.9; table 3.6). Identification of these different techniques pertains to the level of complexity involved in wheel-use in each case; an important consideration when investigating the use of an innovative technique such as this.

3.4 PRESENTATION OF RESULTS

The results of the analysis will be presented in the following two chapters. These will include discussion of discrete groups of fabrics representative of products proposed to derive from different industrial groupings or 'traditions' of pottery-making. Each group is provided with a discussion of the fabrics represented and their analysis

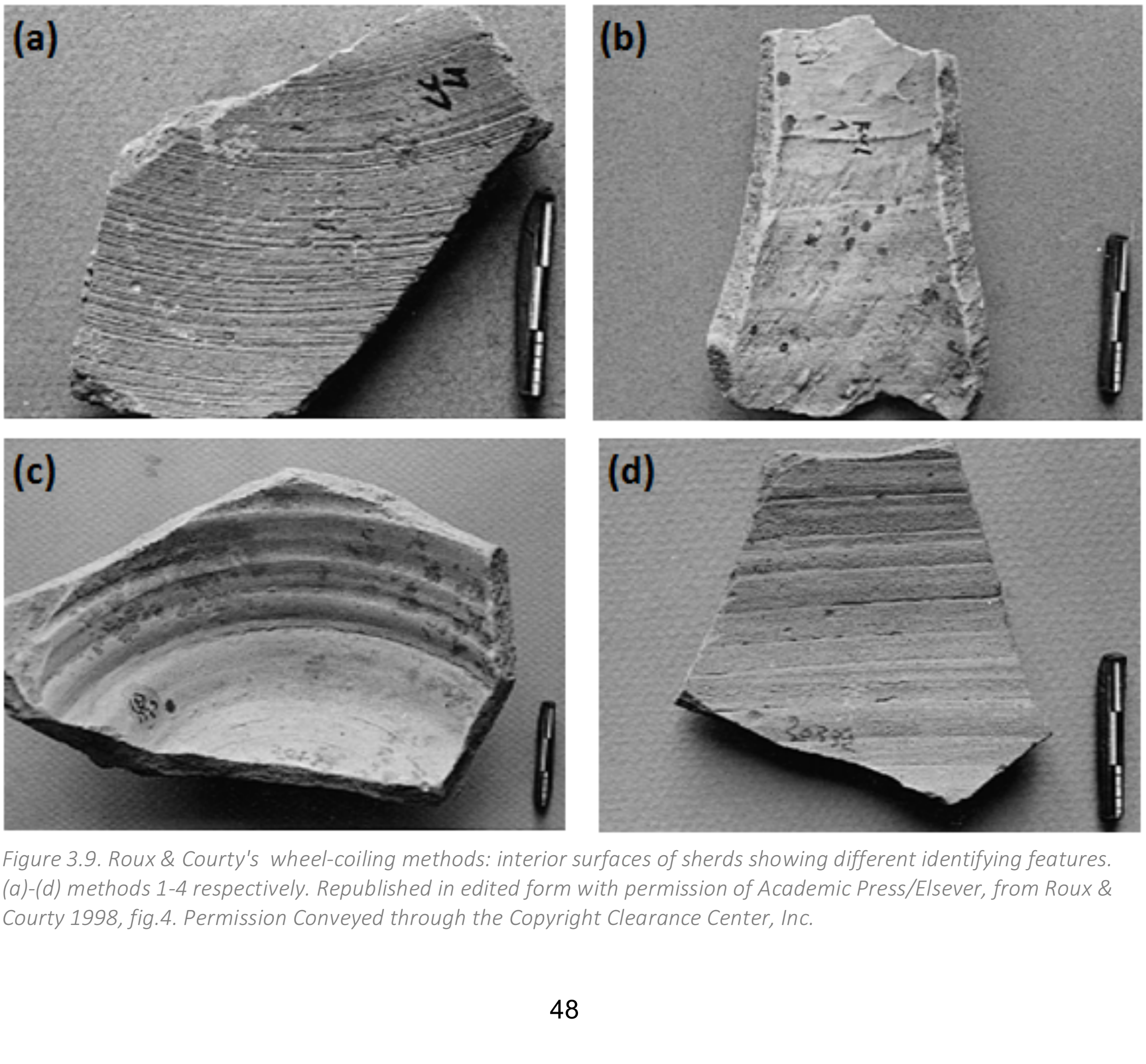


Figure 3.9. Roux & Courty's wheel-coiling methods: interior surfaces of sherds showing different identifying features. (a)-(d) methods 1-4 respectively. Republished in edited form with permission of Academic Press/Elsever, from Roux & Courty 1998, fig.4. Permission Conveyed through the Copyright Clearance Center, Inc.

Method	Operations				Identifiers
	Making coils	Joining coils	Thinning coils	Shaping preform	
1	No	No	No	Yes	• Wall weakly 'stretched' • Patchy variations in wall thickness ('blisters') • Lack of rilling
2	No	No	Yes	Yes	• Irregular wavy grooves (seams) • Some rilling
3	No	Yes	Yes	Yes	• Abundant rilling, often with grooves (seams) within rilled bands
4	Yes	Yes	Yes	Yes	• Regular – though not necessarily parallel – rilling. • Parallel grooves (seams). • 'Stretched' surfaces

Table 3.6. Summary of Roux & Courty (1998) wheel-coiling methods. Reproduced in edited form with permission of Academic Press/Elsevier, after Roux & Courty 1998, table 1; permission conveyed through the Copyright Clearence Center, Inc.

utilising the methods discussed in this chapter. Consideration of vessel function is also offered where appropriate, as this is considered to have a bearing on technological variables in certain cases. Consideration is also given to the provenance, chronology, and distribution of the wares of each fabric group, following which analysis of the production techniques involved in the manufacture of vessels is detailed.

Results are presented in Chapters 4 and 5, Chapter 4 dealing with Region 1 and Chapter 5 dealing with Region 2. Chapter 6 presents a consideration of certain of the most prominent techniques identified in the preceding two chapters, analysing these as objects of interest and significance in their own rights and drawing together data from other sources, including other relevant technological data from outside the sphere of pottery production, for the purpose of interpretation. Chapter 7 continues discussion by considering aspects of the localised social significance of technological change in each region in light of the new data. This includes interpretations relating to the spheres of economics, the social significance of innovation, and the expression of different forms of identities through technical practice. Chapter 8 will then conclude the analysis by summarising the findings and finally contextualising the interpretations at the broadest level.

CHAPTER 4: CHARACTERISING TECHNOLOGICAL CHANGE IN REGION 1 (BERKSHIRE & NORTHERN HAMPSHIRE)

4.1 INTRODUCTION

4.1.1 Location and geology

Region 1 is defined as the areas of the modern counties of Berkshire and northern Hampshire currently occupied by the major towns of Basingstoke, Reading, and Slough. The southern and central part of the region is immediately south of the river Thames, being dominated by the valleys of the rivers Kennet and Loddon/Blackwater, both of which flow north and east to meet the Thames near Reading. The oldest deposits outcropping in the region are the upper cretaceous deposits associated with the Chalk Group. This occurs north of the Thames on the Chiltern dip-slope and along the Kennet Valley near Theale (Mathers & Smith 2000, pp.5–8), as well as to the south on the Hampshire Downs. In all other areas it is overlain by younger deposits. The chalk is found as varying beds of soft, white, and sometimes nodular chalks with common seams of flint (*ibid.*).

Immediately overlying the chalk are the Palaeogene deposits of the Lambeth Group, traditionally known as the Reading Beds. These consist primarily of the mottled clays and occasional sands of the Reading Formation, with the thin layer of green and blue glauconitic clays and sands known as the Upnor Formation occurring at the interface with the chalk (Mathers & Smith 2000, pp.10–11). Lambeth Group deposits outcrop as irregular formations principally to the north of the Thames, and in the south as a thin band running northwest-southeast from Kingsclere to Farnham, at the interface between the Thames Group (the main constituent of the tertiary clays of the London Basin) and the chalk. It also outcrops sporadically in the Loddon and Kennet/Blackwater valleys.

The Thames Group dominates much of the central part of the region. It consists primarily of the London Clay and its deposits of blue-grey clayey silts and silty clays with interleaved glauconitic sands and pebble beds (Mathers & Smith 2000, pp.11–12). In the east of the region the London Clay is overlain by the Bracklesham Group, another source of localised glauconitic geology but predominantly occurring as quartz-rich marine sands (Mathers & Smith 2000, pp.12–13). Clays do occur as part of these deposits, but these are inconsistent and localised (*ibid.*).

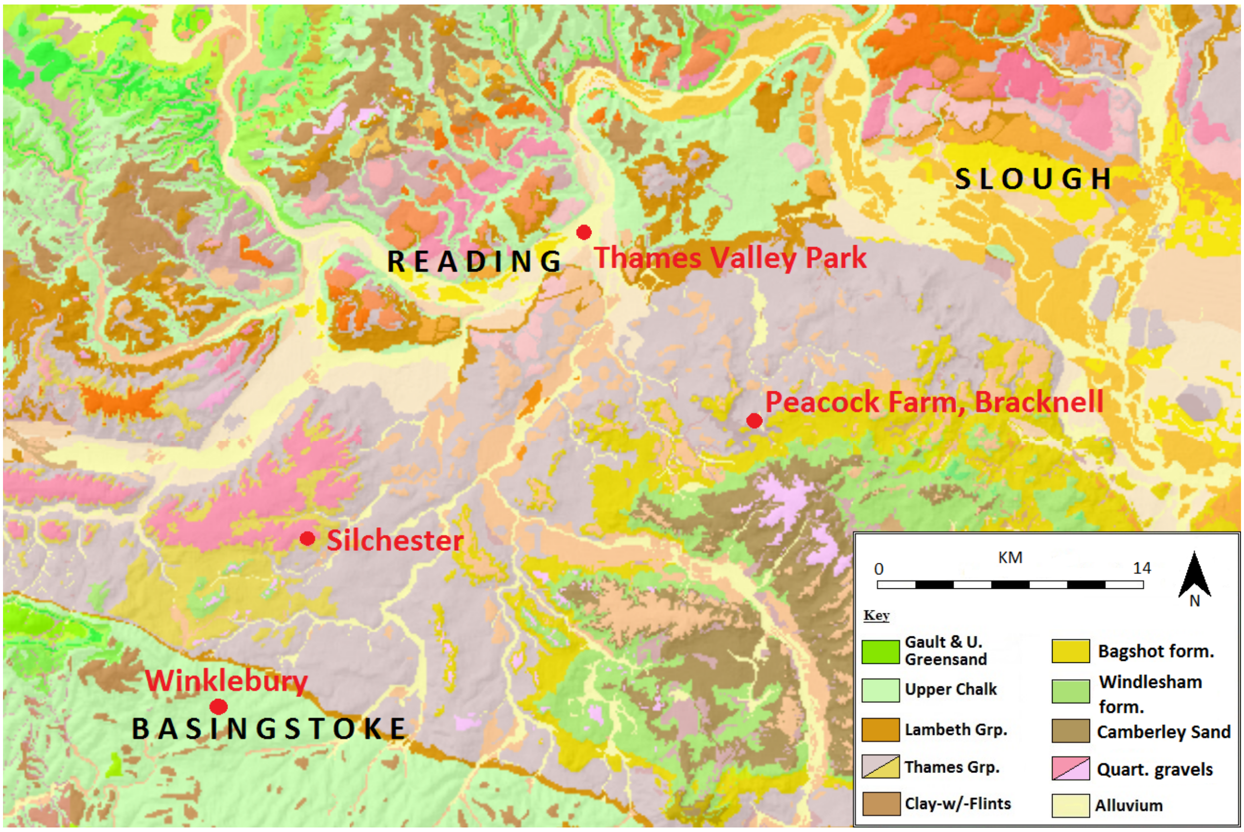


Figure 4.1. Region 1 bedrock and superficial geology (http://mapapps.bgs.ac.uk/geologyofbritain/home.html?)

Quaternary deposits in the region are dominated by a variety of gravels and alluvium occurring in the river valleys, and by localised clay-with-flints deposits associated with the chalk. In all cases the gravels are dominated by flints, but also with localised occurrences of quartz and quartzite (e.g. in the terrace deposits of the Thames), and occasional erratics (Mathers & Smith 2000, pp.13–20).

The region is rich in good clay that has been proved to be of use in manufacturing, being exploited until even the present day. Brick clay was commonly dug from the Reading Formation until recent times, and the London Clay is still exploited for brick manufacture at Knowl Hill (Mathers & Smith 2000, p.23). In addition, the 'plastic clays' interbedded with the lowest deposits of the Bracklesham Group, and the Langley Silt, are both said to be suitable for the manufacture of bricks and potentially other ceramics (*ibid.*).

4.1.2 The Middle Iron Age: c.400/300 – 150/50 BC

The majority of sites known to have had occupation during the MIA appear to have been enclosed farmsteads of various sizes. In general, these sites have yielded relatively little material culture aside from abundant finds of pottery. While most of these sites show little evidence for being of specialised settlement types, there is a suggestion that some may have occupied specific socioeconomic roles. For example,

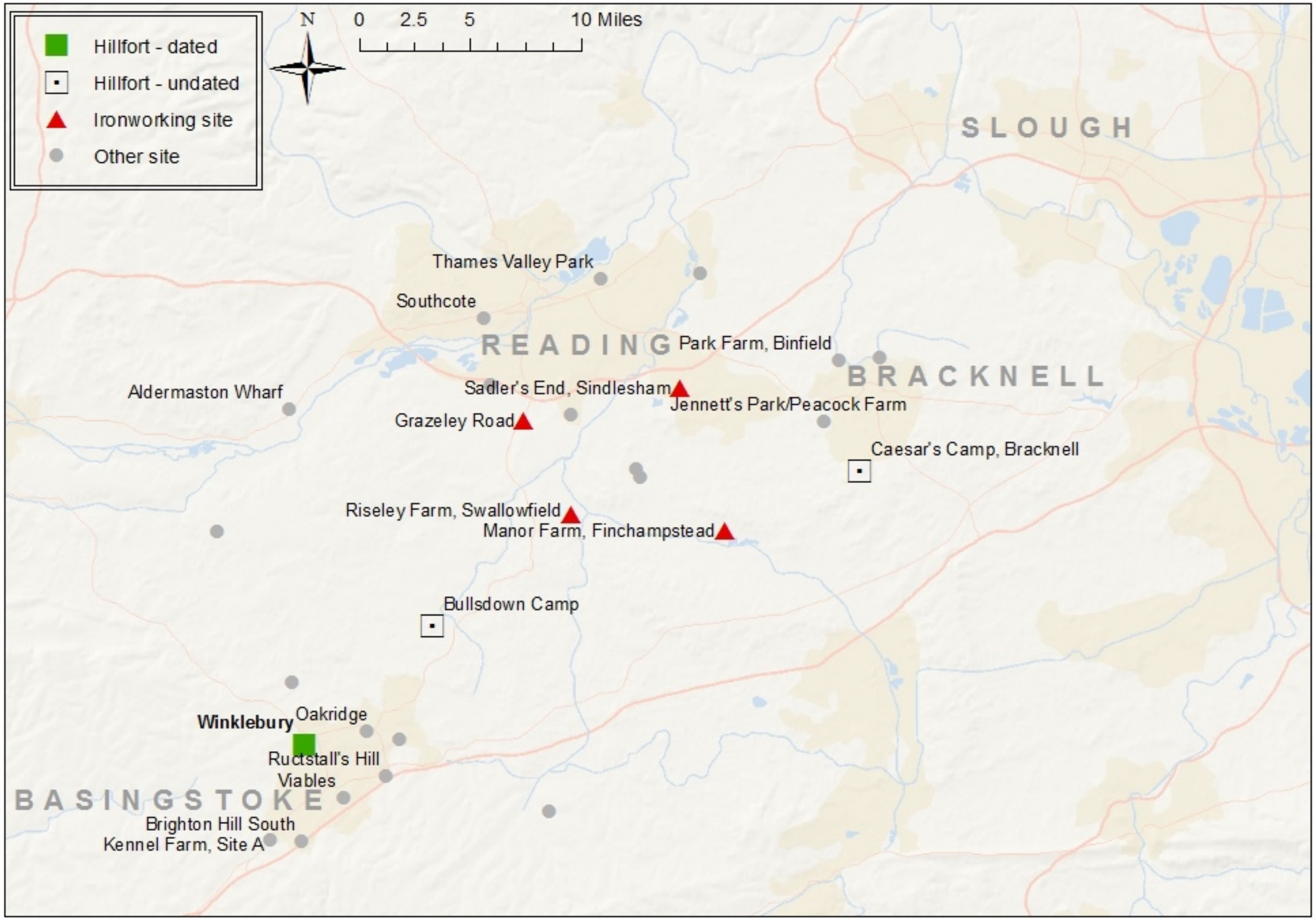


Figure 4.2. Region 1, MIA. Major sites.

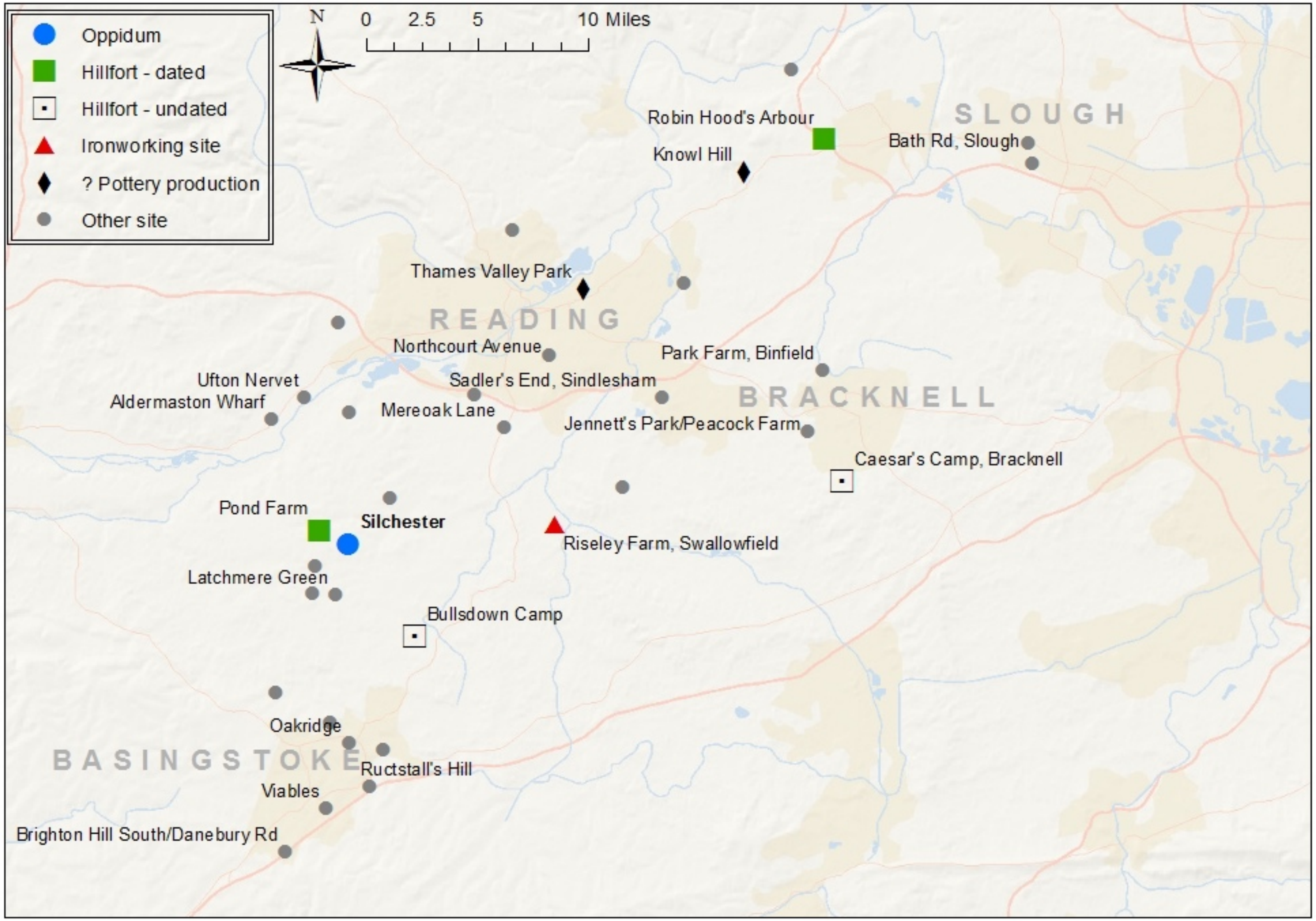


Figure 4.3. Region 1, LIA. Major sites.

evidence for ironworking has been recovered from a small subset of sites: specifically Grazeley Road, Three Mile Cross (Ford et al. 2013), Riseley Farm, Swallowfield (Lobb & Morris 1993), and Sadler's End, Sindlesham (Lewis et al. 2013). Further to this at least one hillfort is known to have been occupied during the MIA: Winklebury Camp (Smith 1977). Two more hillfort-like structures are also known in the area, but their occupation is undated: Bullsdown Camp, north of Basingstoke; and Caesar's Camp, Bracknell. In particular, it is likely that Winklebury acted as a focal point for the communities occupying the tight cluster of sites known from the region in and around modern Basingstoke.

The general distribution of sites during this period suggests two broad clusters of occupation (fig.4.2). One lay in the south of the region and is that referred to above as surrounding the hillfort at Winklebury. The other occupied the northern and eastern part of the region, and has a more dispersed settlement pattern with no confirmed evidence for a focal point in the form of a hillfort or similar. Between these two clusters lay what appears to have been a far more thinly-inhabited zone, dominated geologically by the quaternary gravels and Thames Group clays. New information on this area has recently been provided by publication of the Silchester Mapping Project (Creighton & Fry 2016, pp.339–342), and by the interim publications of the Silchester Environs project (Fulford et al. 2016; 2017), suggesting that the immediate hinterland of the oppidum had a limited amount of occupation during the MIA and earlier. In particular, dating evidence for the linear 'dykes' that are prominent in this part of the landscape suggests that at least some of these were first constructed during the latter part of the MIA (Barnett et al. 2017). Additionally, the newly-excavated settlement at Windabout Copse was found to have a phase of occupation dating to the Early Iron Age (Wheeler & Pankhurst 2017). Continuation of the Silchester Environs programme promises to clarify our understanding of MIA occupation in this area.

In general, occupation appears to have been mostly associated with the river valleys, occupants of sites seemingly preferring to have easy access to a watercourse, and to avoid the gravel terraces (Timby 2012, pp.138–41).

4.1.3 The Late Iron Age: c.150/50 BC – AD 43

The settlement pattern changes somewhat going into the LIA. The most obvious change is an apparent intensification in occupation in the area of the plateau gravels. The *oppidum* at Silchester was established here in the fourth quarter of the first century BC (Fulford & Timby 2000, pp.13–14), and several other sites such as Little London Road (Moore 2011), Pond Farm (Barnett et al. 2016), and Windabout

Copse (Wheeler & Pankhurst 2017) were either established or re-occupied at around the same time. In addition, the large enclosure or plateau-fort at Robin Hood's Arbour near Maidenhead appears to have begun during this period (Cotton 1961). Importantly, the hillfort at Winklebury probably went out of use or at least experienced a major reduction in activity by the mid-first century BC at the latest (Smith 1977, p.111). The apparent lack of a settlement focus did not result in the cessation of activity in the area around Basingstoke: occupation remained intense with sites such as Brighton Hill South (Fasham & Keevil 1995), Marnel Park (Wright et al. 2009), Viables Farm (Millett & Russell 1984; Gibson 2004), and Oakridge (Oliver 1992) all being either continuously occupied or newly established during the Middle-to-Late Iron Age.

This continuity is mirrored elsewhere in Region 1. Sites such as Aldermaston Wharf (Cowell et al. 1980), Thames Valley Park, Reading (Barnes et al. 1997), and Riseley Farm, Swallowfield (Lobb & Morris 1993) all continued in occupation into the LIA. There is also evidence for the continued specialisation of some sites. Evidence for metalworking is reported for both the MIA and LIA phases at Riseley Farm, suggesting that the role of this site continued at least somewhat unchanged between the two phases. In addition, some sites suggest – on the basis of their associated material culture – that their roles may have been different from a typical 'domestic' one. Particular comment is made by Timby (Timby 2010a, pp.14–15; 2010b, p.33) regarding the relatively high proportion of storage jars found at the Mereoak Lane site in Three Mile Cross and how this suggests the use of the site as being predominantly oriented towards the storage and processing of agricultural produce. This contrasts with the assemblage from the nearby site at Northcourt Avenue, Reading, which produced fewer storage jars and is more easily associated with domestic occupation (*ibid.*). Overarching all of this is the clear evidence that the Silchester *oppidum* had a completely different and novel character within the nearby settlement and social landscape, certainly serving as a political centre and a locale for the consumption of goods derived from both its immediate hinterland and further afield (Fulford 2000; 2011). The question of the relationship between Silchester and its surrounding landscape is now a crucial one (*ibid.*).

4.2 ANALYSIS OF FABRIC GROUPS

The fabric series was defined on the basis of analysis of 111 fabric samples, of which 102 were analysed entirely at the Department of Archaeology, University of Reading; the other nine were thin-sections made in advance of the report on the site at Winklebury Camp (Smith 1977), loaned to the current author by the Department of Archaeology, University of Southampton. Of the 18 fabrics defined for this study 13 are present in Region 1, these incorporating 21 distinguishable variants. These have subsequently been amalgamated into three fabric groups: the 'Flint', 'Sandy', and 'Grog' Groups. One fabric (incorporating two variants) is allocated to the Flint Group; four (incorporating nine variants) to the Sandy Group; and five (incorporating seven variants) to the Grog Group. A further three fabrics were not able to be easily allocated to one of the fabric groups, and these are left as standalone fabrics (section 4.2.4).

4.2.1 Flint Group

The Flint Group fabrics are an abundant, discrete and well-defined component of both Middle and Late Iron Age ceramic assemblages in Region 1. Two fabrics have been distinguished, these being heavily related to one-another. When found in LIA contexts these fabrics have commonly been known as 'Silchester ware' based on their abundance in first-century AD contexts at the type-site (May 1916, pp.177–184 (as "British Gritted Ware"); Timby 2000, pp.239–243; forthcoming). The fact that thin-section petrography now supports the notion that the MIA and LIA versions of these fabrics are basically indistinguishable is significant, highlighting the long-lived and continuous nature of this pottery-making tradition through a period of otherwise rapid change. Although other flint-tempered fabrics are known from these dates in Region 1, these are demonstrably different, fitting better with the Sandy Group fabrics in terms of both typology and provenance.

<u>Fabric F1a</u>

A dense, typically very hard and coarse fabric, usually fired to dark shades of brown, grey, or black; may also occur with zones of oxidation presenting as light pinkish browns or buff shades. Breaks are normally hackly and are loaded with common-to-abundant angular calcined flint up to 10mm, with little else being visible macroscopically. Petrography confirms this, in all cases being dominated by calcined flint, sometimes with organic matter and generally very minor numbers of quartz grains and iron oxide pellets. Very occasionally, rock fragments other than flint will be visible

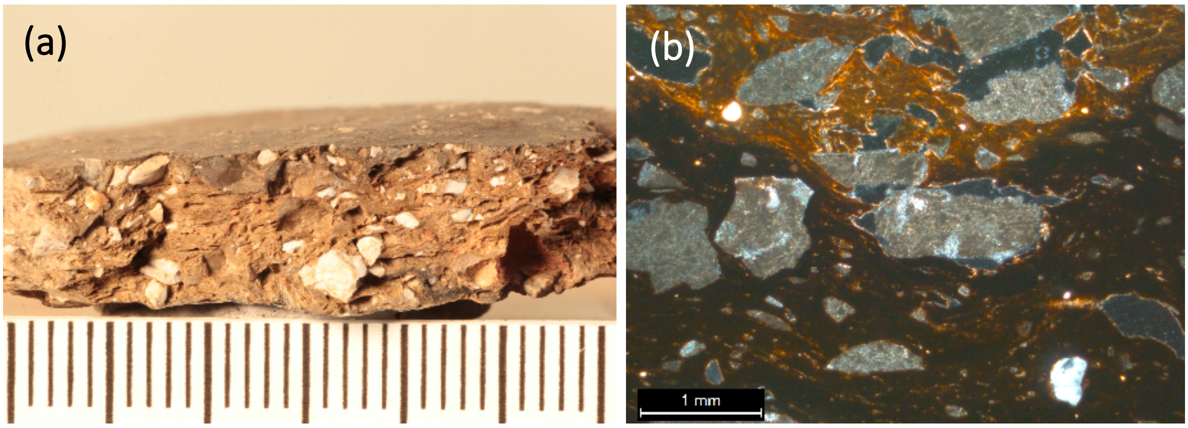


*Figure 4.4. **Fabric F1a**. (a): photograph of fresh break. (b): photomicrograph, x40, XPL.*

in thin-section, these all being sedimentary silicate rocks such as siltstones and mudstones/argillaceous rock fragments. These inclusions are all set in a very fine, yellowish-brown, occasionally heterogeneous, clay matrix. The feel is usually very granular as a result of the flint, which is to be regarded unequivocally as a deliberate temper on the basis of angularity, grain-size, and the presence of calcination (fig.4.4).

Fabric F1b

The 'b' subtype is defined by the occurrence of a silty fine-fraction consisting of densely-packed small (<0.2mm) quartz. This can be viewed most clearly in thin-section, but can also be perceived in the hand-specimen on the grounds of a sandier texture, with fine quartz often being visible when viewed with a x10 hand lens. These characteristics contrast with the clean matrix of the F1a fabric and may indicate the exploitation of separate clay sources for raw materials. The flint – again a certain temper – is also generally smaller (up to 2mm) and better-sorted, but this is not always the case (cf.SIX-05)(fig.4.5).

Provenance

Neither of the fabrics can be provided with a precise provenance on petrographic grounds, all of the inclusions present being geologically nonspecific. Flint for temper could be acquired from any number of quaternary deposits within the region, or from sources directly associated with the Upper Chalk. Similarly, the quartzes and very occasional sandstones and mudstones are of little use in distinguishing a particular source. The almost complete lack of calcareous matter in these fabrics may or may not be significant to their provenance. On the basis of the distribution it seems likely that production – or at least the acquisition of certain clays used to make these fabrics – will have taken place either outside Region 1, or on the southern edge of it near modern Basingstoke (see below). The clay-with-flints deposits associated with the

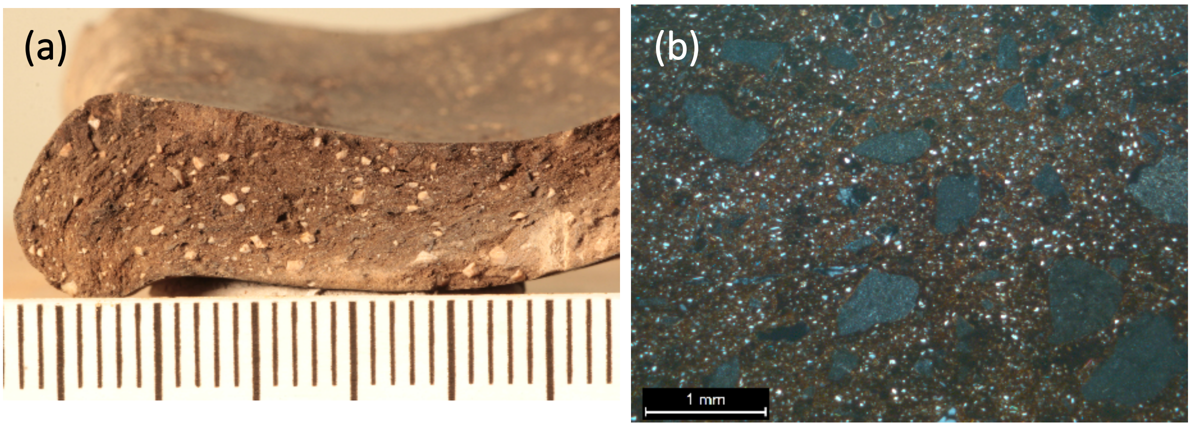


*Figure 4.5. **Fabric F1b**. (a): photograph of fresh break. (b): photomicrograph, x40, XPL.*

chalk would provide ideal raw materials for the acquisition of both clay and temper for these vessels, and are poor in calcareous matter due to their geological history of association with the Lambeth Group (Mathers & Smith 2000, p.20). These fabrics are also typically very fine-grained (particularly F1a), which is also a feature of the clay-with-flints (J.R.L. Allen, pers. comm.). The clay may have been thoroughly sieved or levigated in order to filter out larger naturally-occurring aplastics (cf. Rice 1987, p.118).

Distribution and chronology

Flint-tempered fabrics are found in abundance on MIA sites in central-southern England, being used primarily to make a limited range of plain and decorated saucepan pots and bead-rim jar forms. Assessing the origins of these vessels has proved problematic and in most cases the wares have been assumed to be locally rather than centrally produced and distributed (Cunliffe 1984a, pp.244–245; Morris 1995, p.243). There is little ground to prove one or the other case, although there are hints that a variety of fabrics is in evidence and these may warn against the notion of centralised production. For example, at Winnall Down near Winchester, flint-tempered fabrics dominated both the Early and Middle Iron Age assemblages, in the MIA occurring in the usual array of saucepan pots and jars (Hawkes 1985, pp.61–63). Petrographic analysis of the small assemblage from the newer site at Winnall Down II showed that the most common of these wares is a highly sandy variant of the fabric (Davis 2014, pp.33–34) and therefore not similar to those characteristic of Region 1. The dominant fabric from the M/LIA assemblage from Rectory Road, Oakley is also referred to as a sandy flint-tempered fabric and is apparently paralleled at Danebury (Brown 2008), despite the proximity of the site to the Basingstoke sites of Region 1. In the MIA ceramic phases (6 and 7) at Danebury itself and its immediate environs, numerous flint-tempered fabrics are known including sandy types and one fabric (B1) comprising “a virtually sand-free clay with dense, well-sorted angular pieces of flint temper measuring 1-3mm" (Brown 2000a, p.38). This may be a parallel for Region 1 fabric F1a, occurring commonly in the area of the Danebury Environs alongside a range of other flint-tempered fabrics, seemingly made according to a closely related recipe. While far from ideal, this evidence is highly suggestive: a geochemical characterisation study of these wares may prove very useful in further discussing the origins of the fabrics.

Going into the LIA, the prominence of flint-tempered fabrics reduces significantly in many areas. In the area of modern Winchester flint-tempered fabrics become almost non-existent, at Winnall Down being replaced by a range of sandy wares of varying quality (Hawkes 1985, pp.69–72). A similar situation is evident at Danebury, where Cps.8 and 9 also see a range of sandy fabrics come to prominence; although some handmade flint-tempered wares are still known (Cunliffe 1984a, pp.248–249). In the hillfort environs, assemblages of LIA or early Roman date are most commonly dominated by imported Durotrigian wares, with subsidiary components of 'Atrebatic' sandy and grog-tempered wares and 'local' handmade flint-tempered wares (Brown 2000b; Brown 2000c; though see Brown 2000d, pp.66–67 for a discussion of the assemblage from Suddern Farm, which had an unusually low proportion of flint-tempered fabrics throughout the sequence).

In Region 1, the sites associated with the area around Basingstoke are distinguished by high proportions of Flint Group fabrics. This is exemplified at Brighton Hill South, where the quantification of the large assemblage showed that flint-tempered fabrics maintained predominance continuously from the MIA to the early Roman period (Rees 1995, fig.23). This does not appear to have been the case further north and east in Region 1, where sandy fabrics predominate in MIA contexts (e.g. at Grazeley Road (Timby 2013a) and Riseley Farm (Morris 1993)) before mostly giving way to grog-tempered fabrics during the LIA (see, e.g., Riseley Farm (Morris 1993), Park Farm, Binfield (Booth 1995), Jennett's Park, Bracknell (Biddulph et al. 2009), and Bath Road, Slough (Timby 2003)). The fact that the division between assemblages dominated by flint-tempered fabrics versus those dominated by sandy fabrics seems to fit so closely with the two settlement 'clusters' during the MIA may be explained by a number of factors, including the restricted distribution of Flint Group wares (Timby 2003, pp.115–116); the exclusive exploitation of localised resources for pottery making (the divide between the two groups of sites falling broadly along the split between the calcareous geology of the Hampshire Downs and the primarily marine clays of the London Basin); and/or the restricted circulation of technical knowledge across this apparent divide.

Given the apparent archaeological distinction between the two geological provinces noted during the MIA, the ceramic sequence of the region around Silchester – being more intensively-settled during the LIA – is informative. At Silchester the earliest (first-century BC) occupation is distinguished by the predominance of wheel- and hand-made grog-tempered and sandy wares with a relatively minor component of the flint-tempered 'Silchester ware'. Only later, during Period 3 (c.AD 40-50/60), does Silchester ware come to predominate (Timby 2000, pp.239–240). Similar sequences have been noted nearby at Mereaok Lane (Timby 2010a), Aldermaston Wharf (Cowell et al. 1980, pp.25–33), and Ufton Nervet (Thompson & Manning 1974). This suggests that the inhabitants of sites in this area had a changing relationship with sites in their hinterland, apparently looking to the south for much of their pottery trade during the period around and immediately after the Roman conquest. This had evidently not been of necessity previously, and begs the question of a change in the functional role of Flint Group wares.

Function

One relatively early effort to consider the function of the central-southern British flint-tempered wares was made in the second Danebury volume (Cunliffe 1984a, pp.249–50). On p.249 it was proposed that the two main types of jar known at Danebury (those with vestigial or incurving (i.e. beaded) rims, and those with flaring (i.e. everted) rims) may have served different functions: the former rim type lending itself to the boiling and simmering of liquids either whilst open or covered; the latter to the storage of products that would require a cover to be attached (the everted rims serving as a surface around which to fasten a sheet of skin or fabric). Larger jars were equated with storage; finer bowls (including saucepan pots) with serving. In her study of Wessex E- and MIA pottery, Woodward (1997), however, found that the size of a vessel (as indicated by rim diameter), rather than its type, was the operative indicator of vessel function. Woodward demonstrated a direct correlation between vessel volume and rim diameter in the vast majority of cases. This led to her being able to process a large sample of Iron Age vessels, producing the conclusion that three main size-groupings existed, that these cross-cut typological distinctions and – crucially – probably represent different functional classes (classified as eating and drinking vessels; serving and food preparation vessels; and large storage vessels, in order of increasing size). Woodward also found (*ibid.*, p.31-3) regional differences in the sizes - and therefore apparent employment – of certain types. Fabric was a factor in this difference, with the flint-tempered saucepan pottery from Danebury and Winnall Down having a different, less well-defined distribution than the shell-tempered saucepan pots from South Cadbury (*ibid.,* pp.31-2; Fig.4.2). This poses the question whether the different fabrics represented different intended functions for these vessels, and sets a precedent to be aware of in the analysis of all vessel types.

The notion of limited functional specialisation is also supported by lipid residue analysis (Copley, Berstan, Dudd, Straker, et al. 2005; Copley, Berstan, Dudd, Aillaud, et al. 2005). Copley et al (*ibid.*) found that vessel size – not type – was the operative factor in dictating which vessels contained which kinds of absorbed residues (*ibid.*, pp.491-3; Fig.6), mirroring Woodward's findings. Smaller vessels were more likely to have contained lipids consistent with milk, while animal fats and the absence of lipids were associated with vessels over a far wider size-range. Differences were found in the occurrences of lipids in different vessel types according to the site from which the vessels derived, and this again tallies with Woodward's observations of regional difference in vessel employment (*ibid.*, pp.491-3).

Appendix I contains the results of a study of rim diameters of MIA vessels from Region 1, based on Woodward's original study. The results support the notion of individual types as subject to varying functional interpretations, with bead-rim and everted-rim jar/bowls both being found in comparable, widely varying size-ranges. This is suggestive of many and varied uses being catered for by morphologically similar vessels, but that morphologically different vessels seem to have catered for similar ranges of functions. Saucepan pots have a different size-profile to jar/bowls (fig.4.6), suggesting their use in service and food preparation but not storage. Crucially, fabric does not appear to have been an operative factor in defining vessel function. The Flint Group is defined by saucepan pots and bead-rim jar/bowls. While these types may represent two partially-distinct functional categories, together they cater for the full range of functional (size) categories identified by Woodward, and in this way present a comparable functional repertoire to the vessels in the Sandy Group.

It is notable that the forms in which LIA Silchester ware is found consist almost entirely of forms known from the MIA, with little if any apparent influence from new technological or stylistic ideas. The chronological differences to the repertoire are limited to the cessation of production of saucepan pots during the LIA, and an increase in the number of everted-rim forms – including large, coarse jars (specifically the X1) – being made. However this broad continuity is coupled to what seems – from the evidence of the distribution – to be a contraction of the Flint Group tradition/industries

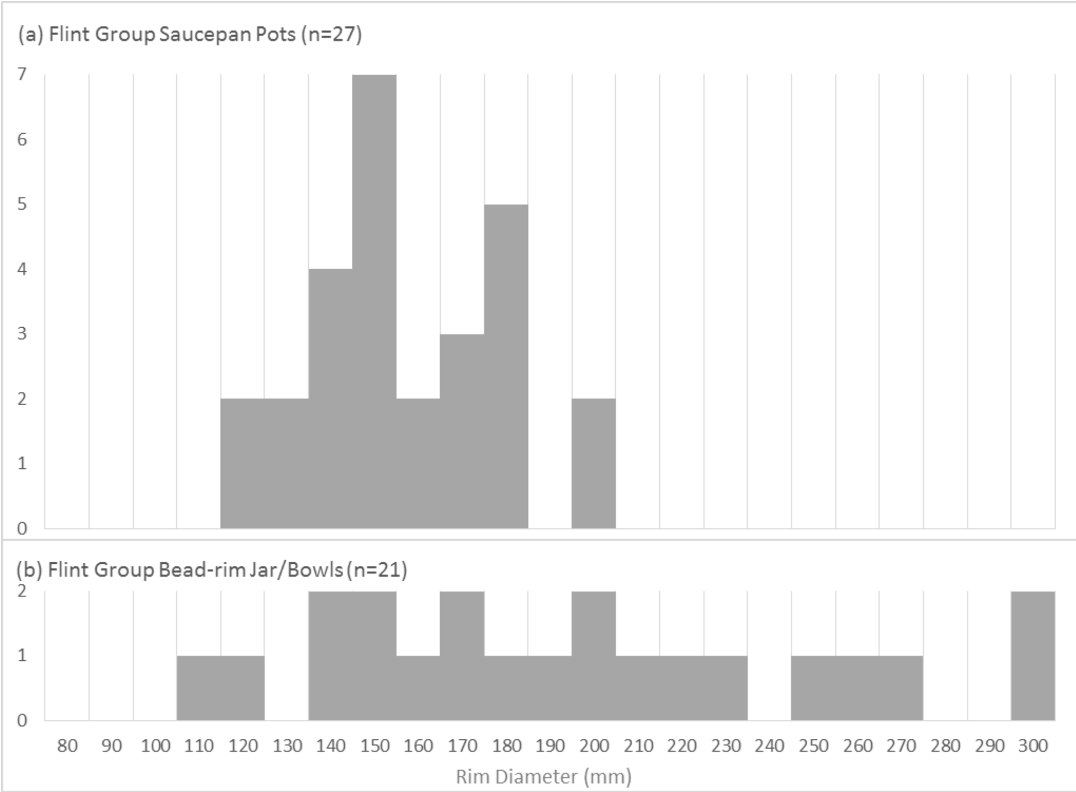


Figure 4.6. Region 1, MIA. Rim-diameter distributions for the two main Flint-Group vessel categories.

to a first-century BC 'heartland' in the region of modern Basingstoke (flint-tempered wares remaining popular throughout the Later Iron Age at sites in this area, e.g. Brighton Hill South: Rees 1995). This was followed by expansion of the distribution during the first century AD to incorporate the area immediately to the north, extensively settled sixty or seventy years previously (see above on chronology and distribution).

It is also worthwhile noting the results of recent lipid residue analysis of LIA pottery from Silchester (Colonese et al. forthcoming), including Silchester wares, which suggest that these vessels were used in processing meat and/or vegetables, and not to store or process dairy products. This is potentially consistent with Timby's most recent observations that Silchester ware vessels served a supplementary or re-use purpose as cookpots (based on the occurrence of carbonised residues on some vessels), as well as being valued as large, robust storage containers and possibly also as vessels used in brewing or fermenting (Timby forthcoming). Alternatively, these data might suggest that Sillchester ware vessels were coated with some animal- or plant-derived fatty substance in order to waterproof them, leaving open the possibility that any produce being transported within them could have been liquid. While currently hypothetical, these observations are interesting when contextualised against the MIA pattern of pottery use, which appears to be similarly variable and not primarily tied to vessel morphology. These data also represent a chronological differential between the dairy-fat-dominated MIA, and limited evidence for dairy-fat processing in the LIA. It is unclear what the precise significance of this differential is, but it is very possible that it relates to a difference in the consumption and use of pottery, as well as to other factors.

Analysis of manufacturing techniques – MIA

Vessel forming

Analysis of the MIA Flint Group is composed of data derived from 35 vessels. Vessels in this group consist entirely of moderately-constricted jars and bowls: saucepan pots (19 vessels), bead-rim jar/bowls (12 vessels), and a small number of everted-rim forms (4 vessels).

Fig.4.7 shows the primary and secondary forming techniques represented amongst the MIA Flint Group. Coiling predominates by a large margin, evidence of the technique being found in one or more body-parts in 22 (63%) of the 35 vessels. The only other primary methods identified - pinching/drawing and slab-building/moulding – were only represented in one vessel each. In both of these cases identification is tentative – one (1/BHS-042) is a small Cunliffe JD3.1 everted-rim jar/bowl that may have been started as a pinch pot before having coils added to its upper half. The other (1/SCT-001) is a Cunliffe PB1.1 saucepan pot that may have a slab-made base to which coils were certainly added to make the wall. There may be some differential between form types in terms of primary forming. Coiling was positively identified or recorded as being suspected in 15 of the 16 jar/bowls (94%) compared to only 7 of the 19 saucepan pots (37%). This does not appear to be a result of primary forming being

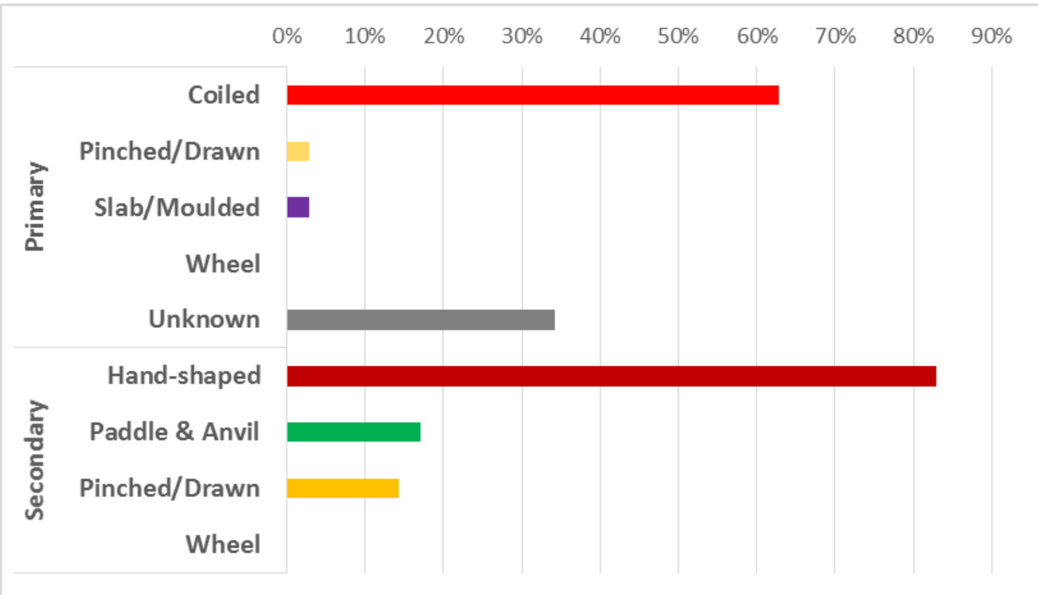


Figure 4.7. Region 1, MIA, Flint Group. Forming techniques as proportions of vessels.

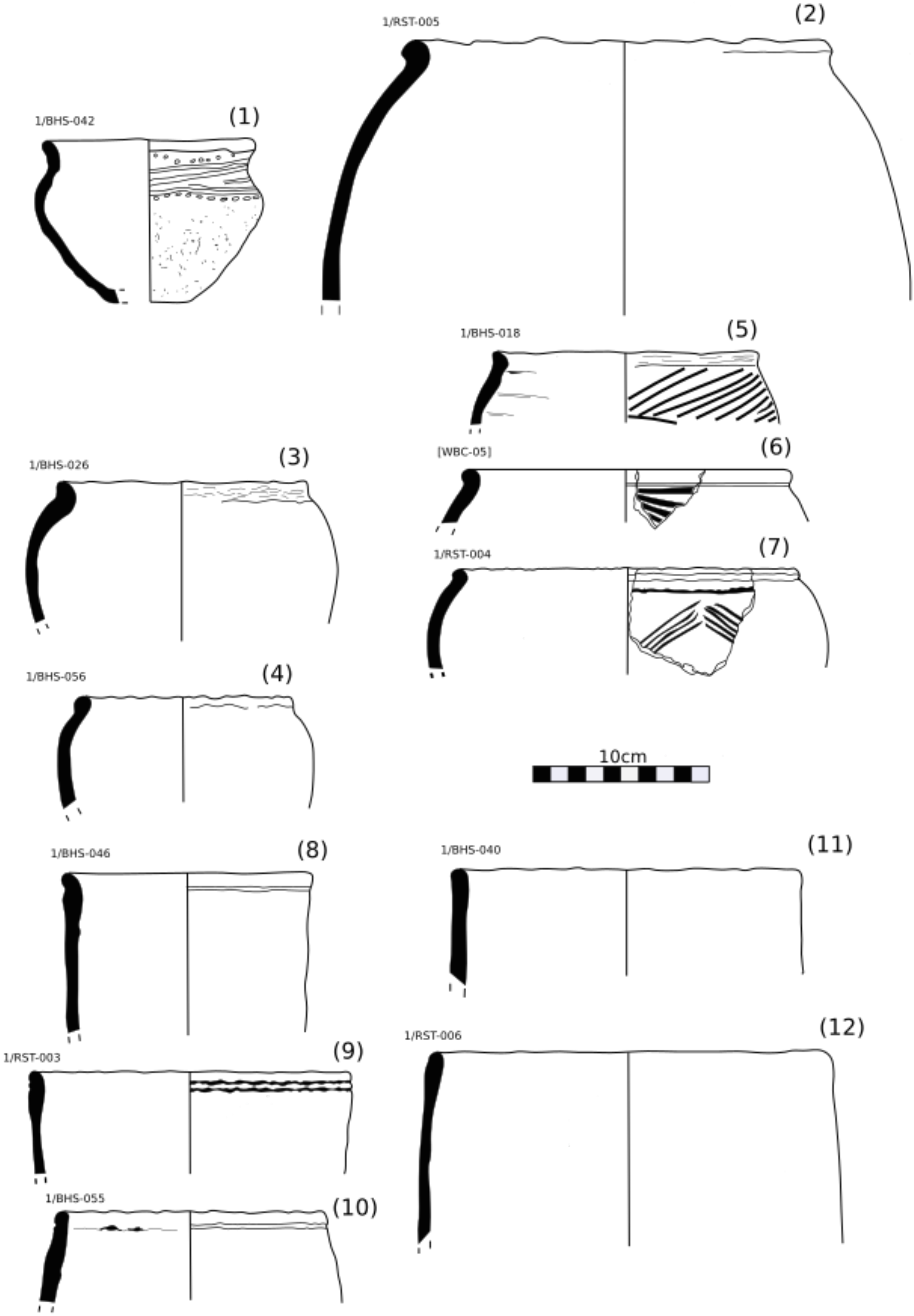


Figure 4.8. MIA Flint Group forms. 1: Everted-rim bowl. 2-7: Bead-rim jar/bowls. 8-12: Saucepan pots. Nos.2-12 by the author. No.1 redrawn after Rees 1995 fig.25, no.47 (©The Trust for Wessex Archaeology).

obscured by secondary forming – the proportion of jar/bowls that can be identified as having been crafted using either secondary pinching/drawing or paddle-and-anvil (both of which can obscure void alignments resulting from primary forming) is in fact higher than in saucepan pots (7 of 16 jar/bowls (32%) against 4 of 19 saucepan pots (21%)). This may suggest that saucepan pots were formed using a technique that proves difficult to identify using the techniques utilised here, though the evidence suggests that a significant number of them were coil-built.

Figs.4.7 and 4.10 both show that hand-shaping was the most popular form of secondary forming technique in this group, comparatively few vessels showing signs of being thinned, smoothed or shaped using anything other than simple, manual pressures. Fig.4.10a shows the breakdown by body-part of the occurrence of the hand-shaping technique. 100% of the necks and bases were found to have been secondarily formed in this way, but this is probably due to small sample-sizes – 3 and 4 samples, respectively.

Fig.4.10b and c shows that the paddle-and-anvil and pinching/drawing techniques appear to have been used for crafting similar vessel body-parts; i.e. the bodies of vessels, and a limited number of rims. In particular, pinching/drawing is represented by vertical 'stripes' visible on radiograph running up the bodies of vessels. This pattern results from the rhythmic movement of the potter's fingers up the vessel when manipulating the clay into shape – the particular technique used seems to be better described as pinching rather than drawing, being comprised of many small manipulations of the clay arranged in vertical patterns, rather than a smaller number of drawing motions used to pull the clay into shape (G. Taylor pers. comm.). The latter would result in far more obvious vertical void- and

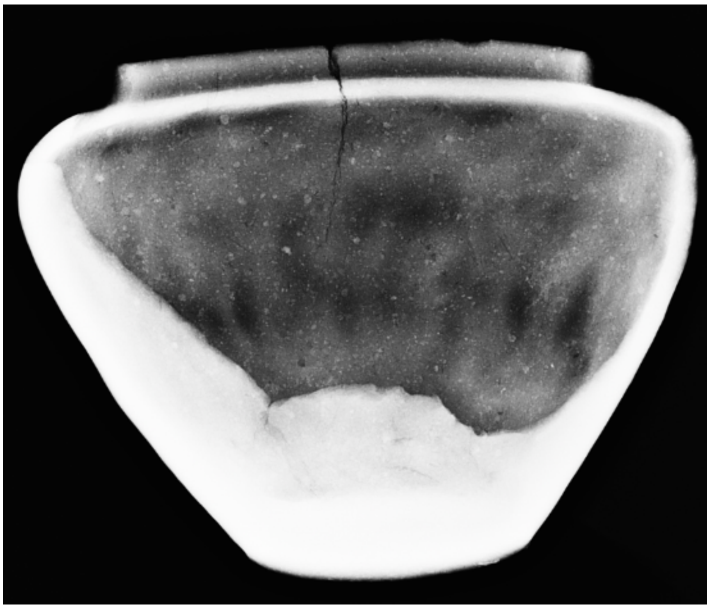


Figure 4.9. Radiograph of 1/VBF-001, showing dark vertical 'stripes' indicative of a rhythmic pinching technique used to craft the vessel body.

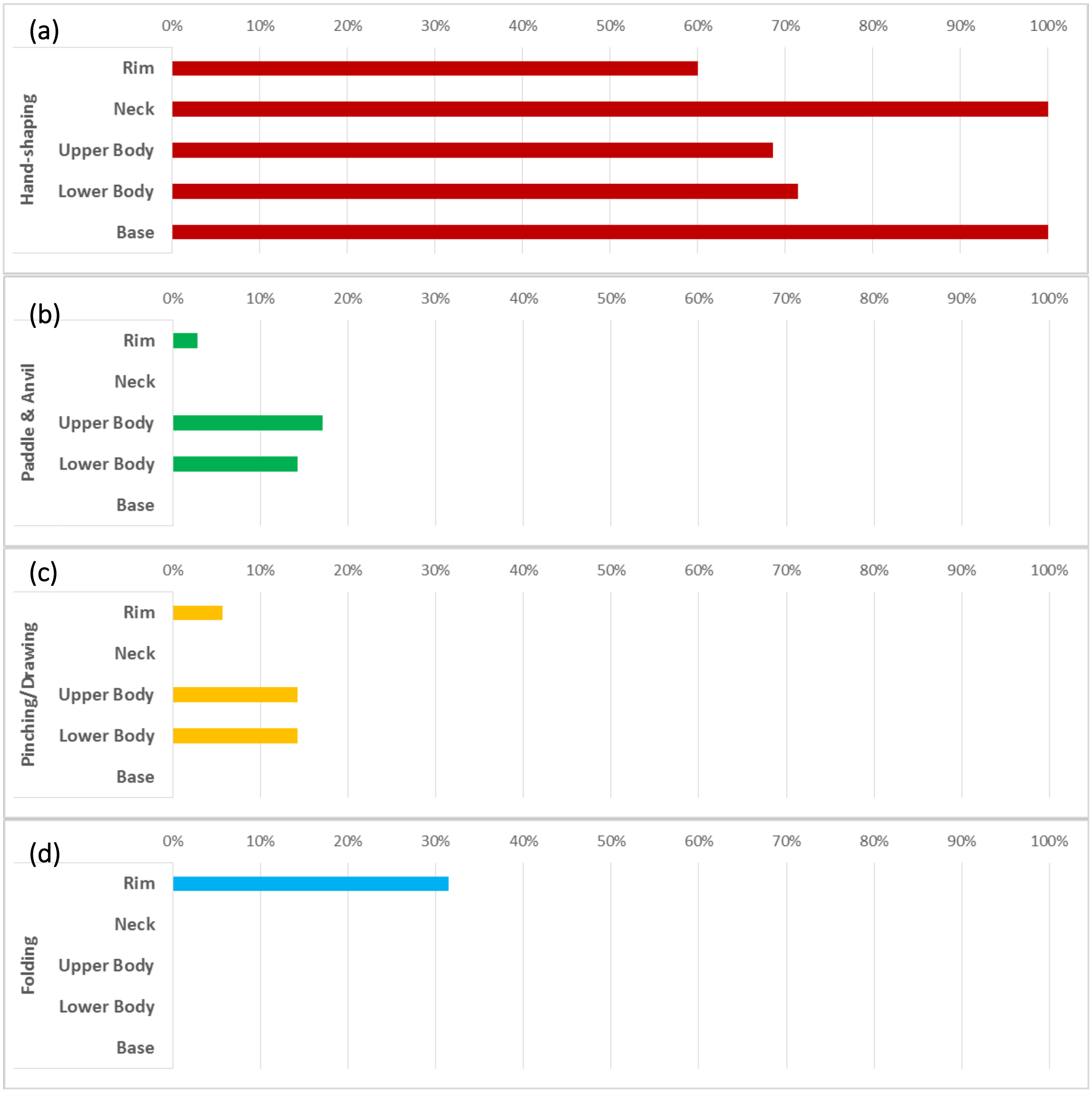


Figure 4.10. Region 1, MIA, Flint Group. Occurrence of secondary forming techniques according to vessel body-part. Totals: Rims n=35; Necks n=3; Upper bodies n=35; Lower bodies n=7; Bases n=4.

inclusion-orientation patterns that are not in evidence in the radiographs. Both pinching/drawing and paddle-and-anvil were found to occur in the case of both jar/bowl forms and saucepan pots.

G. Taylor (pers. comm.) has suggested that there may be a size function to each of these two techniques, with paddle-and-anvil only being used in the case of larger vessels. Indeed, this is suggested when rim diameters are considered. Of the 17 vessels with a rim diameter of 150mm or less, 4 showed evidence for pinching whilst only one showed evidence suggestive of the paddle-and-anvil technique. Meanwhile, of the 16 vessels with a rim diameter greater than 150mm, paddle-and-anvil was noted

4 times whilst pinching was only noted once. However, it is worth reiterating that evidence of these techniques was only found in a small minority of vessels.

Rim-folding was noted in 11 cases (31%). In all cases except one (1/RFM-003) this evidence was found on a bead-rim or saucepan pot form. Even though the number of everted-rim forms in this group is small, the use of this technique in the case of saucepan-pot and beaded-rims is suggestive that the technique found its primary use in crafting even, rounded rim forms such as are found on these vessel-types.

Surface treatment

Surface treatment was found to be very popular in the Flint Group. 71.4% of the MIA sample was found to have surfaces that had been treated in some way; burnishing being overwhelmingly the most popular technique (present on 65.71% of the vessels). Wiped surfaces were observed on 2 of the vessels (5.71%). In all cases where the technique was identified, burnishing had been applied to the exterior surface of the vessel; only in 11 of the 23 cases (47.8%) had it also been applied to the interior surface. This may suggest that the functional significance of burnishing was minimal in these cases, unless the treatment was intended to create a smooth surface that was easy to clean or which was more waterproof. An apparent general lack of a functional dimension to burnishing is also supported by the lack of any clear association between the treatment and any particular vessel type or size-range. Numerous examples of saucepan pots (13 examples), bead-rim (7 examples) and everted-rim (3 examples) jar/bowls were found to have been burnished. Similarly, burnished vessels were found in a range of sizes, with rim diameters ranging from 110 to 260mm. This all suggests that burnishing was not regarded by the producers of the Flint Group vessels as having any particular functional benefits that would have improved the working qualities of a particular category of vessels. It may have been that some individuals would have preferred to use a burnished vessel for certain purposes – for example for cooking (the burnish acting as a non-stick surface when applied internally) or liquid storage (the burnish having better sealed an otherwise-porous earthenware surface) – but this is not clearly evident in this dataset. Instead, the role of burnishing appears to have been primarily decorative, being mainly applied to the exterior surfaces of various vessel types.

Decoration

Decoration was also found to be popular, with 43% (15) of the vessels having been decorated in some way. The most common form of decoration also involved the use of burnishing, to produce straight and/or curved lines arranged in a pattern.

Figure 4.11. Left (1 sherd): double burnished-line decoration on saucepan pot 1/BHS-023; Right (2 sherds): infilled diamonds on 1/SCT-008. Permission to use image of 1/SCT-008 kindly provided by Reading Museum.

Decorative motifs produced in this manner most commonly include diagonal lines applied beneath the rim, or one or two horizontal lines applied all the way around a vessel immediately beneath the rim. These are both easily paralleled in Cunliffe's St Catherine's Hill-Worthy Down style (Cunliffe 2005, Appendix A). Less common forms of burnished-line decoration include cross-hatching (1/SCT-009), and diamonds filled with vertical lines (1/SCT-008). These latter examples are better paralleled in the Southcote-Blewburton Hill style (*ibid.*).

Firing

The firing of Flint Group vessels was primarily reducing (firing patterns R1 and UR representing 83% (29) of the vessels). Significantly, many of the vessels (19: 54%) were found to be thoroughly and consistently reduced to dark greys, dark browns, and blacks (firing pattern R1). This may represent a deliberate effort on the part of the potter, as open firings of the kind probably used typically result in uneven surface colourations due to fire-clouding and partial oxidation of the surfaces as the fuel inevitably falls away from the load. Rice (1987) refers to the process of 'smudging', by which pots are blackened by the addition of carbonaceous matter to the surfaces of newly-fired pots, and it may be the case that a similar technique was used to achieve the evenly-blackened colours present in many of the Flint Group vessels. The remainder may have been fired without the use of such an application, this being reflected in their more uneven colour profiles.

<u>Analysis of manufacturing techniques – LIA</u>

Vessel forming

Analysis was also conducted on 32 LIA vessels identified as occurring in fabrics F1a or F1b. These comprise bead-rim (12), and everted-rim jar/bowls (14; including 'storage' jars), and a single example each of saucepan pots and lids.

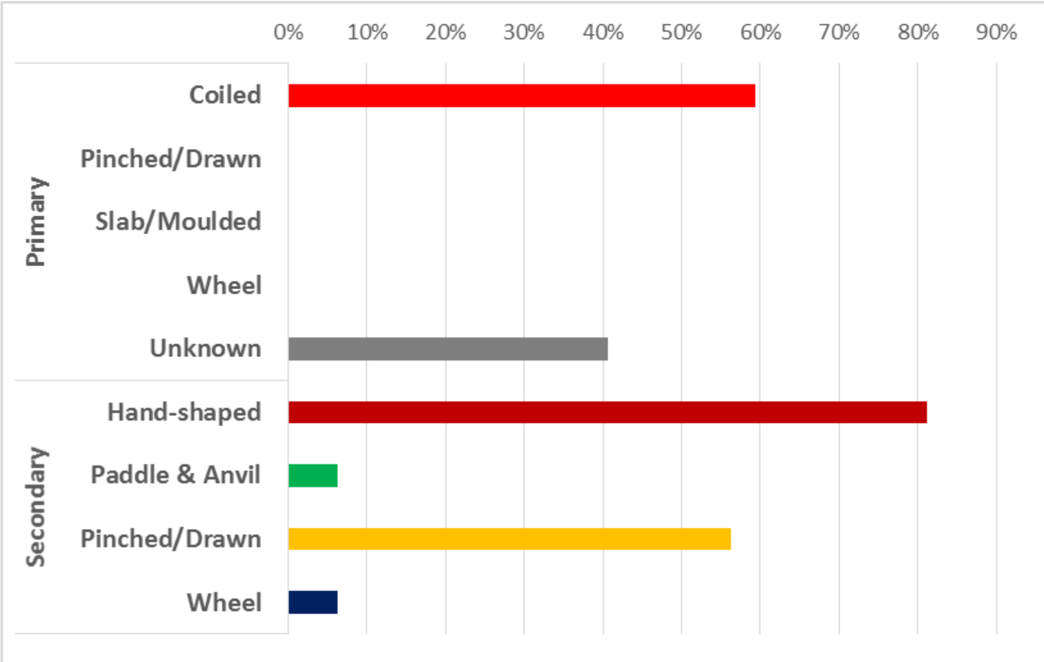


Figure 4.12. Region 1, LIA, Flint Group. Forming techniques as proportions of vessels.

There is no evidence that primary forming changed significantly from the MIA (fig.4.12). Coiling is still predominant (identified in 19 of 32 vessels: 59%), and although caveats need to be stated in relation to the possibility that the 'uncertain' category actually contains examples of other forming techniques that were not able to be identified, the situation appears to be very similar to that from the previous phase.

Figs.4.12 and 4.14a show that hand-forming was also very popular in the LIA group, though fig.4.14a evidences a significant drop-off in the recognition of this technique in the case of vessel lower-bodies. Observing Fig.4.14c, this trend appears to result from a rise in the popularity of the pinching/drawing technique, which was found to be very popular in the crafting of lower bodies (79% of examples of this body-part showing evidence of this technique). In addition to a high proportion of vessels, a great variety of vessel-types were found to have pinched/drawn lower bodies, and these occurred in a range of sizes. In particular, four of the five X1-type storage jars – a novelty in the LIA – were found to have been secondarily pinched, and the method by which this secondary forming was conducted appears to have been similar, if not identical, to that identified in the MIA – i.e. with many successive, rhythmic pinches being applied up the body, producing the distinctive vertical-striped pattern seen on radiographs (fig.4.15). Evidence of a similar technique was also noted in five everted-rim Cunliffe JB4.1 jar/bowls, and in four bead-rim forms. Vessels with evidence of this form of manufacture range in rim-diameters between 90 and 510mm – a huge range

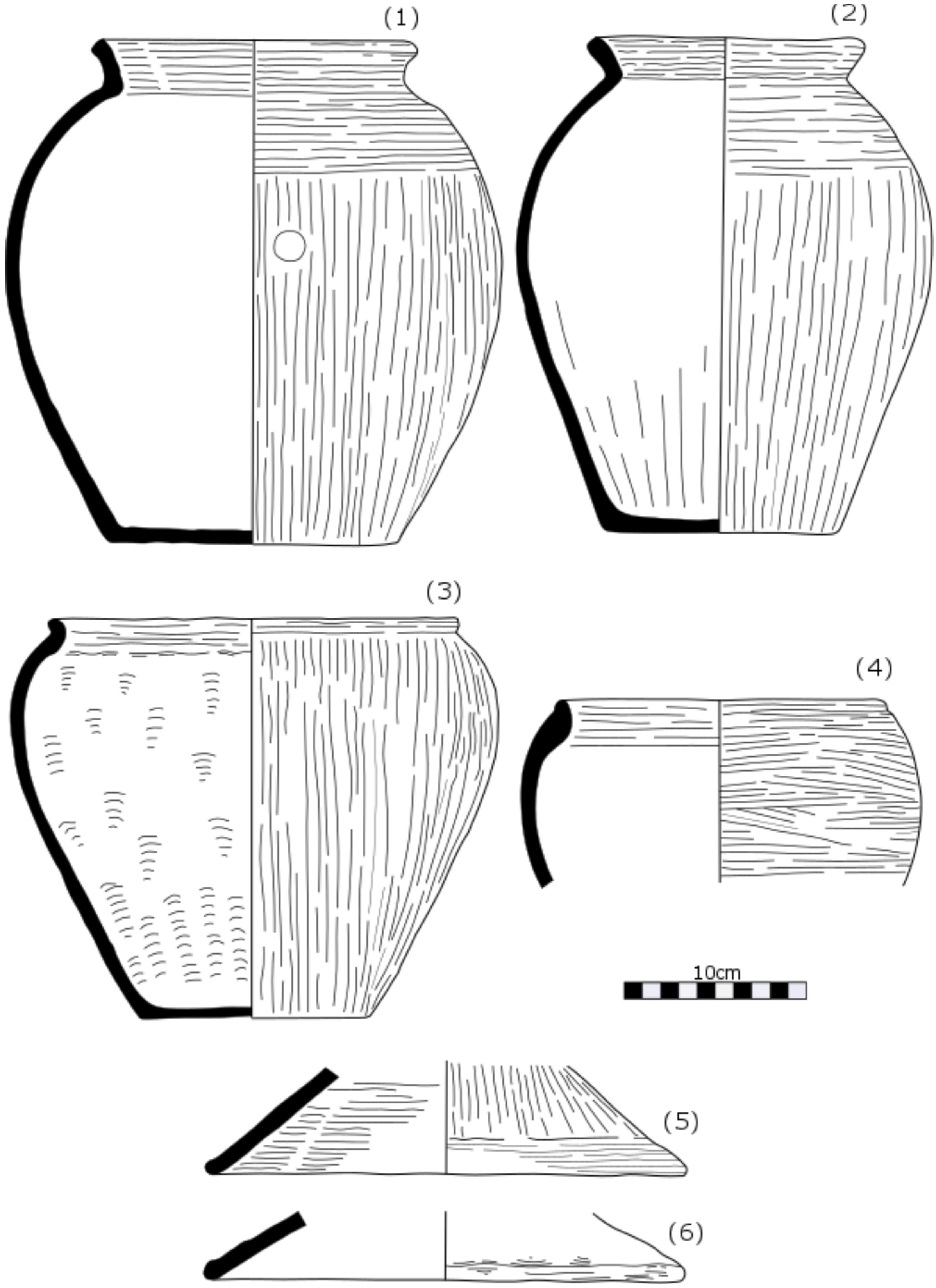


Figure 4.13. LIA Flint Group forms. 1-2: X1 storage jars. 3-4: Bead-rim jars. 5-6: Lids. All images redrawn from Timby 2000: nos. 496, 497, 478, 484, 507, 508, respectively (©Society for the Promotion of Roman Studies). Scale 1/3.

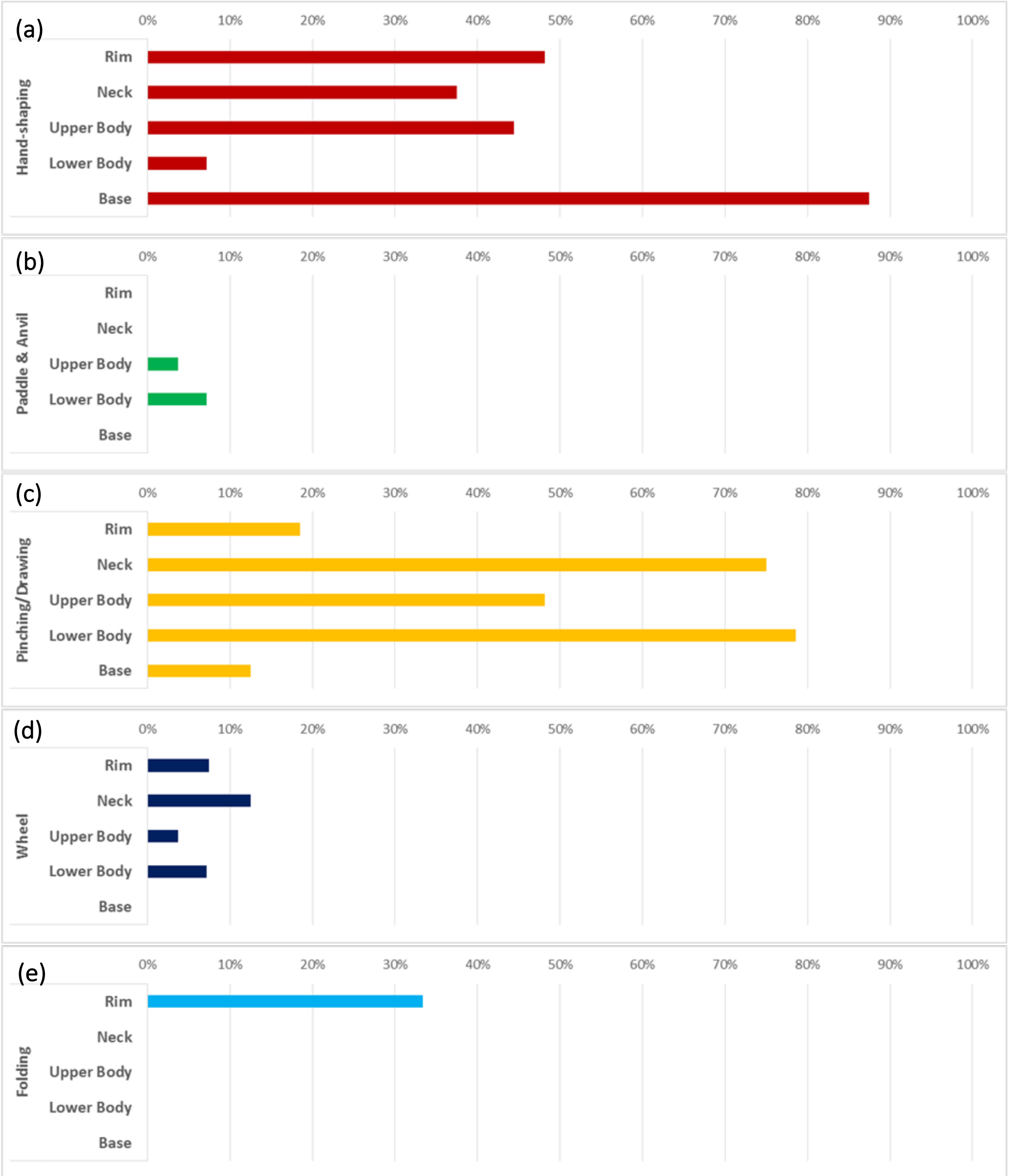


Figure 4.14. Region 1, LIA, Flint Group. Occurrence of secondary forming techniques according to vessel body-part. Totals: Rims n=27; Necks n=8; Upper bodies n=27; Lower bodies n=14; Bases n=8.

suggesting that, while pinching appears to have been common for smaller vessels in the MIA, the same is not true here.

Indeed, only two vessels in the LIA group showed any hint of the broader concavities indicative of paddle-and-anvil use (and this evidence uncertain at best). These are 1/BHS-010, a JB4.1 everted-rim jar/bowl, and 1/UFT-018, a base-sherd of unknown form. The former has no surviving rim with which to make an approximation of size on the basis of rim diameter, and the latter has a modestly-sized 90mm base.

In addition, 75% (6 of 8) of the necks of vessels from this group were found to have been secondarily formed – at least in part - using pinching. These are all everted-rim types, of which four are of the new X1 type.

Figure 4.15. X1 jar 1/SIX-025, showing vertically-arranged thin patches on the lower body.

Importantly, two vessels evidence wheel-use in this period (fig.4.14d). One is a finely-made Thompson C1-1 bead-rim form (1/BHS-043) which appears to have been competently shaped with the aid of a turntable or slow-wheel. The other is one of the new X1 storage jars (1/SIX-015), which has coarse horizontal striations around the rim that are strongly suggestive of the finishing of this area of the pot using a coarse cloth whilst the vessel was turning. Such an operation may only have required the vessel to have been resting on a mat rather than on a turntable or wheel, but the feature is nevertheless noteworthy.

Folding was noted in a comparable number of vessels to the MIA group (fig.4.14e). The types represented are a mixture of MIA-style bead-rim forms (4 vessels), and everted-rim (4 vessels) or storage-jar (1 vessel) types. Therefore, in the LIA, the use of the folding technique was not specialised to the crafting of rounded forms, but was also used in the case of a comparable proportion of everted-rim forms. The single X1 storage jar found to have a suggestion of a folded rim is particularly interesting, folding seemingly used to round off the rim-edge whilst pinching or drawing had been used to create the highly pronounced eversion that is typical of this form.

Surface treatment

Surface treatment is also popular in the LIA Flint Group, although less so compared to the MIA. 47% (15) of the LIA vessels were found to have treated surfaces, compared to 71% (25) of the MIA vessels. The overall profile of the surface treatments represented is similar, however. Burnishing is most popular, being found in 11 vessels

(34%). Wiping makes up the remainder, in the form of 5 vessels (16%). Again there is no evidence to suggest that the use of surface treatments was specialised to a particular functional role. Burnishing is found in examples of all three main types in vessels with rim diameters ranging from 110-330mm. This suggests that burnishing was being used similarly by LIA potters to how it had been by MIA potters, i.e. with little specialisation in mind. It is again probable that the application of a burnished finish was primarily a decorative feature, the significant reduction in occurrence reflecting an overall downturn in the input of labour into the manufacture of these more utilitarian vessels.

Decoration

Decoration is present in only three vessels, representative of 9% of the group. This is down significantly from the 43% (15 vessels) reported for the MIA Flint Group. The decorative features observed include two examples of burnished patterns and one of a fingertip-impressed pattern. These are generally crude – the everted-rim storage jar 1/BHS-028 has a single line of widely-spaced finger impressions beneath the neck; while the similar vessel 1/BHS-010 has a poorly-executed burnished line in the same position. 1/UFT-010 has similar 'slash marks' to those seen on numerous vessels, including MIA Flint Group sample 1/RST-004. The overall lack of decoration, and its crudeness where found, corroborates with the evidence of the surface treatment in suggesting that LIA Flint Group potters had de-emphasised the decorative aspects of their products, either as a reflection of their almost exclusively utilitarian nature, and/or as an effort to save time and energy in the production of unnecessary decoration. In the context of the hypothesis of the cultural significance of decorative motifs, the decline in their use may be significant of the breakdown of certain social networks, or of a once-prominent symbolic scheme.

Firing

Firing patterns recorded are again predominantly reduced. However, in contrast to the situation in the MIA, the LIA Flint Group vessels are most commonly found to have uneven firing patterns, mainly recorded as firing pattern 'UR' (14 vessels: 44%). Pattern R1 is still common (9 vessels: 28%), but the increase in unevenly-fired vessels suggests that there was also a decline in effort applied to firing, perhaps with a decline in the number of vessels to which a coating was applied in order to deliberately produce an evenly blackened surface. This would again be consistent with a reduction in emphasis on the decorative qualities of these vessels relative to those being made in the MIA.

Summary

The MIA Flint Group can be seen as representing a distinctive, well-defined tradition of potting. Analysis presented here shows that Flint Group vessels were made in a limited range of distinctively fine clays tempered with varying amounts of crushed, calcined flint. These are likely to have been derived from clay deposits (clay-with-flints) local to the Basingstoke area, and this provenance is corroborated by the popularity of such wares on sites in this vicinity throughout the Later Iron Age. Vessel forms were typologically limited, being restricted to jars and bowls with mostly beaded (but occasionally everted) rims, and saucepan pots. Analysis of the sizes of vessels suggests that these were multipurpose utilitarian containers with only partial evidence for functional specialisation (i.e. saucepans). Fabric does not appear to have been at all specialised. Forming may have been somewhat more-so: the argument is offered that all (or at least the majority of) vessels were coil-built at the roughout stage, following which different techniques were employed to craft the final form of the pot, depending upon what that final form was ordained to be. Some larger vessels were subjected to paddle-and-anvil for smoothing coils and shaping walls (rather than the hand-shaping or pinching done to smaller vessels); beaded or rounded rims were created by folding over flaps of clay and sticking these against the surface of the wall. Many vessels were burnished, this being predominantly decorative. It is also proposed that in many cases firing procedures were designed to impart specific aesthetic qualities to the vessels: in particular, blackened surfaces. It is presently uncertain whether the Flint Group represents the products of a centralised industry, or those of a dispersed tradition. The observation has nevertheless been made that similar pottery is known across a broad area of south-central England.

There is significant evidence that the LIA Flint Group was (a) continuous with the MIA group; and (b) predominantly inspired by technological and design elements derived from the MIA group. In particular, the fabrics utilised in both periods have been shown to be petrographically identical, it being likely that procurement and processing of clay remained unchanged between the two periods. Similarly, the majority of forming techniques are of kinds known from the MIA, and especially those that are known to have been in widespread use. There is, however, evidence that some of these (e.g. pinching/drawing) were used with differential frequency to their MIA counterparts. Similarly, decorative and firing techniques appear to have remained substantially similar where these occurred, although there is less evidence for the use of specialised versions of these. Forms change slightly, with saucepans going out of production and the commencement of the X1 storage jar.

It is likely that the LIA Flint Group was manifested as a community of craftspeople – centralised or otherwise – who descended from the producers of the MIA Flint Group wares. The continuation of craft practices so heavily based upon those used previously is conspicuous in this period of otherwise marked technological change. It will have also been conspicuous at the time, Flint Group wares contrasting with, for example, the more 'modern' Grog Group wares in a variety of sensual ways. The technical practices of the Flint Group potters can be seen as serving to define a particular range of material culture – in the LIA this seems to have been based upon adherence to general notions of what MIA pottery was like, incorporating coarse fabrics with distinctive white-speckled appearances; bodies clearly uneven and derived from hand-making techniques; and unevenly-coloured, often fire-clouded bodies. The significance of the performance of these more anachronistic technical acts is also likely to have been of importance to craftspeople and those connected to them, helping define these individuals as separate categories of potters and to express the social values to which they adhered (i.e. the value of ancestral knowledge and tradition).

4.2.2 Sandy Group

The Sandy Group is comprised of a variety of fabrics identified as predominantly containing common-to-abundant quartz sand along with other accessory inclusions/tempers. Like the Flint Group, these fabrics are best interpreted as the localised variants of kinds of pottery that were traditional in MIA south-central England. In some cases, these have been able to be distinguished as the products of particular geological sources, and these fabrics are discussed separately as their own subgroups. The group is united in its form repertoire, which consists mainly of typologically MIA saucepan pots and everted-rim jar/bowls. There is also a small component of typologically LIA pottery associated with the 'Miscellaneous Sandy' subgroup, including necked jar/bowls and one example of a 'specialist' form.

<u>Glauconitic Sandy Group</u>

Fabric Q2

A hard, densely sandy fabric with irregular breaks that show common-to-abundant inclusions of quartz silt and sand alongside varying amounts of angular calcined flint. The characteristic feature of this fabric group is the glassy, rounded, black grains visible amongst the sand, which can be seen in thin section to be oxidised glauconite. The oxidation of glauconite – which causes a colour-change from green to reddish-brown – is a heat-induced process, in the case of pottery resulting from exposure to the high temperatures associated with firing (Basso et al. 2008).

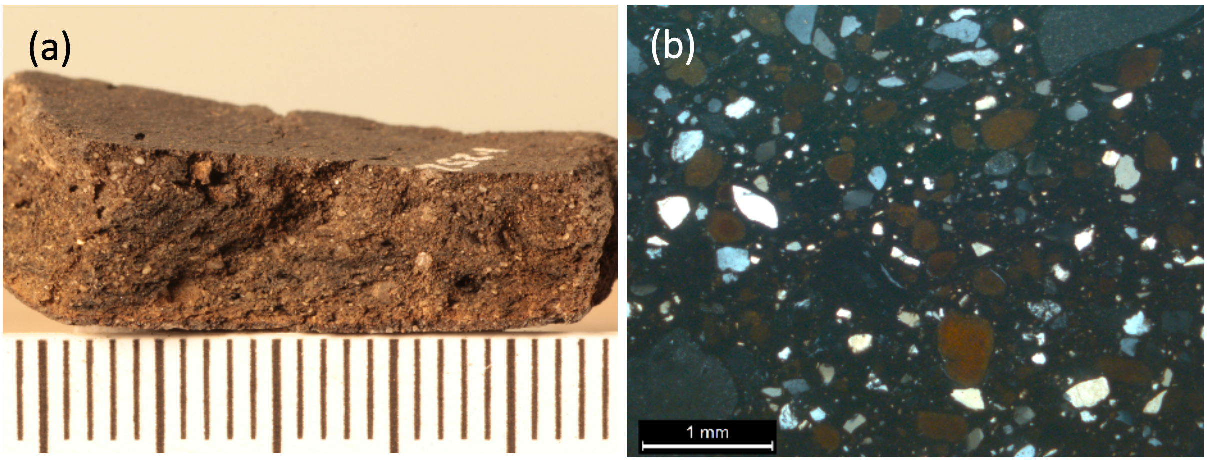


Figure 4.18. ***Fabric Q2a****. (a): photograph of fresh break; (b): photomicrograph, x40, XPL.*

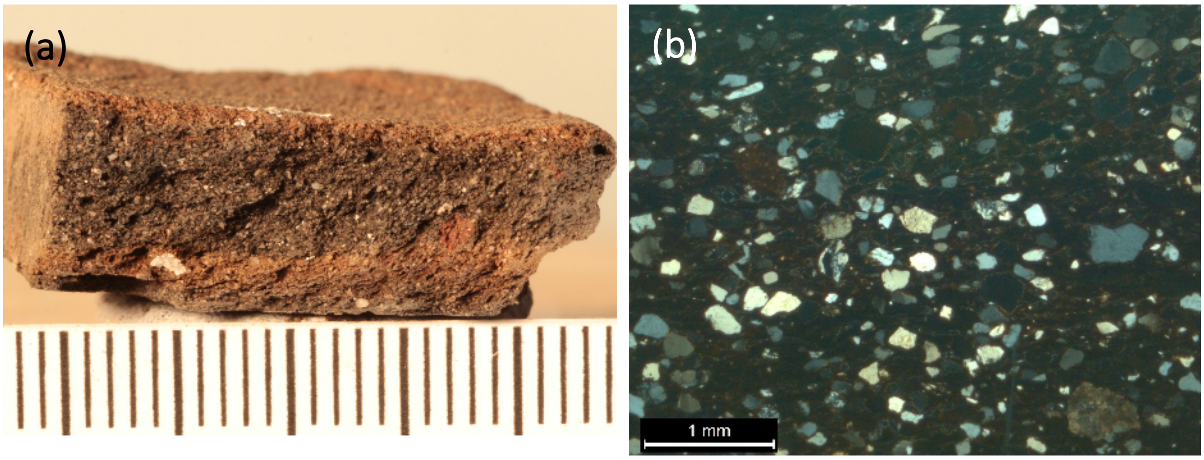


Figure 4.17. ***Fabric Q2b****. (a): photograph of fresh break; (b): photomicrograph, x40, XPL.*

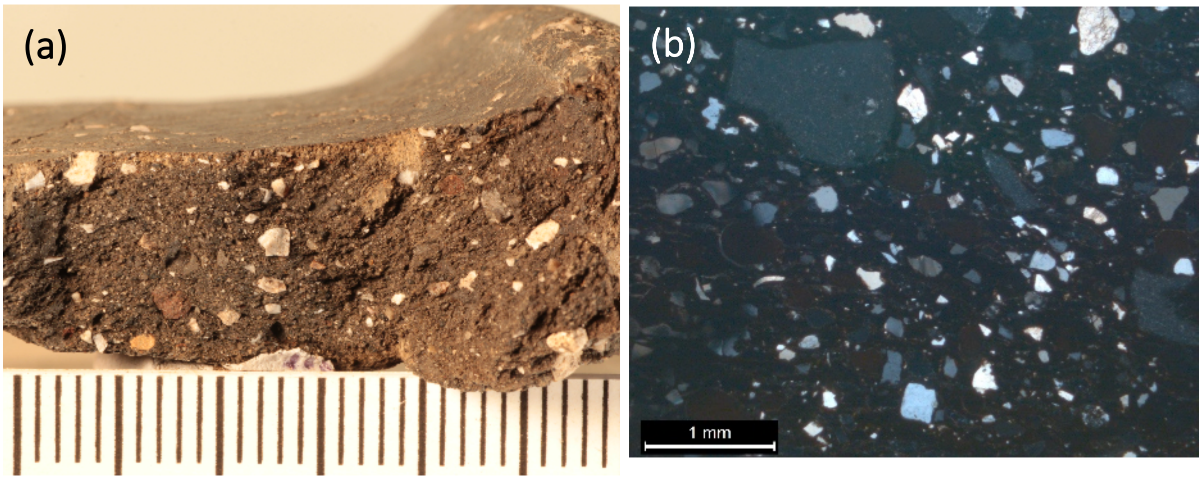


Figure 4.16. ***Fabric Q2c****. (a): photograph of fresh break; (b): photomicrograph, x40, XPL.*

Three variants have been distinguished:-

- Q2a – as described, with sparse-to-common calcined flint.
- Q2b – Q2a with additional rare calcareous inclusions.
- Q2c – a coarse variant of Q2a with abundant larger (up to 3mm) calcined flint. Appears superficially similar to 'Silchester Ware' fabric F1b.

Glauconite in these fabrics occurs in similar size-ranges to the quartz it is found alongside, although in widely varying proportions (fig.4.19). The clay may have borne a naturally glauconitic sand, or such a sand may have been added as a temper, sometimes alongside moderate amounts of crushed flint.

Provenance

Sources of glauconite are occasional but extensive in Region 1. The lowest strata of both the Reading Formation and the London Clay contain glauconitic sands associated with clays, as do numerous of the deposits comprising the Bracklesham Group (Mathers & Smith 2000, pp.10–13). Outside Region 1 to the south and west, outcrops of the Upper Greensand and Gault Clays also bear glauconite. While the amount and density of glauconitic inclusions in many samples may suggest that a provenance within the Reading Formation is the most likely (J.R.L. Allen, pers. comm.), the other potential sources cannot be completely discounted. Flint for tempering is easily acquired from a number of superficial deposits throughout Region 1 and elsewhere.

It is also worth noting that glauconitic wares are known to have originated from Wiltshire during this period, being associated with a distinctive range of forms and transported throughout central-southern England (see below); it cannot be discounted that one or more of the Region 1 fabrics derived from this source.

Distribution and chronology

Like the flint-tempered wares, glauconitic fabrics are known from Early and Middle Iron Age sites across much of south-central England. The history of their study provides some contrast to that of the flint-tempered wares. The identification of at least one glauconitic sandy fabric at Danebury (from Vol.5 onwards coded as fabric D15 (Brown 1991, p.288)) led to the assertion that these wares were (a) non-local: the nearest source of glauconitic clay being c.30km away from the hillfort in Wiltshire; and (b) that the correlation with a particular form repertoire and style of decoration indicated centralised production near this source (Cunliffe 1984a, pp.245–246). Based on the distribution map of these wares (*ibid.* Fig.6.16) this hypothesis may hold for Danebury and its immediate environs, which are stated as being on the edge of the distribution on the basis of the low proportion of these fabrics found at the hillfort. However, glauconitic fabrics are also known from sites around Winchester as well as from several sites in the current study. Importantly, at Winnall Down the glauconitic- and plain-sandy wares were identified on the basis of heavy mineral characterisation as deriving from Reading Formation clays – an assertion consistent with a potential geological origin for the glauconite (Hawkes 1985, pp.60–61). These fabrics are therefore inconsistent with an Upper Greensand provenance and it is reasonably concluded that they originated more locally (*ibid.*). Certain of the Region 1 fabrics seem to be distinct again; none of the fabrics occurring elsewhere having inclusions of flint alongside glauconitic sands. This fabric may derive from outcrops of the Reading Formation more locally, or from another local glauconitic source.

One of the vessels analysed in this study, at least, was probably an import from the Wiltshire source identified in the Danebury analyses. Cunliffe defines the Wiltshire glauconitic wares as a restricted range of saucepan pots, everted-rim jars, and flared dishes, decorated in the Yarnbury-Highfield style (Cunliffe 1984a, pp.245-246-256). The most distinctive features of this group are the saucepan pots with 'arc' decoration, typologically-unusual flared dishes, and shouldered, bead-rim jars and bowls (fig.4.20a). Reconsideration of vessel 1/SCT-010 – illustrated in the original publication as an unusual kind of hemispherical bowl (fig.4.20b) – suggests that this may in fact be an example of one of the shouldered types[1]. This vessel, in glauconitic fabric Q2a, fits within the known repertoire of the Wiltshire industry and therefore seems to be a rare example of one of these decorated types in Region 1. Examples of clearly identifiable Wiltshire-type glauconitic vessels are virtually non-existent further east than Danebury: only one clear example of a Yarnbury-Highfield saucepan pot is known in Region 1: from Winklebury (Smith 1977, fig.34 no.2: reported as being in a glauconitic fabric), and there are no known examples of the flared dish type. It is possible that the distribution pattern of these wares may be similar to that identified for Morris' Malvernian finewares, i.e. a thin, wide distribution probably resulting from occasional

[1] Sufficiently little of the rim of this vessel survives to permit the correct orientation of the vessel. This seems to have led Piggott & Seaby to assume that the vessel was a very open type; however, a groove running around the body of the vessel allowed a correct orientation of the sherds to be achieved and this demonstrates that the vessel indeed had a distinct shoulder and was significantly more closed than had originally been assumed (fig. 4.20c).

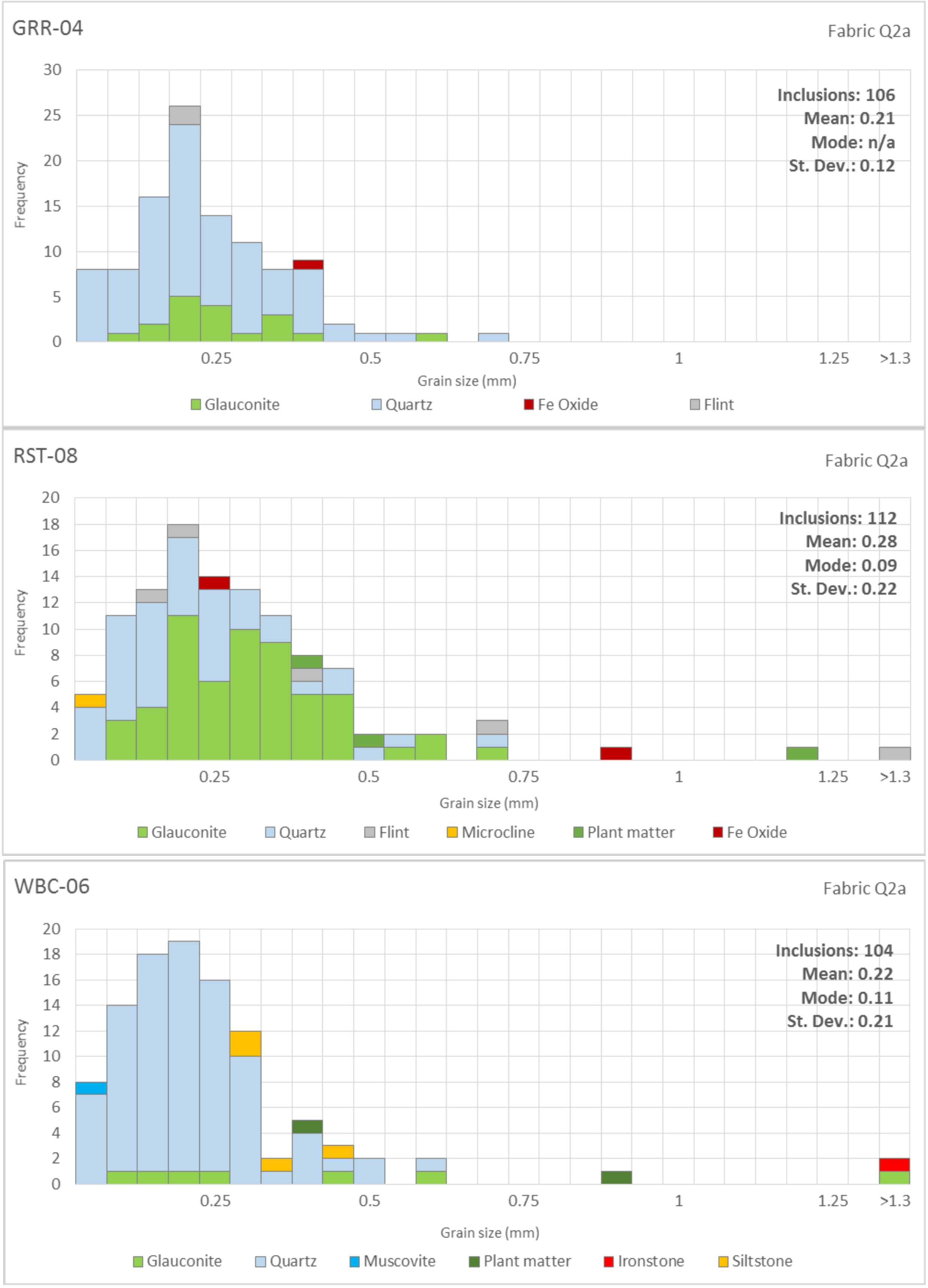


Figure 4.19. Region 1, Glauconitic Sandy Group. Grain-size histograms.

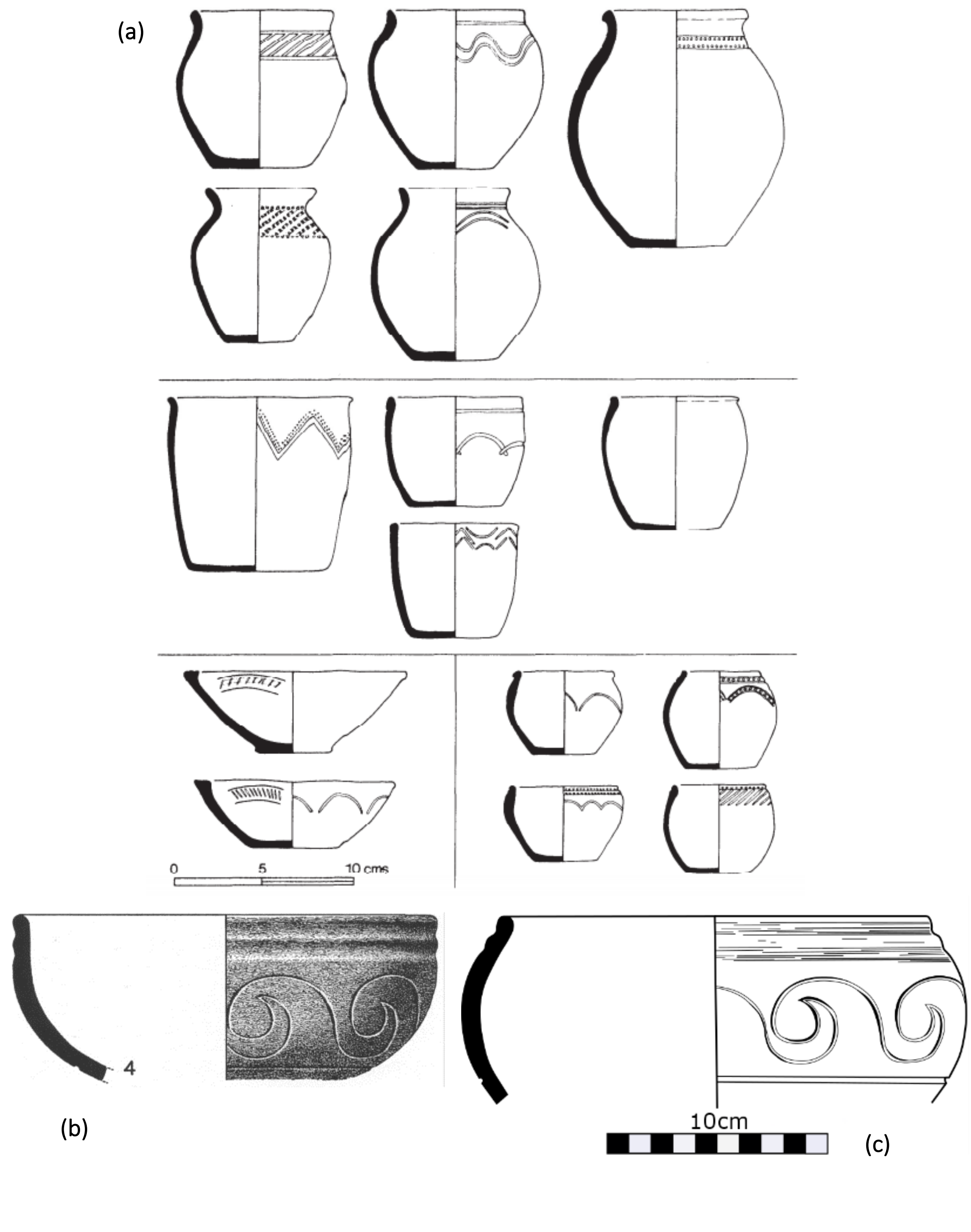


Figure 4.20. (a) Simplified illustrations of Cunliffe's Wiltshire Glauconitic types (from Cunliffe 1984a, Fig.6.15: reproduced with kind permission of Barry Cunliffe/Council for British Archaeology); (b) Original illustration of 1/SCT-010 (from Piggott & Seaby 1937, fig.7: © Cambridge University Press; (c) Revised illustration of 1/SCT-010 (image: the author).

exchange through kinship interactions (1981; 1982), or indeed that identified by Peacock for certain categories of Glastonbury ware (1969); and that this distribution explains the occurrence of certain other of the glauconitic wares in Region 1.

Glauconitic fabrics are not known from LIA contexts in Region 1, and this fits with the chronology of these wares in other regions.

<u>Ferruginous Sandy Group</u>

Fabric Q1b

All of the variants of the large Q1 fabric are united by their sandy-to-very sandy texture and irregular-to-hackly fracture, as well as by the presence of moderate-to-abundant quartz sand and silt, rare-to-sparse angular flint of varying colours, and varying amounts of subrounded reddish-brown iron oxide. In the Q1b variant, the iron oxide is the defining feature, the volume of ferruginous clasts always being perceptibly higher than that of quartz. This provides a lumpy, uneven texture to the fabric, which is also softer than usual, being able to be scratched with a fingernail. In thin section the mineralogy is identical to that of the other Q1 fabrics, being composed primarily of silicate minerals (mono- and polycrystalline quartz in sand- and silt-grades; muscovite mica; and rare fine tourmaline).

The clays used for this fabric were probably naturally iron-rich, being derived from a source with very high iron content that is expressed in the clay as the loose, oxidised formations visible in thin-section (J.R.L. Allen, pers. comm.). Alternatively, modal analysis of the grain-size data of three of the Q1b samples shows that the quartz and iron oxide inclusions present in the fabric have different grain-size distributions (fig.4.22). The quartz exhibits the arguably 'natural' distribution evident in

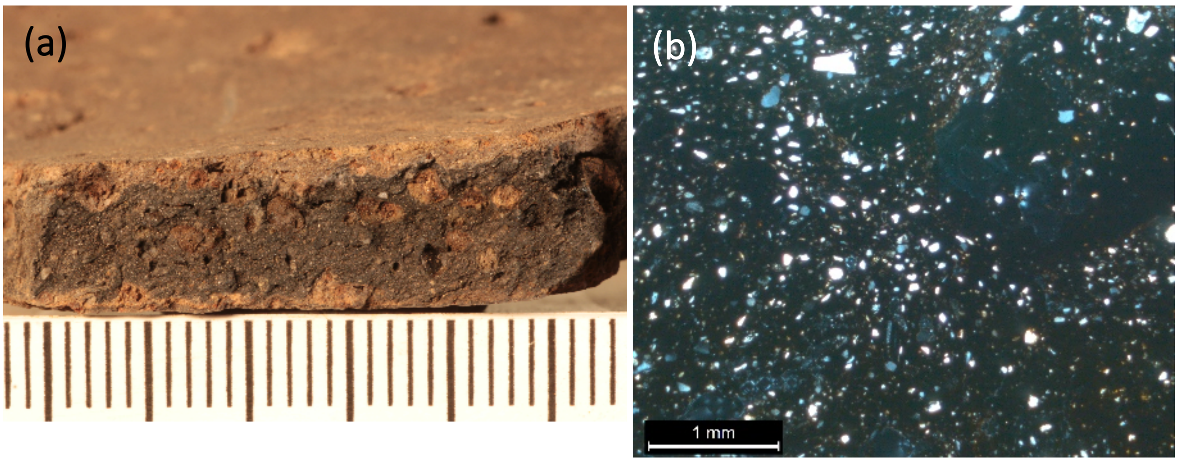
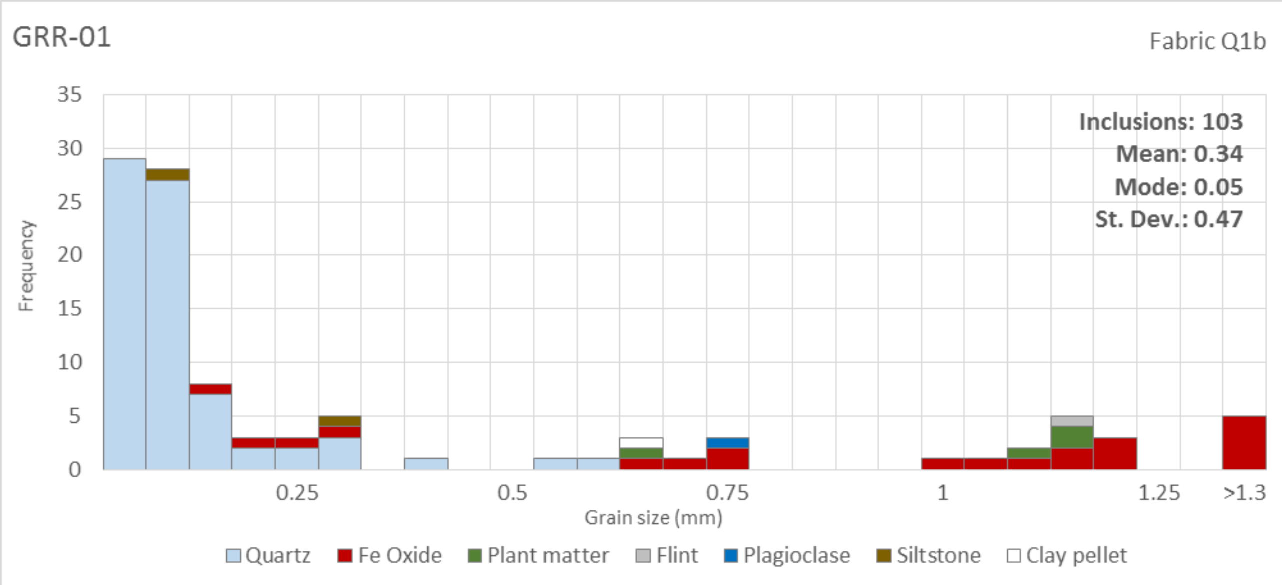
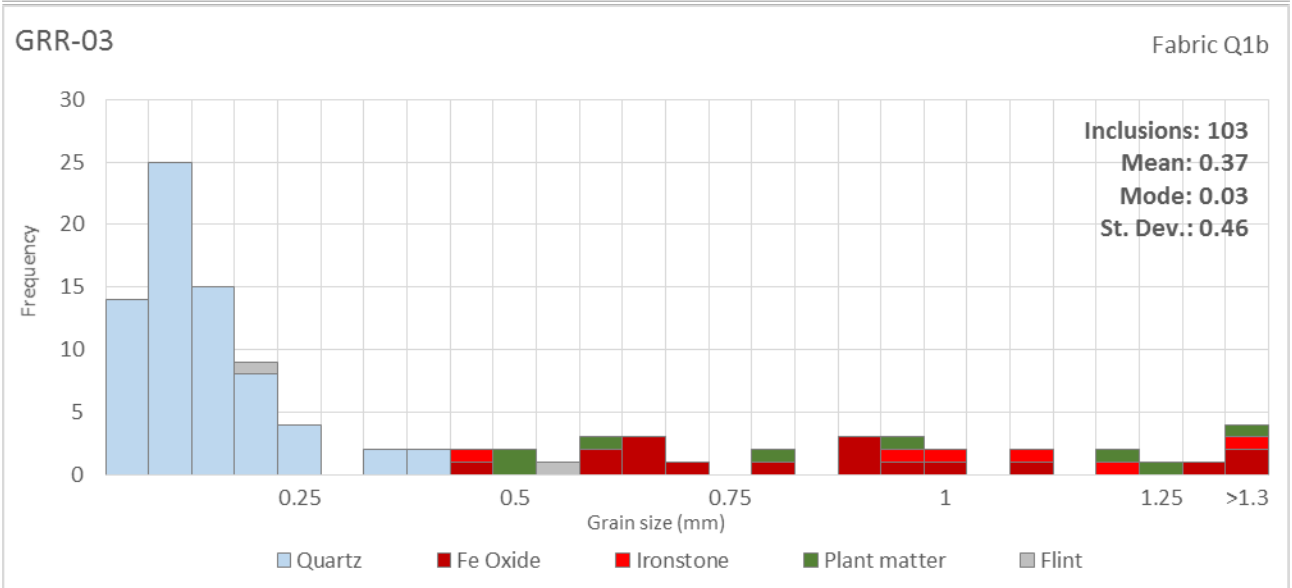


*Figure 4.21. **Fabric Q1b**. (a): photograph of fresh break; (b): photomicrograph, x40, XPL.*





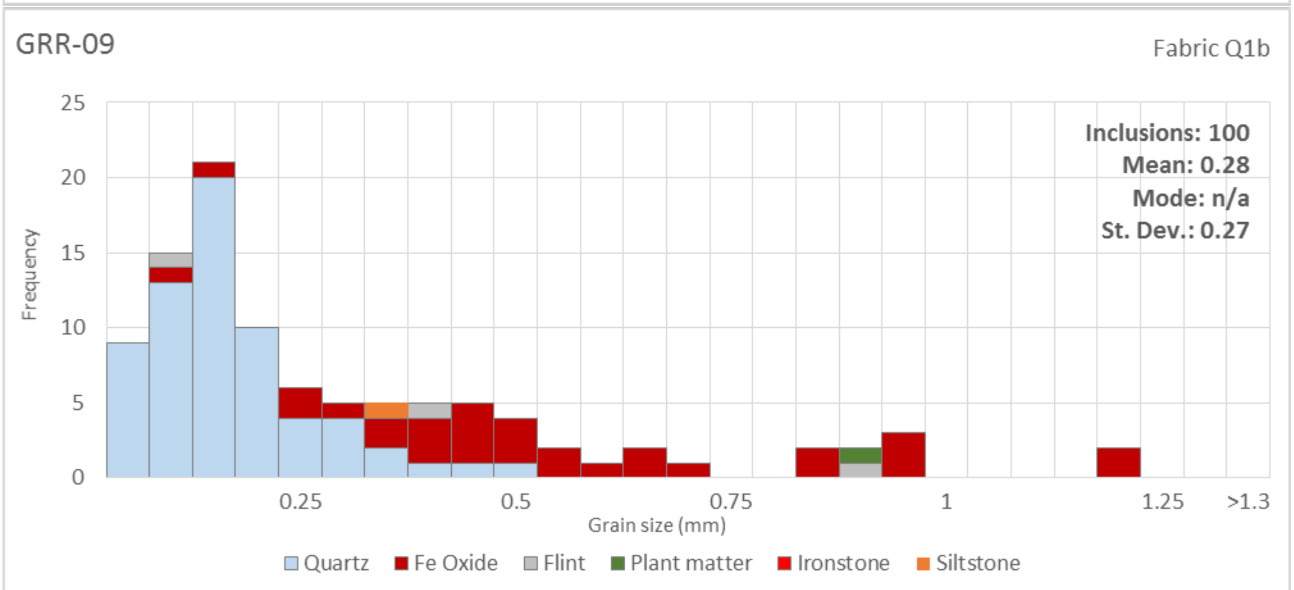


Figure 4.22. Region 1, Ferruginous Sandy Group. Grain-size histograms.

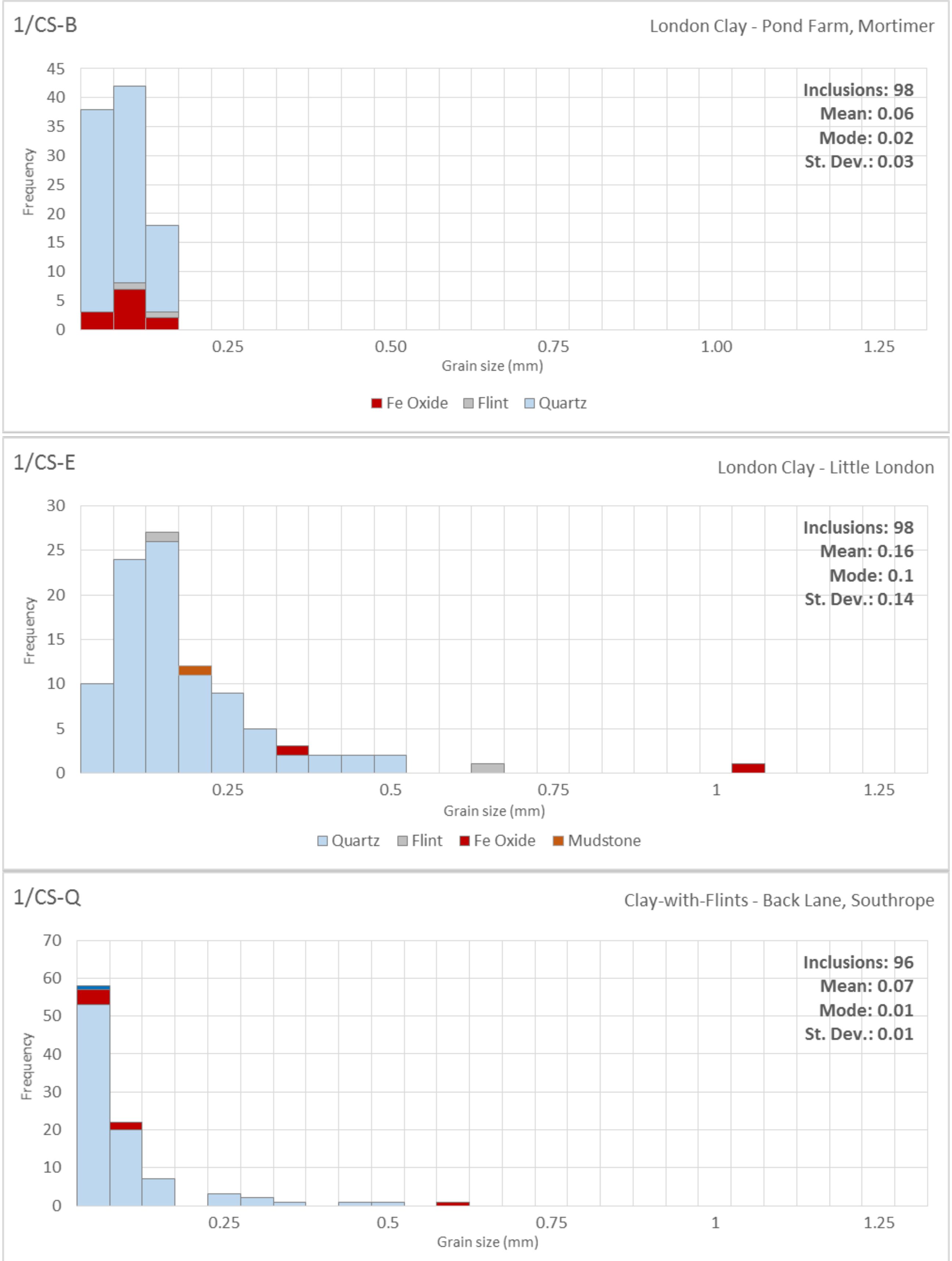


Figure 4.23. Region 1, clay samples. Grain-size histograms.

clay samples from the nearby area (fig.4.23), wherein the frequency is highest in the smaller size-ranges, and tails off into the larger. The pattern evident in the iron shows both inconsistency of grain-size (indicative of poor sorting), and a general preference for larger grain-sizes. This contrasts with natural iron in the clay samples, which is present in both lower frequencies and smaller grain-sizes. Although a difficult hypothesis to confirm, this hints at the possibility that these iron inclusions are not natural to the clay, but were added as a deliberate temper. A more focused clay-sampling programme, in combination with experimental work, would be required in order to verify whether the clay is likely to have borne iron formations of this kind naturally, or if they were added.

Provenance

The clay samples demonstrate that iron oxide pellets are natural to numerous of the clays of the surrounding region, and the remainder of the mineralogy evident in thin-section is non-diagnostic. However, sources of highly ferruginous soils are of localised significance within Region 1, with both sporadic occurrences of ‘bog iron’ (Allen 2013, p.29) and iron ore derived from the Bracklesham Formation (Potter 1977, pp.235–240) having been worked during the Iron Age. There is therefore a significant likelihood that the clays used for fabric Q1b were derived from sources relating to one or more of these highly ferruginous deposits, and this is significant given the contextual associations of the fabric (see below).

Distribution and chronology

Ferruginous sandy fabrics have been noted at several sites in Region 1 (e.g. Grazeley Road (Timby 2013a: fabrics FESAFL and FESAOR); Riseley Farm (Lobb & Morris 1993: fabric FT25); Aldermaston Wharf (Cowell et al. 1980: fabric 3); and Brighton Hill South (Rees 1995: fabric 3)). These wares generally make up only a small proportion of the fabrics in most assemblages, with two exceptions: Grazeley Road and Riseley Farm. Occupation is radiocarbon dated to the Early-to-Middle Iron Age at the former site (Ford et al. 2013, p.56), and to the Middle and Late Iron Age at the latter (Lobb & Morris 1993). It is significant that both of these sites show evidence for iron-making, being two examples of an increasing number of Iron Age sites in this area to have produced evidence of iron-smelting (e.g. Sadler’s End, Sindlesham (Lewis et al. 2013), and Manor Farm, Finchampstead (Platt 2013)). All but one (Temple Lane, Bisham) of the sites with evidence of ironmaking lie in close proximity to one-another within a relatively restricted area to the south of modern Reading, and may have been located to take advantage of a nearby source of iron ore: potentially either deriving from the Bracklesham Beds (outcropping a few kilometres to the east: cf. Potter 1977), or from 'bog ore' present in localised deposits in the nearby landscape (Allen 2013, p.29). In this context the tight distribution of the fabric combined with a clear material connection between the ceramics and metalworking strongly suggests on-site production using materials derived from the associated industry. This would appear to be the case whether the pottery is being tempered with production waste, or if the clays being used are derived from a naturally iron-rich source. It may have been that these vessels were being produced in-house for use in ironworking, and only occasionally traded to nearby sites. Alternatively, they may have served a domestic role, being used by the ironworkers and/or their families. It may be noted that petrography does not support the notion of a refractory role for these wares, as none shows any sign of having been exposed to the high temperatures associated with ironworking. The chronology of Q1b seems to be mostly limited to the MIA, although some examples of the fabric have been identified in LIA contexts at Riseley Farm (e.g. sample 1/RFM-009) and Ufton Nervet (e.g. samples 1/UFT-002, -011, -014), including a typologically LIA necked bowl (1/UFT-002). This suggests at least some continuation of the use of ferruginous clays and/or tempers into the LIA.

The Miscellaneous Sandy Group

This group contains the range of sandy fabrics that could not be sourced on the basis of petrographic analysis.

Fabric Q1

Six variants of Q1 are defined, of which four are known from Region 1 and three are included in the Miscellaneous Sandy Group. All are united by their sandy-to-very-sandy texture and irregular-to-hackly fracture, as well as by the presence of moderate-to-abundant quartz sand and silt, rare-to-sparse angular flint of varying colours (exclusively non-calcined except for in Q1d), and varying amounts of subrounded reddish-brown iron oxide. It should not, therefore, be expected that sources can be assigned in the majority of cases; rather these, like the G1 and G2 fabrics discussed below, seem to be the products of a geographically-dispersed tradition of clay preparation.

The three varieties present in Region 1 are:-

- Q1a – the usual features of the fabric are present and nothing else. Inclusions consist only of common-to-abundant quartz sand and silt, rare-to-sparse flint, and moderate iron oxide.

- Q1d – Variant of Q1a with common-to-abundant calcined flint: a deliberate temper.

- Q1ei – Q1a with moderate-to-abundant elongated blackened voids indicative of burnt out organic material.

There is evidence of variation in clay preparation within the group. However, the sand that is the principal component of all of the fabrics may or may not have been

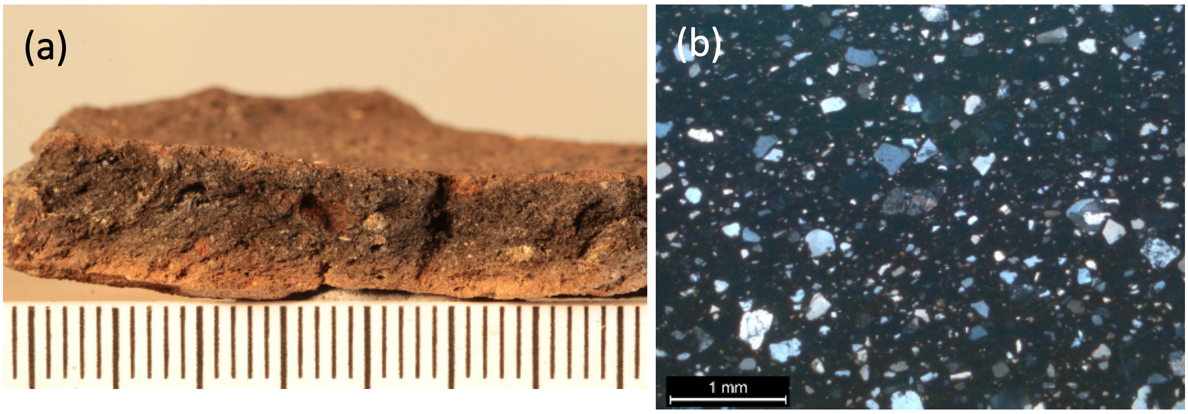


*Figure 4.24. **Fabric Q1a**. (a) photograph of fresh break; (b) photomicrograph, x40, XPL.*

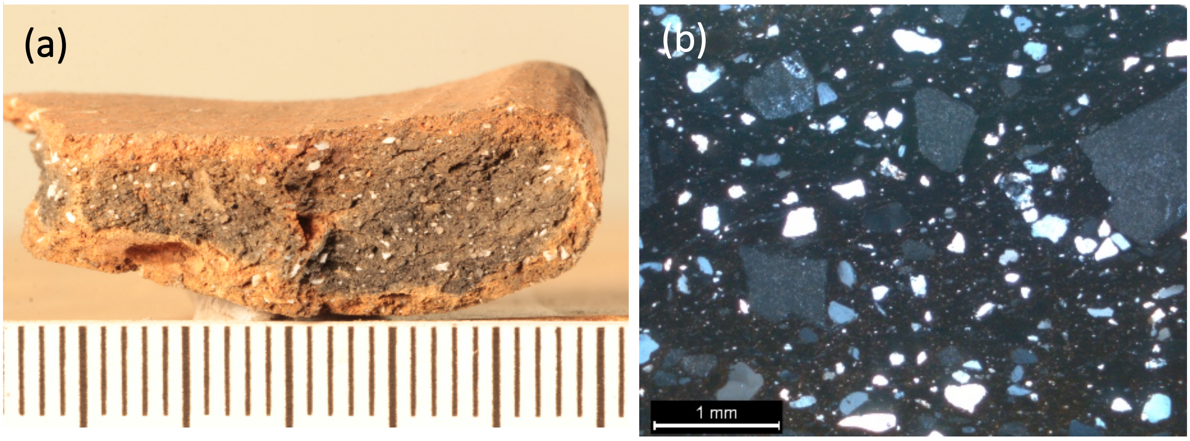


*Figure 4.26. **Fabric Q1d**. (a) photograph of fresh break; (b) photomicrograph, x40, XPL.*

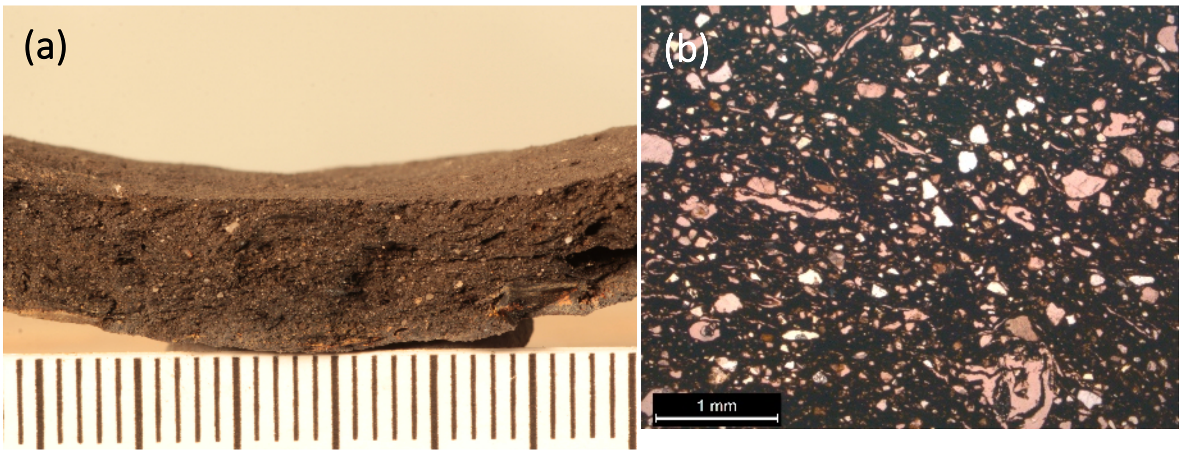
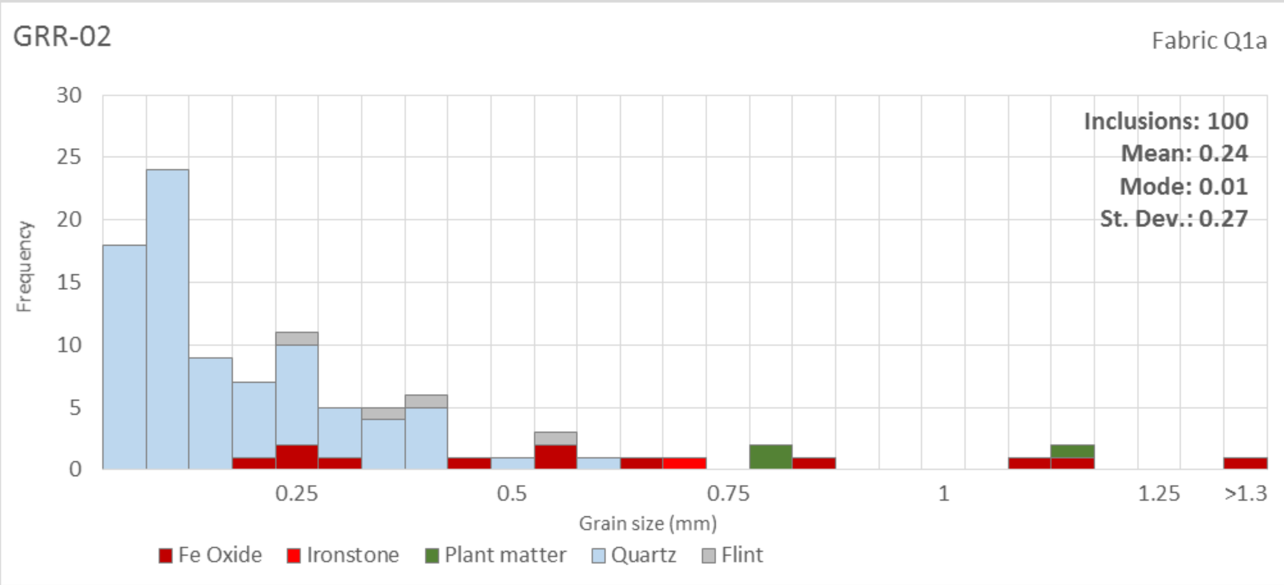
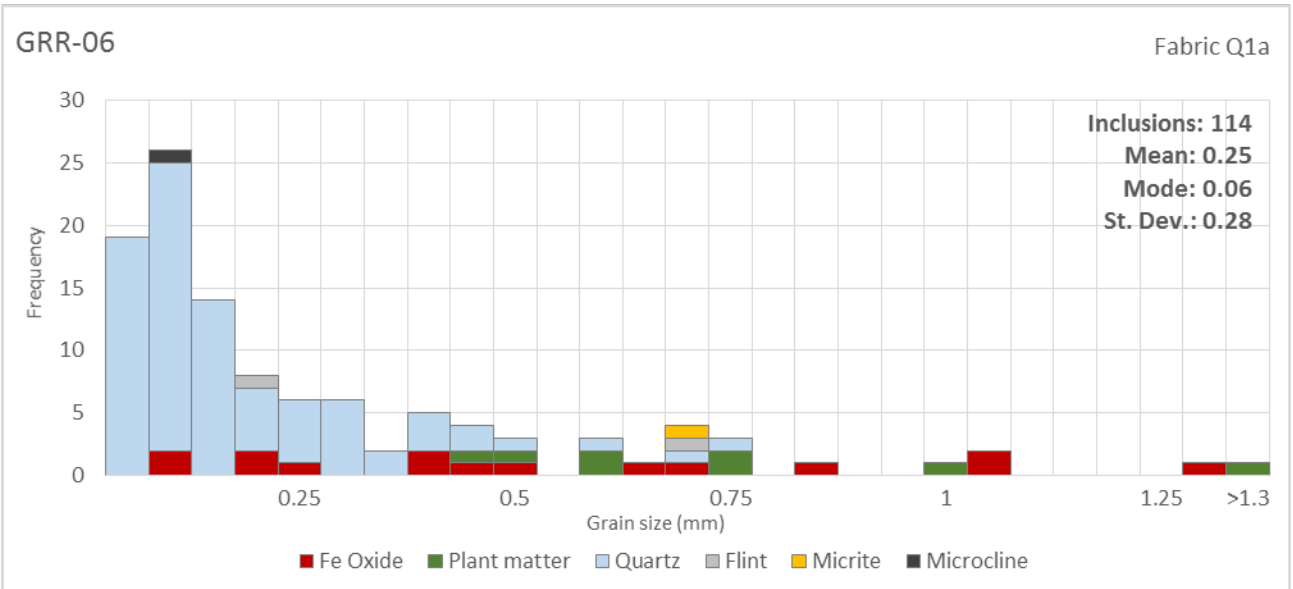


*Figure 4.25. **Fabric Q1ei**. (a): photograph of fresh break; (b): photomicrograph, x40, PPL.*





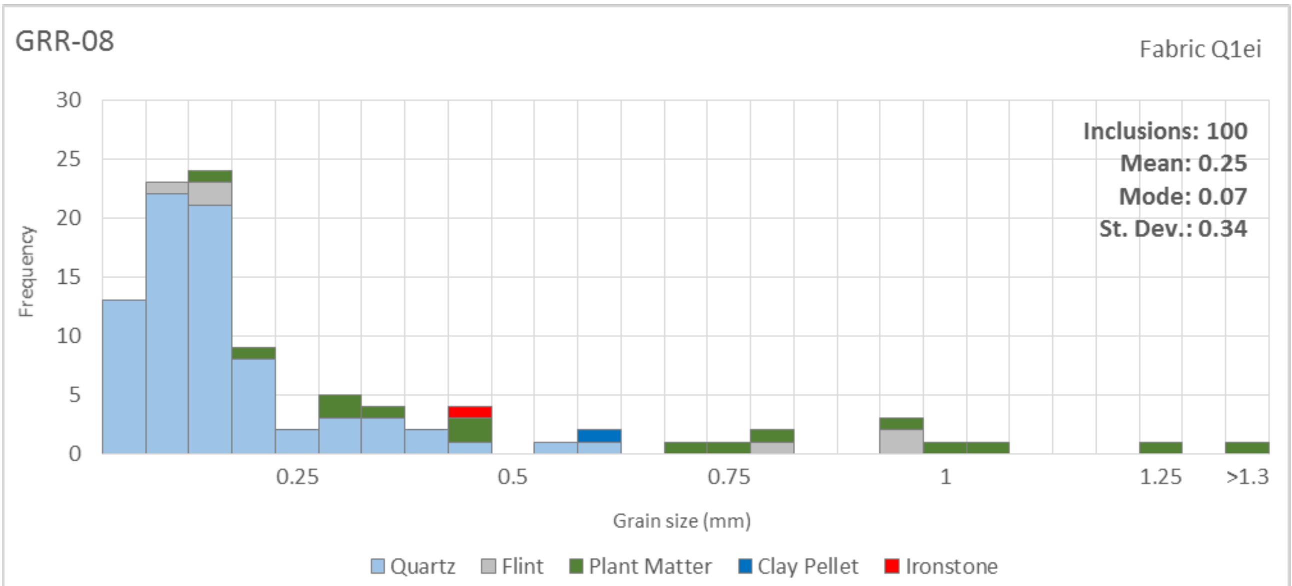


Figure 4.27. Region 1, Miscellaneous Sandy Group. Grain-size histograms.

deliberately added. Grain-size analysis of these fabrics (fig.4.27) is inconclusive as to the nature of the quartz sand inclusions, in no case lending credibility to the idea that the sand was deliberately added. The grain-size distributions in all cases have a preference for the lower end of the scale, tailing off towards the larger grain-size categories; this is again similar to the natural patterns seen in the clay samples (fig.4.23). It therefore seems that these fabrics were generally only very lightly tempered or wholly untempered, the natural clay most often being found satisfactory but occasionally being modified with various tempers when it was felt that the plasticity and/or texture should be improved before working and firing. This was achieved using a variety of different materials in differing quantities, including calcined flint (Q1d), organics (Q1ei), and – if we include Q1b as part of this continuum of fabrics – possibly also oxidised iron.

Fabric Q3

A hard, fine fabric with well-executed, even surface oxidation. This results in an even mid-orangish-brown over a pale grey core, with well-defined firing horizons visible in both hand-specimen and thin-section. The feel is sandy and slightly harsh, the break fine and showing inclusions of common fine quartz (up to 0.2mm), common calcined flint (up to 1.5mm), moderate elongated voids (organics) up to 2mm, and sparse rounded iron oxides. In thin-section, diagnostic mineralogy is limited, inclusions other than quartz and flint being confined to the iron and muscovite, neither of which need be non-local.

Fabric Q4

Only known in hand-specimen in Region 1. A fairly coarse fabric: hard, with soapy-to-sandy feel and irregular breaks. Breaks show a dense, common-to-abundant scatter of quartz sand and silt, along with common elongated voids possibly representing burnt-

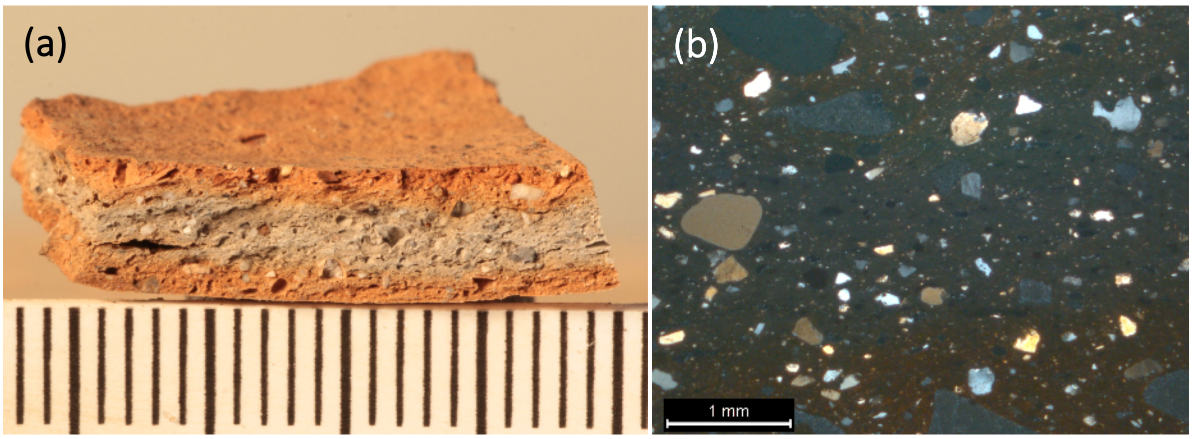


*Figure 4.28. **Fabric Q3**. (a): photograph of fresh break; (b): photomicrograph, x40, XPL.*

out organic matter. Sparse-to-moderate grog up to 2mm is also present. There is similarly little of value for provenancing in the suite of inclusions identified in thin-section (Region 2 samples only). This appears to be a rare fabric that may or may not have been produced in one of the two study regions.

Provenance

Petrographic analysis shows that all Q1 samples contain the same basic suite of silicate minerals and rock fragments (mono- and polycrystalline quartz, muscovite mica, tourmaline, flint, etc.) which – while geologically nonspecific – are suggestive of a potentially very local source within the London Basin. These wares are likely to have their origins with various producers, all part of the broad tradition of Later Iron Age potters making vessels in sandy fabrics. The MIA tradition also includes the producers of the Glauconitic and Ferruginous subgroups, as well as those making much of the sandy pottery known from sites throughout southern England. The same can be said of the LIA tradition, the fabrics associated with this group being similarly difficult to provenance, being composed of Q1 fabrics and the probably-local Q3 and Q4. The cessation of exploitation of glauconitic and (to a lesser extent) ferruginous raw materials going into the LIA may highlight a change in the perception of these raw materials and/or their source locations, which for one reason or another seem to have been deemed inappropriate for the production of pottery in this period.

Distribution and chronology

Little can be said regarding the distribution of these fabrics as there are no firm data regarding provenance. Sandy fabrics of the kind discussed are common throughout the Iron Age on sites throughout south-central England. The same is true in Region 1, with sandy fabrics occurring in varying proportions in all assemblages encountered, and in lower proportions in the south of the region where Flint Group fabrics take a larger share.

While the ceramic sequence for many Region 1 sites sees the LIA as a relative lull in the production of Sandy Group pottery, on the basis of the occurrence of numerous examples of typologically LIA vessels in sandy fabrics (in particular, in assemblages in the east and north of the region (e.g. Park Farm, Binfield (Booth 1995), Jennett's Park, Bracknell (Biddulph et al. 2009), Bath Road, Slough (Timby 2003)) manufacture must have been ongoing throughout much of this period.

Indeed, there may not have been a break between the cessation of production of MIA-style wares and the commencement of production of LIA-style wares in these fabrics. Important in this regard is a consideration of the assemblage from Pit H at Ufton Nervet (Manning 1974, p.33). This was identified as one of the earliest contexts on this site, being given a date of 'early pre-conquest' by the excavators. Its early date was attributed on the basis of a relative dearth of Silchester ware, an abundance of which was considered to reflect a later, Claudian date in other contexts. This pit yielded an assemblage primarily consisting of necked jar/bowl forms, with some bead-rims and sandy-fabric saucepan pots alongside (ibid. fig.17, nos. 113-126). Re-examination of this assemblage by the present author has shown that the necked jar/bowl forms from Pit H occurred both in sandy and grog-tempered fabrics, and this is significant given the probable early date of the context. The saucepan pots in particular are more at home in contexts of MIA date than of LIA, and their occurrence here suggests contemporaneity of production of saucepan pots into the earlier part of the LIA, when necked forms had begun being made (Tyers 1981, pp.184–187)[2]. In this context, then, the fact that sandy-fabric, necked forms of LIA type are present at an apparently M-LIA transitional date implies that there was little, if any, break between the end of the MIA sandy tradition and the beginning of the LIA wares, the typologically LIA vessels seemingly utilising a more traditional fabric 'recipe' than their grog-tempered cousins. Similar suggestions of continuity are present in the sequences at, for example, Brighton Hill South and Riseley Farm. At the former, the transition from CP2 to CP3 is marked by the continuation of both flint-tempered and sandy fabrics; although in the case of the latter a new fabric is defined for the predominant LIA/early Roman unoxidised and occasionally wheel-made sandy wares (fabric 5: Rees 1995). Meanwhile, the stratified sequence of ditches at Area A on Riseley Farm (Lobb & Morris 1993) demonstrates similar patterns. The earliest contexts here – ditches 79 and 182 – similarly contained pottery in sandy and grog-tempered fabrics, with low proportions of flint-tempered wares, allying these groups to that from Pit H at Ufton Nervet. No imported finewares or copies were found in these contexts, but these were recovered from the immediately succeeding context 78, which cut these two ditches. This may suggest a date earlier than c.25 BC for the former groups, and demonstrates again the continuation of production of sandy fabrics throughout the LIA.

It therefore seems that the production of sandy wares of LIA type emerged more-or-less directly from that of their MIA predecessors, with a regionally varied, but generally low volume of wares being deposited prior to the mid-first century AD. In this

[2] Tyers (1981, p.184) claims that these MIA-style vessels were found exclusively in flint-tempered fabrics. However, this is incorrect: examination by the current author showed these vessels to be in a mixture of Sandy-Group and Flint-Group fabrics.

context the technical characteristics of this LIA production is significant, particularly given the predominance of kiln-fired sandy wares in the early Roman period.

Function

Functions of MIA vessels have been addressed in the discussion of the Flint Group. To summarise in relation to the Sandy Group, the rim diameter data presented in Appendix I suggest that both the Flint and Sandy groups contained a similar range of vessel sizes and therefore represent broad similarity in terms of the functional roles attributed to vessels in these fabrics. In concert with work done on MIA pottery function previously, this suggests that vessel type is not a reliable indicator of intended function,

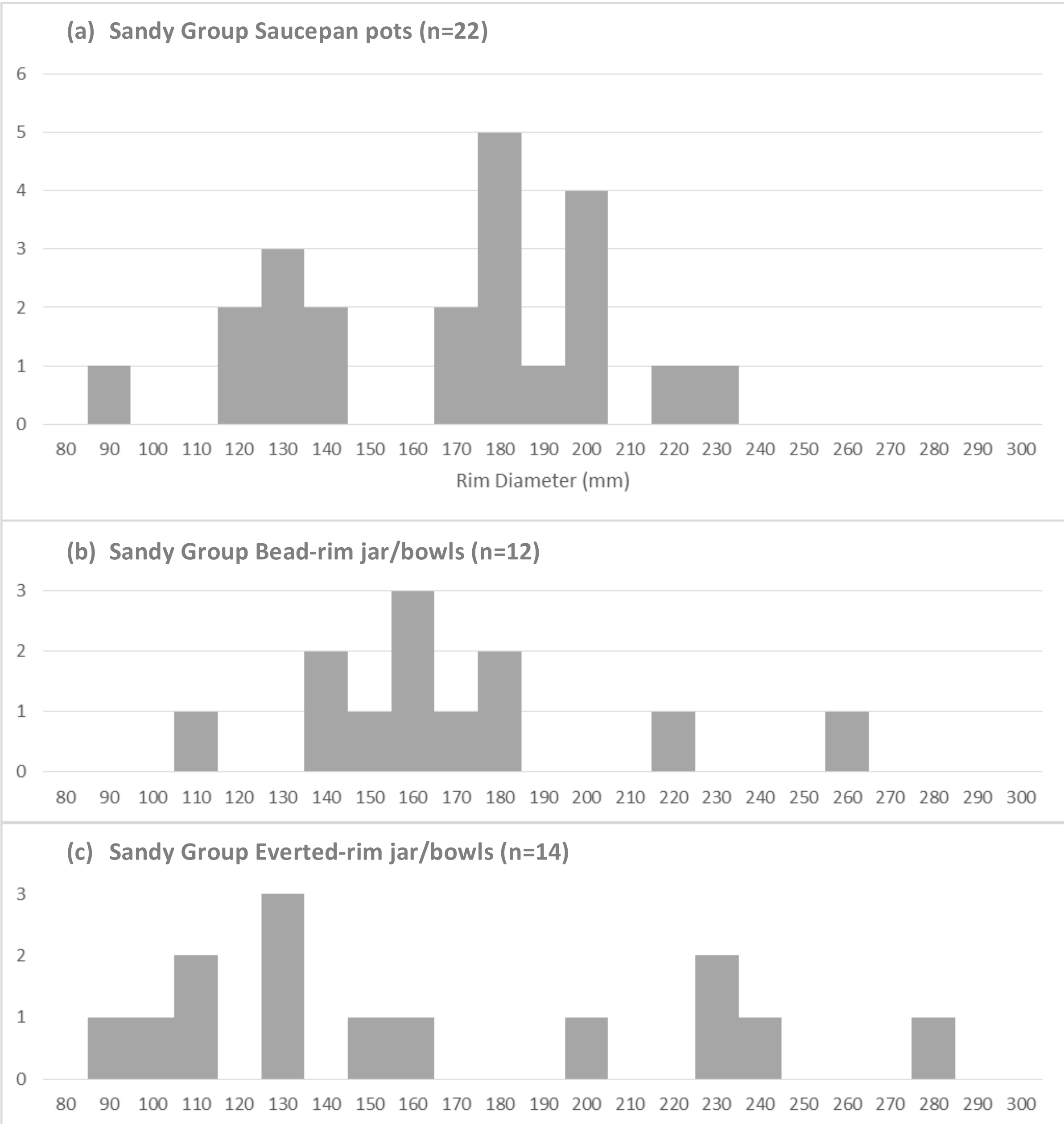


Figure 4.29. Region 1, MIA. Rim-diameter distributions for the three main Sandy Group vessel categories.

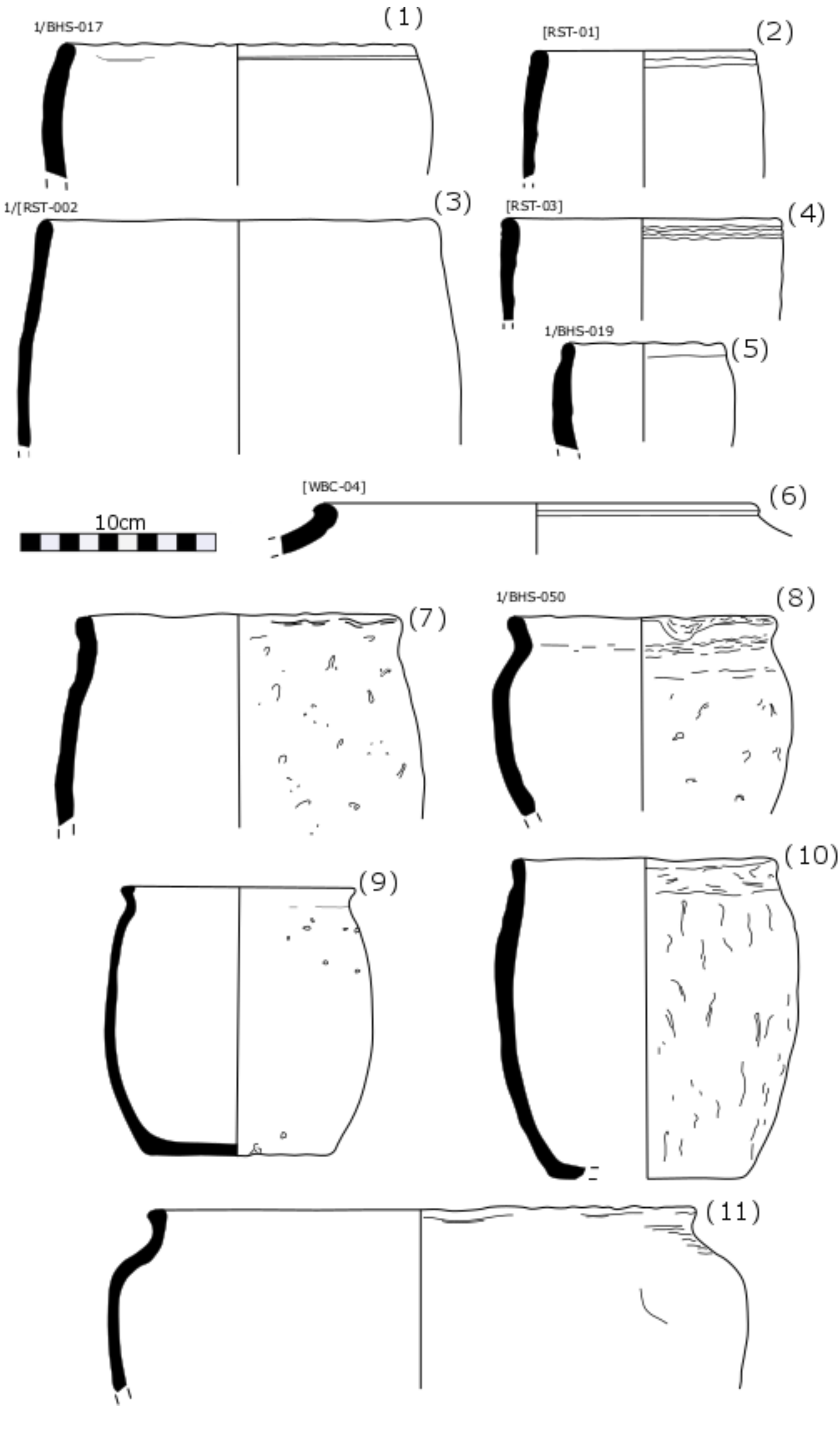


Figure 4.30. MIA Sandy Group forms. 1-5: Saucepan pots. 6: Bead-rim jar/bowl. 7-11: Everted-rim jar/bowls. Nos. 1-6 illustrated by the author. Nos. 7, 8, & 10 redrawn from Rees 1995, nos. 8, 9, & 15, respectively (© Trust for Wessex Archaeology). Nos. 9 & 11 redrawn from Timby 2013 nos. 3 & 15, respectively (© Thames Valley Archaeological Services).

but that size is. The exception to this is saucepan pots, which do not appear to have been used for bulk storage. Crucially, there appears to be little difference in the functional repertoires provided for by either fabric group. Both Flint and Sandy groups contained saucepan pots alongside jar/bowls of various kinds and with similarly wide-ranging sizes representative of correspondingly wide-ranging intended functions. These encompass the whole range of service, preparation, and storage roles.

The functions of the typologically LIA vessel types represented amongst the Sandy Group are more complicated to interpret, but appear to represent a mixture of functionally specialised vessel types (the 'specialist' wares, i.e. platters, beakers, pedestal jars, etc.) and jars/bowls with widely varying morphological characteristics. These are difficult to interpret due to these varying characteristics but are considered at more length in their discussion in the Grog Group section below.

Analysis of manufacturing techniques – MIA

Forming

The MIA Sandy Group consists of 47 vessels in six fabrics. Form types represented include everted-rim jar/bowls (20) and saucepan pots (11), as well as bead-rim forms (6) and a single bowl form of a debated type (1/SCT-010). In addition, fragments of 9 vessels of unknown type were analysed.

Coiling predominates primary forming in the Sandy Group (fig.4.31). In this case there is little evidence to support the notion that secondary forming is obscuring the visibility of primary forming – 15 of the 47 vessels (32%) had a secondary forming technique that may have obscured evidence of primary forming (i.e. paddle-and-anvil or pinching/drawing), but of these 10 (67%) did in fact show evidence for coiling. In these cases, secondary forming demonstrably did not obliterate evidence of primary forming, leading to the conclusion that other factors must have been responsible for obscuring evidence of primary forming in the case of the 40% of vessels that could not be assigned a primary technique for any body-part. Other techniques than coiling may be amongst these, but there is no way of knowing using the current methods. Nor does there appear to be patterning in the kinds of vessels represented by coiling. 17 of the 26 jar/bowls (65%) showed some suggestion of having been coil-built, while 6 of the 11 saucepan pots (55%) showed similar signs. It therefore seems that significant proportions of both the jar/bowls and saucepan pots were crafted using the coiling technique to manufacture the preform, and on the basis of an almost complete lack of

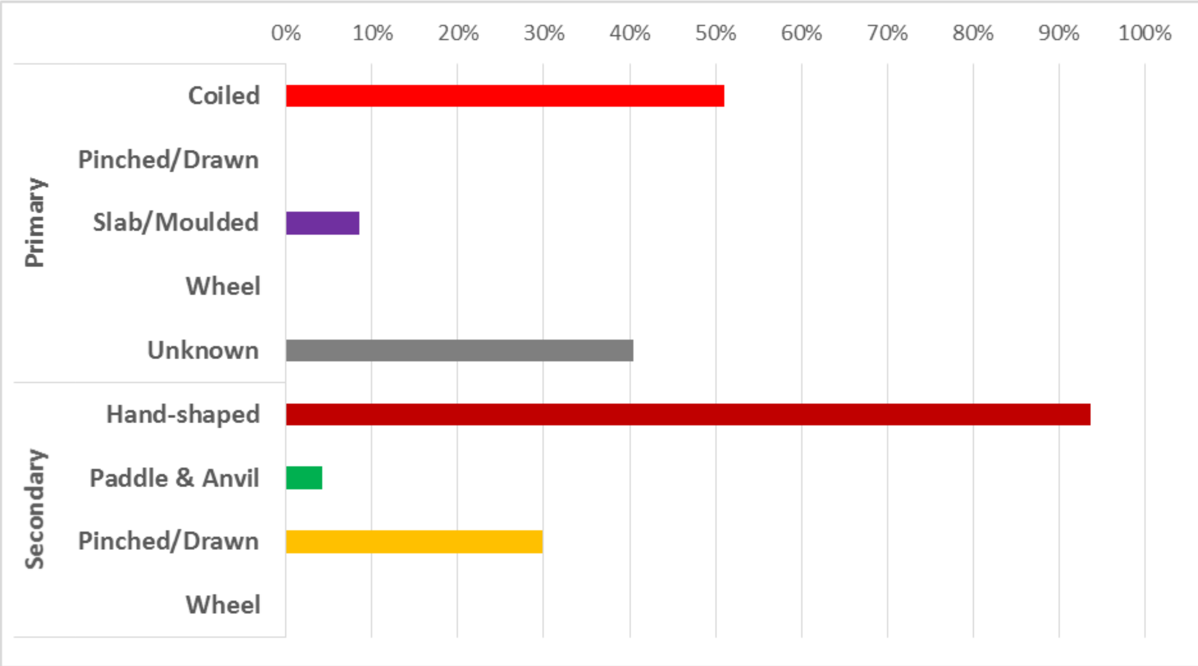


Figure 4.31. Region 1, MIA, Sandy Group. Forming techniques as proportions of vessels.

evidence to suggest that other techniques were used (aside from the limited and specialised use of a form of 'slab-building' – see below), it seems probable that most vessels were made using the coiling technique regardless of the intended eventual shape or function of the vessel.

A small number of bases exhibited evidence for forming techniques other than coiling. Whilst three bases did show positive evidence for being made from concentrically-arranged coils, four vessels had bases either formed from clay 'plugs' - i.e. roughly-shaped lumps of clay around which the body was built, or which were added to pre-made bodies – or for the use of potentially better-made round slabs of clay, around which the body will have been built. Unfortunately, none of these 'slab' built examples could be allocated to a type as none was found in association with a complete profile. Nevertheless, the evidence for variation around the traditional norm that these vessels provide is significant.

In secondary forming, hand-shaping was again found to be very popular; particularly for finishing the bodies and bases of vessels. Interestingly, the balance of craftsmanship of vessel rims and necks in the Sandy Group goes to the pinching/drawing technique (fig.4.32). This technique – again most appropriately called pinching due to the occurrence of small, localised patches of thinned, compressed clay visible in radiographs (fig.4.33) – is here arranged as discontinuous horizontal bands resulting from a repetitive motion going around the rim in order to shape the upper parts of the pot, and not in continuous vertical strips as seen in the bodies of Flint

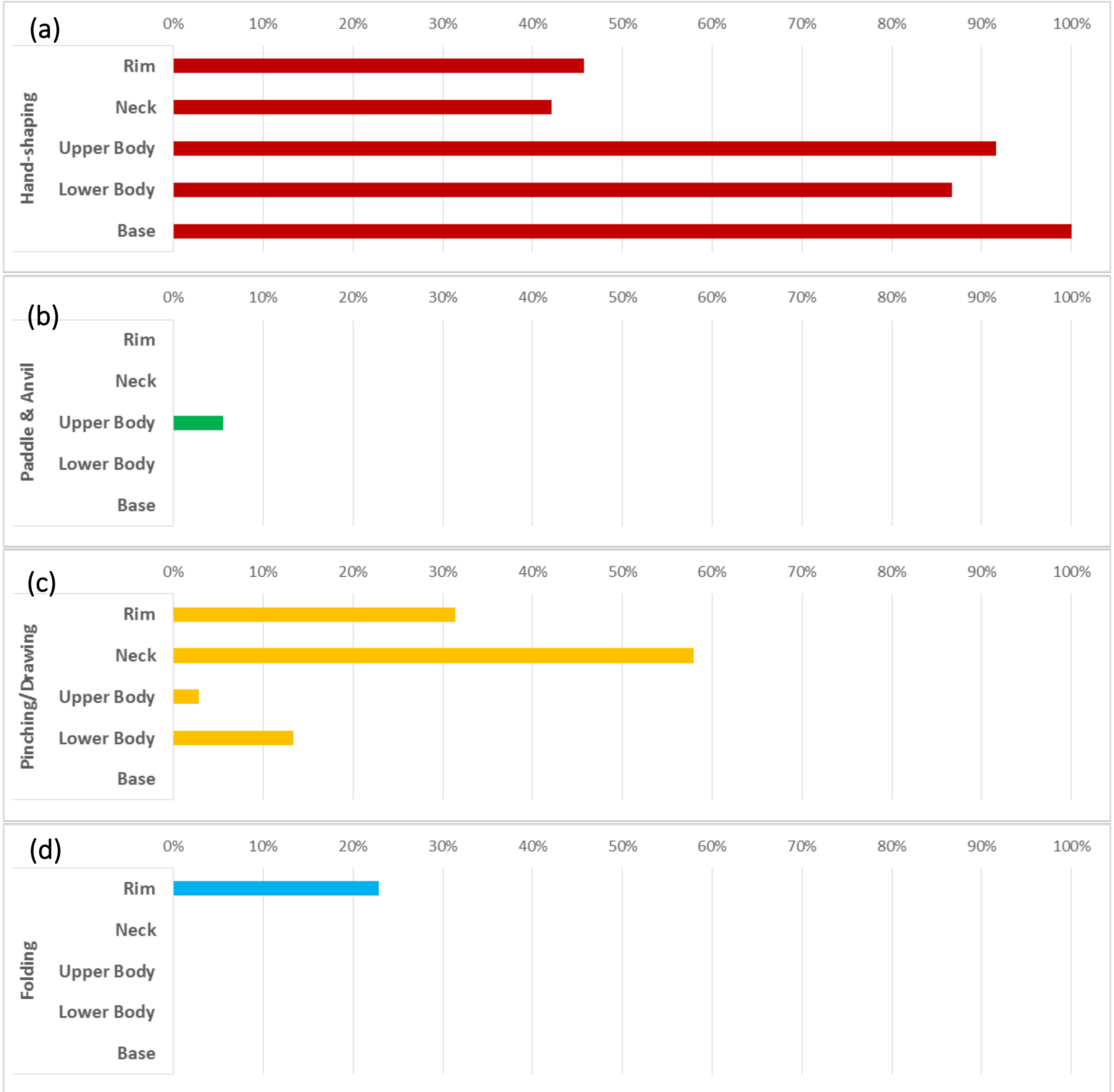


Figure 4.32. Region 1, MIA, Sandy Group. Occurrence of secondary forming techniques according to vessel body-part. Totals: Rims n=35; Necks n=19; Upper bodies n=36; Lower bodies n=15; Bases n=14.

Group pots. Unsurprisingly, in the Sandy Group, pinching is associated with the production of everted rims. 12 of the 20 extant everted rims were found to show evidence of pinching, while only one pinched rim was not of an everted form: 1/BHS-048, a small (90mm rim diameter) saucepan pot. It is worth noting that in this latter case the identification of the technique is not certain.

The evidence also shows that folding was popular in the crafting of rims, being represented by 8 of the 35 extant rims (23%). All of this evidence comes from saucepan pots and bead-rim forms, and this is consistent with the use of this technique as a simple response to the requirement to make fine, even, smooth and rounded rim shapes, and in this way is a specialised equivalent to the pinching technique.

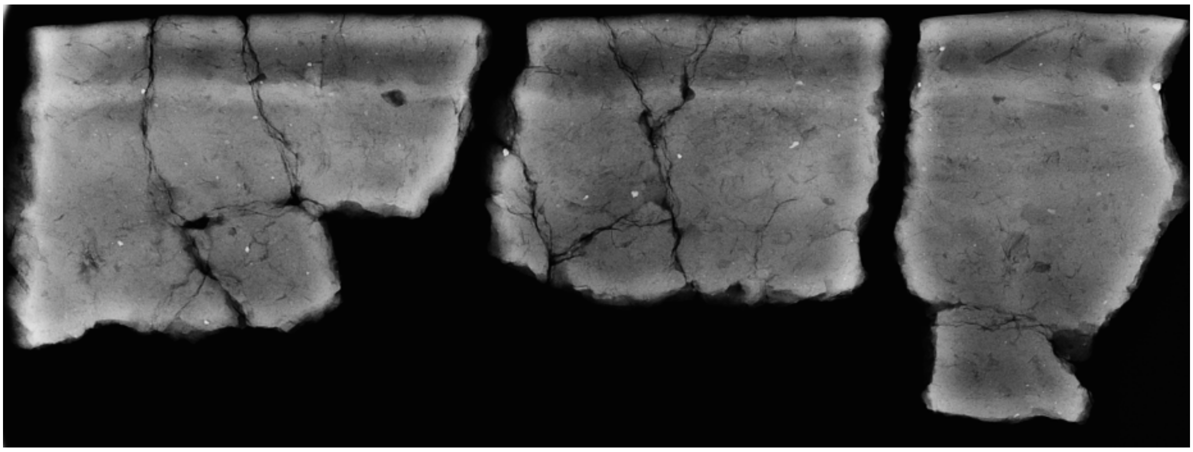


Figure 4.33. Radiograph of 1/KFM-005. Note localised dark patches near the rim, indicating the application of individual compressive forces using pinching.

Suggestion of the paddle-and-anvil technique was found in two upper bodies: 1/KFM-005 and 1/VBF-004, the former a Cunliffe JB4.1 everted-rim jar; the latter a Cunliffe JC2.3 bead-rim jar/bowl. In neither case was identification of the technique unequivocal, and particularly not in the case of the Viables pot, which is represented as a relatively small rim-sherd.

Surface treatment

Surface treatments are commonly found amongst MIA Sandy Group vessels. 22 vessels representative of 47% of the sample were found to have had some form of surface treatment applied. The vast majority (43%: 20 vessels) of this consisted of burnishing, with the remainder of surface treatment consisting of wiping (4%: 2 vessels). None of the five vessels with a rim diameter greater than 200mm was found to have been burnished, and this statistic may be used to very tentatively suggest that there may have been a functional component to the use of burnishing in Sandy Group vessels. Specifically, a preference for smaller vessels – and not for the largest – may reflect the intended use of these pots as serving and preparation vessels, and in this context the burnish may have served to improve the working qualities of vessels made with such purposes in mind; for example, in providing surfaces that were easier to clean, that were more attractive, or in making surfaces less porous and thereby less likely to leak in the cases of vessels used to hold liquids for extended periods.

Decoration

Decoration is relatively uncommon amongst the Sandy Group wares. Only 23% (11) of the vessels were found to have any decoration. These again consist of a variety of burnished, and some incised, patterns, including horizontal burnished lines applied beneath the rims of saucepan pots, and two examples of burnished ‘scratch marks’ on the upper bodies of jar/bowl forms. This latter kind of decoration may be best paralleled amongst the Hawk's Hill-West Clandon style of Surrey (Cunliffe 2005, Appendix A). Other forms of decoration include a burnished double-cross pattern on bead-rim jar/bowl 1/BHS-024; a burnished curvilinear pattern between the horizontal burnished lines on 1/KFM-008; and a zone of diagonal lines beneath the rim of everted-rim form 1/KFM-012. This latter motif is firmly at home in the St Catherine's Hill-Worthy Down style. In addition, bead-rim form 1/BHS-021 is decorated with an unusual incised curvilinear pattern that has been filled in with 'pin-pricks' produced by a very fine implement, such as a thin reed or needle. 1/SCT-010 has a pronounced incised cordon at its shoulder accompanied by an incised curvilinear 'wave' motif applied to the body. The decoration found in this group therefore demonstrates a large degree of heterogeneity in terms of both technique and style.

Firing

Firing was again found to be primarily conducted under reducing conditions, and with variable quality. 40% (19 vessels) and 11% (5 vessels) were found to have the uneven firing patterns 'UR' and 'UO', respectively, and this suggests poor control of the conditions of firing for a large number of the vessels produced. However, some vessels were found to have more even colour profiles: 15 vessels (32%) were recorded as having firing patterns consistent with R1, and this suggests somewhat better control of the firing than was otherwise achieved.

<u>Analysis of manufacturing techniques – LIA</u>

Forming

The 19 vessels allocated to the LIA Sandy Group are of variable character, being produced in two typological traditions – simple, coarse jar/bowls and saucepan pots derived very heavily from those analysed in the MIA sample; and a LIA/early Roman tradition of necked jar/bowls and bead-rim forms. In addition, due to sampling limitations the group is comparatively small – only 19 vessels.

Despite the mixed typological character of the LIA Sandy Group, coiling continues to overwhelmingly dominate the primary forming techniques recognised in this phase (fig.4.34), the technique being noted in as many as 14 (74%) of the 19 vessels. Once again a small number of bases (2) appear to have been slab-made rather than concentrically-coiled; in addition, one vessel may have been wheel-thrown (1/BFD-005).

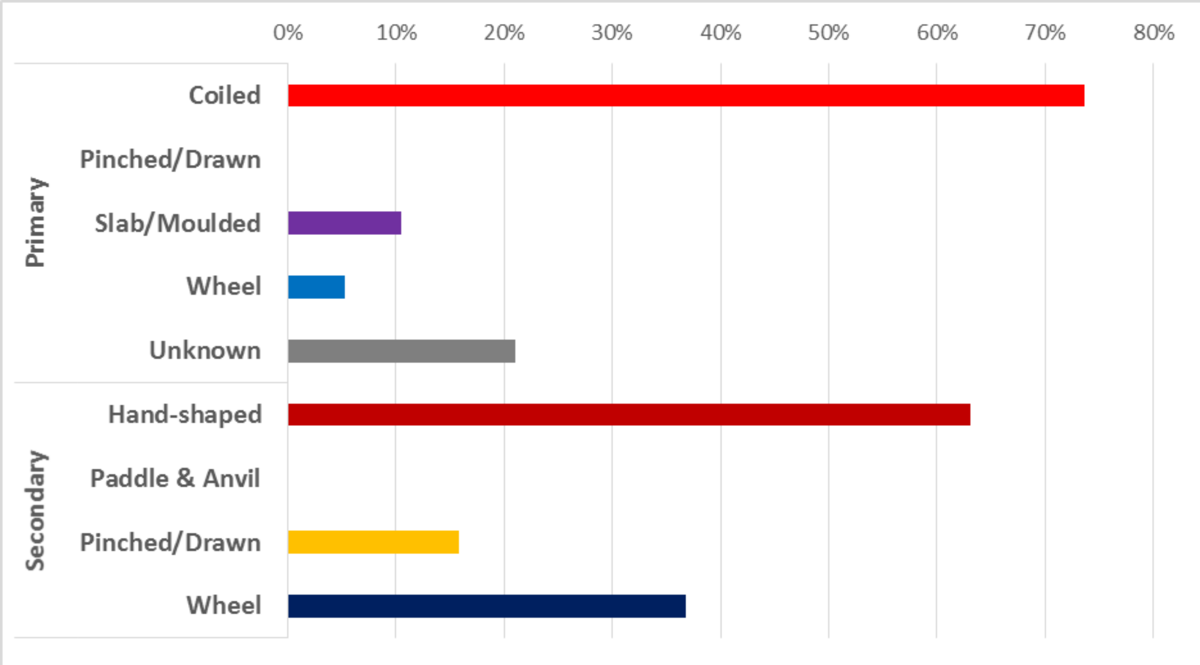


Figure 4.34. Region 1, LIA, Sandy Group. Forming techniques as proportions of vessels.

Secondary forming is dominated by hand-finishing (12 vessels: 63%), but wheel-use is also common for secondary shaping (7 vessels: 37%). The latter was found in four necked-and-cordoned jars, one Thompson E3-1 ‘cup’, a bead-rim jar, and one vessel of unknown type. In all but one of these vessels wheel-shaping had been utilised on all of the extant body-parts; the exception is 1/UFT-002, a Thompson D1-1 necked bowl that may have only been wheel-shaped at the neck and rim.

Pinching was found in the case of three vessels: two everted-rim forms and one bead-rim. Pinching had been utilised at the neck in the case of the everted-rim types, mirroring the use of this technique in the MIA Sandy Group. In the case of the bead-rim form, pinching was found in the form of the vertical ‘stripes’ running up the lower body, evidencing the use of a technique similar to that used to craft the X1 storage jars in flint-tempered fabrics.

Surface treatment

Surface treatment was found in just over half of the Sandy Group vessels (10 vessels: 53%). Eight of these vessels were burnished while the other two were wiped smooth. This pattern mirrors the profile of surface treatments found in the other groups. Importantly, burnishing was found in examples of both MIA and LIA-style vessels: two of the four necked bowls, and two of the three saucepan pots, for example.

Decoration

Decoration was found in the case of six (31.58%) of the Sandy Group vessels. This consisted of five examples (26%) of cordoning and two examples of burnished patterns (11%). The burnished patterns represented are a burnished zone immediately beneath the rim of bead-rim jar/bowl form 1/BHS-001, and pairs of vertical burnished lines on 1/BHS-034. The more common cordoning, however, is a decorative trait typically associated with forms based stylistically on continental La Tène prototypes. This is mostly true here, as in the case of necked forms 1/UFT-002, 1SCT-013, and 1/SIX-024, and the single example of a 'cup' – 1/BHS-022. However, it is less true in the case of 1/UFT-014, an everted-rim jar form that seems to be of more indigenous stylistic derivation.

Firing

Firing of LIA Sandy Group vessels is again dominated by reduced firing patterns, with only three vessels recorded as having primarily oxidised patterns. Significantly, firing appears to have been of generally good quality, with firing pattern R1 accounting for 47% (9) of the vessels. These well-reduced patterns do not appear to be associated with chronologically late vessels, with two saucepan pots showing this firing pattern as well as a range of necked, bead-rim, and everted-rim forms.

<u>Summary</u>

The MIA Sandy Group is certainly representative of a dispersed tradition of potters rather than one centralised production location (or a few). The precise production mode(s) being operated by these producers must remain a matter for speculation in most cases, although the evidence provided by ferruginous fabric Q1b is suggestive of the production of pottery for predominantly localised consumers associated with a geographical concentration of ironworking sites.

In technology and design the Sandy Group is distinct from the Flint Group. Potters utilised different, silty clays to those of the Flint Group, these probably deriving from the Thames Basin deposits rather than the clay-with-flints proposed for the Flint Group. In itself this may suggest geological determinism, these simply being the best and most proximal clays to the production locations of the different wares. However, it has been seen that a variety of other characteristics serve to distinguish the users of these clays: for example, the lack of discernible tempers in many cases (and tempering with a variety of different materials where it is found). Additionally, Sandy Group potters displayed a preference for the use of pinching/drawing in making the upper parts of their vessels: this may have contributed to the relative popularity of the everted-rim forms in this group. Similarly, fewer Sandy Group vessels were provided with surface treatments or decoration, and there appears to have been less effort put into creating the kind of distinctive evenly-reduced finishes applied to contemporary Flint Group vessels. Overall, the techniques utilised by MIA Sandy Group potters served to create a very tangibly different repertoire of vessels to those being made by the Flint Group, despite the fact that analysis suggests that the functional repertoires covered by each group was comparable.

This is not to say that the situation was one of simple division between easily-defined ‘traditions’. Both groups shared a basis in the use of the coiling technique for primary forming, and some Sandy Group fabrics were tempered with calcined flint (Q1d and Q2c). Additional internal variation may be represented by the use of iron for tempering in Q1b. These examples represent the complexity of knowledge circulation during this period, although as a general rule it may be fairly said that the emphasis seems to have been on the definition of localised communities of practice, with the Sandy Group potentially representing a level of internal heterogeneity that is not found in the Flint Group.

Going into the LIA it is significant that the Sandy Group persists. The format of this is particularly interesting. The sandy fabrics in many cases (particularly the Misc. Sandy Group) continue, but often incorporate the use of new technologies and design features such as the potter’s wheel and novel forms. In other cases, inspiration appears to have been derived exclusively from MIA potting. This suggests that some Sandy Group potters were actively deciding to take on new practices and cater to new demands, while others were not. These latter producers may have persisted in similar locally-based production and distribution modes to those practiced previously (although this is currently unverifiable). However, it is worth noting that the Glauconitic and Ferruginous subgroups all but disappear during the LIA: this may represent the cessation of certain elements of low-level production (household production/industry?). Alternatively, in the case of the Ferruginous subgroup this may be coincident with the cessation of ironworking activity at three of the four sites at which it was known during the MIA, and with which this kind of pottery was particularly associated. In this connection it is worth mentioning the ferruginous grog-tempered fabric G1c, which began in the LIA and may represent either the same potters previously associated with ironworking (these individuals perhaps specialising in potting in the face of a downturn in their ironworking industry), or new potters who became aware of similarly ferruginous clay sources.

4.2.3 Grog Group

The Grog Group is another large group encompassing much variation. Again it represents a tradition of pottery-making rather than the products of a discrete industry, although the products of at least one distinguishable production centre are incorporated into this group.

The Grog Group represents a very well-defined component of Iron Age and early Roman pottery in Region 1, being associated with a distinctive form repertoire incorporating vessels of both primarily indigenous (bead-rim jars; everted-rim storage jars, etc.) and continental (necked jars and bowls; pedestalled forms; platters; beakers, etc.) inspiration. The chronology of the group is mostly limited to the LIA.

<u>Fabric G1</u>

Four sub-types of the G1 fabric are defined, of which three are known in Region 1. All of the variants share certain features, the most crucial of which is the presence of grog temper in varying amounts alongside predominantly silt- and fine-sand-sized quartz and rounded iron oxides. In thin section it can be seen that the quartz is always accompanied by other silicate minerals and occasionally by rock fragments: these include muscovite mica, tourmaline, siltstones, and flint (non-calcined, often rounded, and therefore natural to the clay). Some examples also have sparse-to-common blackened voids resulting from burnt-out organics, and in some cases this may have been deliberately added (see commentary on the Miscellaneous Grog Group, below). While numerous examples – particularly from Region 1 – are fired to complete blackened reduction, the most common arrangement is for a reduced core to lie beneath oxidised surface zones (one or both surfaces) of varying thicknesses. This is most pronounced on the 'red surfaced' examples – incorporated into the G1 group generally – wherein the boundaries between the zones are always well-defined and the colours always rich pinkish- or orange-reds rather than the typical mid-browns. Textures are typically soapy although may also present as sandy; breaks are irregular or hackly.

The three varieties present in Region 1 are:-

- <u>G1a</u> – Either lacking in diagnostic inclusions aside from grog (up to 1mm), iron oxide and quartz, or only including up to moderate amounts of quartz sand, angular flint (calcined or not) and/or organics. Calcined flint seems to originate from the disaggregation of grog derived from flint-tempered vessels.

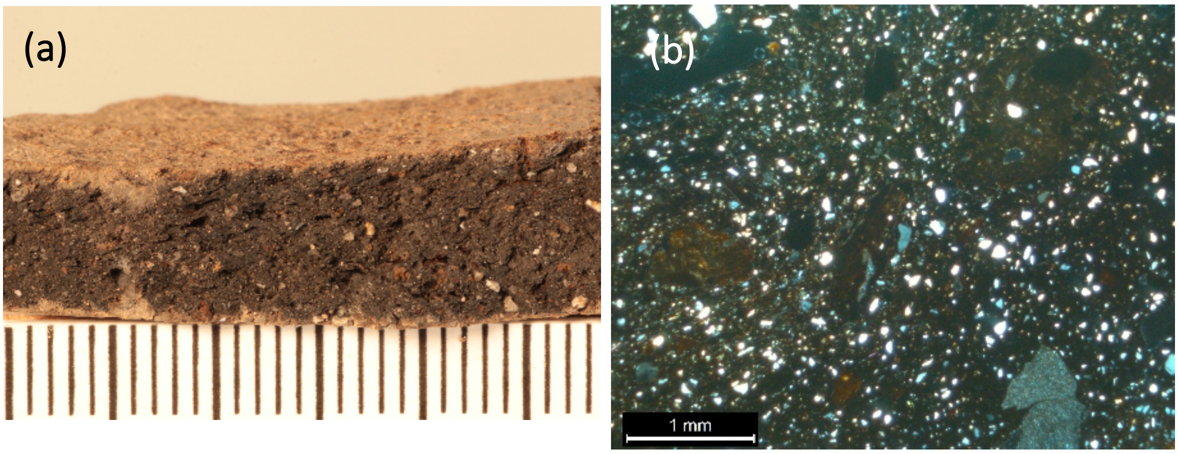


*Figure 4.37. **Fabric G1a**. (a) Photograph of fresh break; (b) photomicrograph, x40, XPL.*

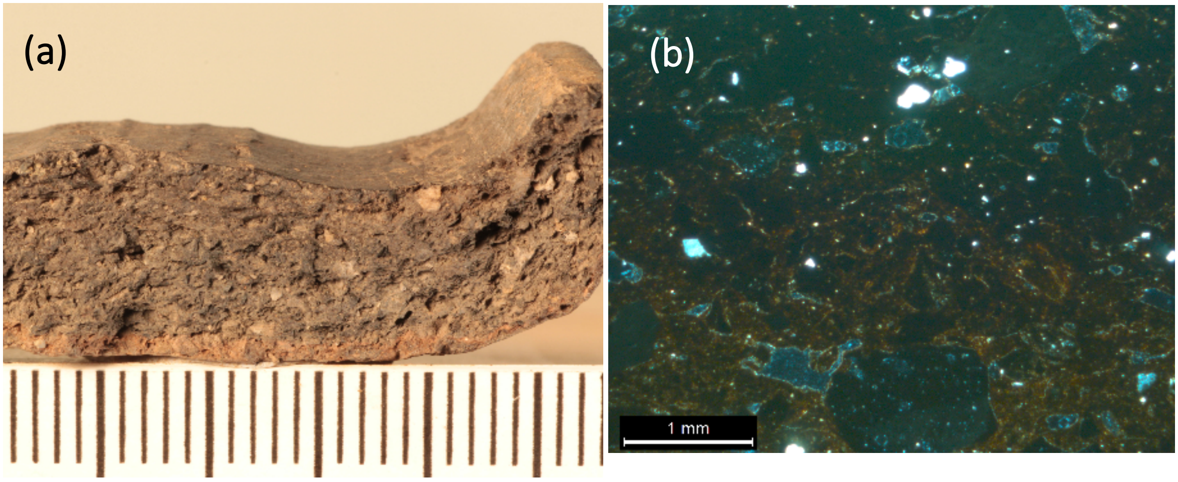


*Figure 4.36. **Fabric G1b**. (a) Photograph of fresh break; (b) photomicrograph, x40, XPL.*

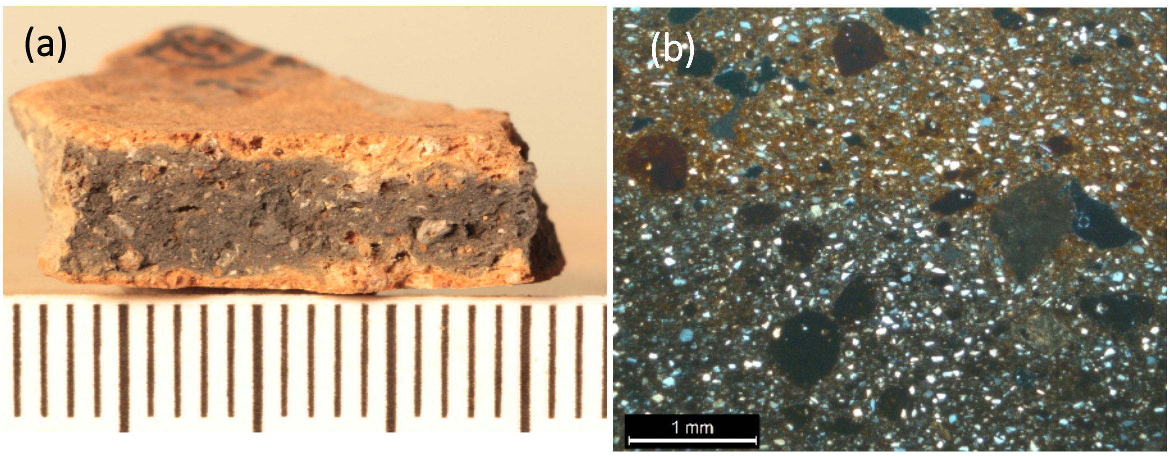


*Figure 4.35. **Fabric G1c**. (a) Photograph of fresh break; (b) photomicrograph, x40, XPL.*

- G1b – Coarse variant of G1a, with exclusively hackly fracture and larger grog and accessory inclusions (up to 3mm).
- G1c – Ferruginous variant of G1a. Defined on the basis of having a ratio of iron:grog perceptibly greater than 1:1. Is often, though not always, softer than other G1 variants.

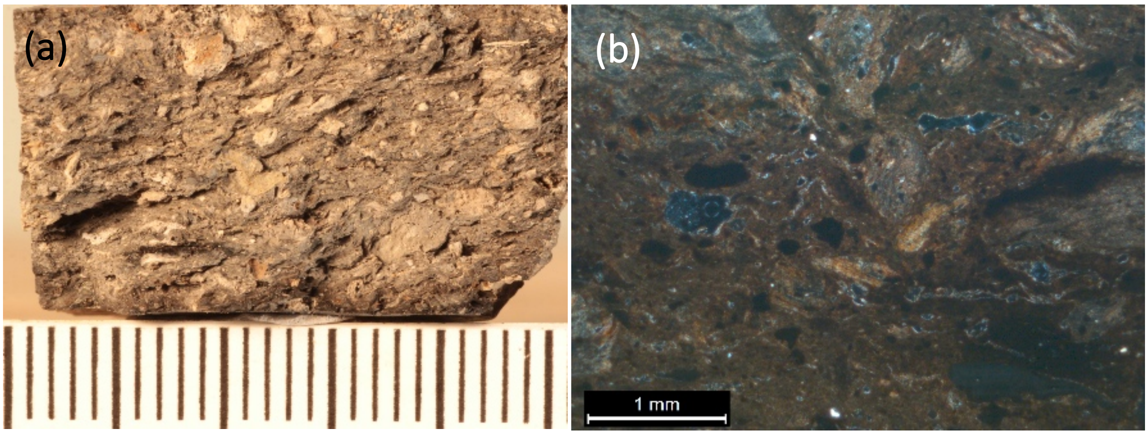


*Figure 4.38. **Fabric G2**. (a) Photograph of fresh break; (b) photomicrograph, x40, XPL.*

Fabric G2

A generally coarse fabric: hard with an exclusively soapy texture and irregular or hackly breaks. Colours are usually limited to greys and browns in varying shades. These are usually heterogeneous within a given sample, with patchy firing patterns suggestive of a lack of control over firing. The clay is tempered with moderate-to-common grog in similar colour ranges as the samples themselves; there is very little else present in terms of inclusions. This is confirmed in thin-section, where grog was always found to predominate and only very small numbers of generally small (<0.5mm) mineral grains and rock fragments are present. These consist of silicate minerals/rocks such as mono- and polycrystalline quartz, muscovite mica, and flint, as well as ferruginous grains (fig.4.38).

Some examples – i.e. those with common-or-greater inclusions of flint – are superficially similar to Flint Group fabric F1a. Petrographic analysis suggests that this is due to the incorporation of F1 fabrics into the paste in the form of grog, resulting in disaggregation and the appearance of a coarse flint temper in the new ceramic body (fig.4.39). The flint inclusions are therefore incidental and have not been used to classify the fabric. The use of a fine-grained, inclusion-free clay very similar to that used for F1a also contributes towards this appearance.

Fabric G3a

Only known in hand-specimen in Region 1. A relatively fine grog-tempered fabric that is defined by its distinctive light-grey colouration. The finer wares are also distinguished by their softness - being able to be easily scratched by a fingernail - yet still producing an audible 'ring' when tapped. Surfaces are sandy to the feel and breaks are irregular or hackly. Within, the temper of common-to-abundant, predominantly dark

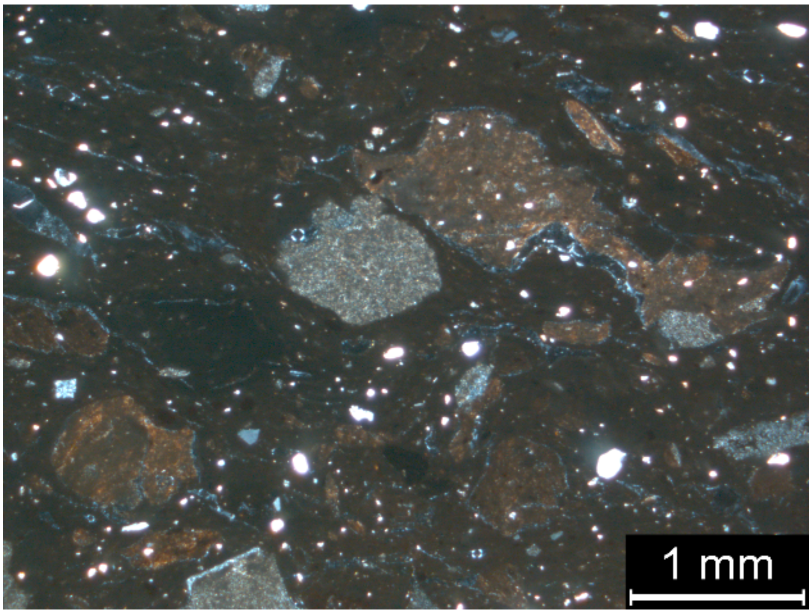


Figure 4.39. Fabric G2 (SIX-27). Photomicrograph showing flint grains disaggregated from grog. x40, XPL.

grey or black subangular grog can be seen alongside varying amounts of quartz silt and sand, and occasional small flint. Far more common in Region 2 than in Region 1, and may therefore be an import from that region.

Fabric G4

Only known in hand-specimen in Region 1. A very sandy-feeling, soft fabric with irregular breaks that reveal moderate-to-abundant quartz silt and sand (up to 0.5mm) and moderate-to-common black and/or buff grog up to 2mm. May be related to G3 (particularly the 'b' variant). Most samples exhibit a characteristic surface oxidation, sending the surfaces a light reddish-brown colour: these examples are a variety of 'red surfaced' grog-tempered ware. A minority of examples are reduced to dark grey, brown, or black throughout. Far more common in Region 2 than in Region 1, and may therefore be an import from that region or elsewhere.

Fabric G5

Only analysed in hand-specimen. A fine, soft-to-hard fabric with soapy-to-sandy feel. The surfaces are always consistently oxidised to a distinctive light brownish-orange. Some examples have a reduced core, but not all. The fabric is distinctive for its light, even surface colour, as well as for the fine burnishing provided to many surfaces, and for the scatter of common-to-abundant light-coloured grog visible both in the breaks and at the surfaces. Grog is accompanied by a scatter of sparse-to-moderate calcined flint, in a silty clay. The fabric is proposed by Mepham (1997) to have been produced in one or two potential kilns excavated at Thames Valley Park, Reading, during the mid-first century AD.

Provenance

Few of the Grog Group fabrics yielded any firm data useful for ascertaining provenance. Petrographic analysis showed that in all cases the typically 'local' suite of rocks and minerals was present, i.e. typically rounded mono- and polycrystalline quartz; muscovite mica; fine-fraction tourmaline; natural flint; and occasional siltstones and mudstones/ARFs. None of these would contradict a local origin within the zones of the Thames or Lambeth groups, for example. Alternatively, while local production was probably the case for most of these wares, some may have originated outside Region 1, and this is tentatively suggested for, for example, G3a, which is a qualitatively distinct fabric noted as being relatively common in the St Albans region during the early first century AD (see below on Region 2).

Williams (2016) has recently commented on the possibility that the most common kinds of southern British LIA grog-tempered fabrics may have had a common origin (pp.2-3). This is based upon his petrographic analysis of a number of samples of these fabrics from Elms Farm, Heybridge, Essex, and the apparent similarity of these to those analysed by Freestone (1989; Freestone & Rigby 1988) from King Harry Lane, Herts. It can also be commented that the basic description referred to in these publications – that of a grog-tempered fabric with varying amounts of quartz silt and sand, iron oxide, and organic matter – is consistent with that of the G1 fabrics reported here. In the opinion of the current author the assertion that these wares may have had a common origin is hasty given the complete lack of any mineral or rock inclusion that may point to a particular, common source. On the basis of the abundance and wide distribution of G1-type fabrics throughout the southeastern counties, the notion of a common origin should be warned against until more robust evidence pertaining to provenance can be provided; in no case have grog-tempered fabrics been proposed to be non-local to a given region. A geochemical characterisation study may be particularly revealing. Similar may be said regarding the hypothesis of a common source for the 'red-surfaced' grog-tempered wares (Timby 2000, p.236), although the suggestion that such wares were being produced on a small scale at Thames Valley Park might warn against this idea.

G5 is a distinctive variant of the 'red-surfaced' grog-tempered wares associated with production evidence at mid-first century AD Thames Valley Park, and this signifies its provenance. Production appears to have been of a limited character. Mepham (1997, p.54) states that a small repertoire of three standardised forms were found in G5 (her fabric C10): platters; high-shouldered cordoned jars; and smaller jars/beakers. Several examples of such vessels were found associated with two shallow depressions, one of which had been surrounded with flint and both of which contained evidence of burning (*idem*. pp.30-1: features 1127 and 1098). These are interpreted as possible simple kilns and included at least one ceramic 'brick' interpreted as kiln furniture (*idem.* p.55). Similarly simple structures are known elsewhere during the first century AD: for example at Rushden, Northants. (Woods & Hastings 1984, p.11). Production of the G5 wares appears to have been short-lived and possibly only a one-time event (Mepham 1997, p.31). This is consistent with the relative dearth of this fabric elsewhere on the Thames Valley Park site (*ibid*. p55) and indeed its apparent absence in assemblages from nearby contemporary sites (no examples being noted by the current author). Evidence of pottery production may have also been recovered at the site at Knowl Hill (Over 1974, pp.63–64) in the form of a shallow, clay-lined pit that contained potsherds and pierced 'bricks' (possible kiln furniture). While this may be a parallel for the Thames Valley Park evidence, the nature of the feature and its finds, and their precise date, are uncertain: the excavators refer to the feature primarily as an 'oven' (*ibid.* p.64). The finds have not been viewed by the present author.

<u>Distribution</u>

Based on difficulties in provenancing the Grog Group fabrics there is little that can reliably be said of their movement. However, the appearance of several distinct subgroups in the fabrics reported suggests the activity of numerous producers with overlapping distributions. Based upon the evidence from Thames Valley Park much of this activity may have been of small scale, with some products not being subject to exchange. Similarly, the Thames Valley Park evidence may suggest the work of itinerant potters in some cases, with occasional, limited episodes of production taking place using simple, ephemeral infrastructure and proximal raw materials.

<u>Chronology</u>

Grog Group pottery is known predominantly from LIA contexts. However, fabrics with grog inclusions are reported from two MIA sites in the region (Winklebury Camp (Smith 1977: fabric 1) and Ructstall's Hill (Richardson 1978: fabric S5)). Observation of the Winklebury assemblage and the thin sections reported upon in the original report shows that in this case at least a limited amount of grog-tempered pottery was being used in the region of Basingstoke during the MIA. The amount of this in circulation appears to have been very small, however, and is uncharacteristic of this period in general.

Grog-tempered fabrics are the key chronological marker for the LIA in Region 1 and throughout much of southeast England. In Region 1 two phases are distinguishable: a 'pre-fineware' phase in which forms are dominated by bead-rim and necked jars and bowls; and a subsequent phase in which imitations of fineware vessels are added to the repertoire: these principally consisting of platters and butt-beakers. Such vessels are inspired by the imported Gallo-Belgic finewares that they are sometimes found alongside, the commencement of production of the copies apparently coming shortly after the commencement of the importation of the originals, i.e. around 20-10 BC (Fulford & Timby 2000, pp.12–14). Grog-tempered pottery continues to be made until at least the Claudian period, and goes on being found until well after the Roman conquest, at which point the earliest sandy greyware fabrics appear to fill their niche (*idem.* p.251).

A key issue in the chronology of Grog Group pottery – and by implication, the absolute dating of the introduction of such developments as the potter's wheel and the beginning of a perceptible 'Late' Iron Age phase in general – concerns the beginning of the pre-fineware phase. This is traditionally placed at around 50 BC or later based on the 'compressed' chronologies of Thompson (1982, pp.1–3) and Birchall (1965). This relatively short time span (maximum forty years) appears to fit generally with the small number of confirmed pre-fineware groups known from Region 1 (i.e. those early groups without finewares or imitations that have been found on sites known to have finewares and/or imitations in demonstrably later groups, e.g. Silchester Forum-Basilica Period 1 (Fulford & Timby 2000, pp.12–14) and Pit H at Ufton Nervet (Manning 1974, p.33)). However, Haselgrove's paper on the implications of revised continental brooch chronologies for the dating of wheel-made pottery in Britain (1997) is significant, and provides the prospect that this phase may be much longer, beginning perhaps as early as the later second century BC. While evidence pertaining to this is slim in Region 1 – there being few stratified finds of brooches that can assist with such dating – one radiocarbon date is suggestive that a much earlier *terminus post quem* for this phase may be appropriate. Recent reanalysis of the dating of Iron Age metalwork (Garrow et al. 2009, p.117) has had the effect of revising the dates associated with the mirror burial from Latchmere Green. This burial consisted of bone contained in a LIA-style pedestal jar in a grog-tempered fabric, covered with a copper alloy mirror. Radiocarbon dating of the bone produced date-ranges pointing towards the late second century BC at the latest (*ibid.*). While the analysts consider the likelihood of the bone having been curated before its final deposition in the urn, it is also worthwhile considering the possibility that the vessel in fact has a far earlier date of deposition. The evidence is currently thin, and it should be said that the present author prefers the established chronology on the basis of the scarcity of groups known from this date; nevertheless, we must remain open to the possibility that future work will challenge this.

Function

The Grog Group form repertoire is a mixture of types with indigenous (e.g. bead-rim and everted-rim jars), late La Tène (e.g. necked jars/bowls and pedestalled forms), and Gallo-Roman (e.g. platters and butt-beakers) pedigrees (fig.4.40). This expansion in the range and style of ceramic vessels is a hallmark of the LIA, and by far the most informative functional discussion of this development is provided by Hilary Cool in *Eating and Drinking in Roman Britain* (2007). Chapter 16 of this book is dedicated to the pre-conquest period and deals extensively with the new vessel forms introduced during the first centuries BC and AD. Categories such as platters, beakers, and tazze are discussed individually and the evidence for their functional and social roles assessed. Measurements of platter diameters, for example, show that vessels were generally fairly small and this is used to suggest that their role may have been to serve individual portions, probably of dry foods that would have required more preparation than the stews or porridges that are likely to have formed a large part of a MIA meal (*idem*. pp.156, 165). Similarly, measurements of beaker volumes are used to show that these vessels were probably too large for the service of a drink such as wine, even when diluted: they would have been more appropriate for the service of beer, perhaps even communally rather than in individual servings (*ibid.* p164). Hill suggests a similar role for pedestal urns (2002, p.148).

However, the attention provided to these more obviously specialised forms neglects the most common and widespread of LIA vessels. 'Specialist' wares such as platters, flagons, and even beakers are relatively uncommon in Region 1 compared to the typical LIA necked and bead-rim jar/bowl forms. These forms are commented upon in substantially less detail than the specialist forms and this is probably due to the relative inaccessibility of their functional roles. Based on a consultation of Thompson's corpus it can be seen that there is a very great variety in the formal characteristics of the overarching necked jar/bowl type, such as in the degree of neck constriction; rim-to-maximum diameter ratio; height to rim diameter ratio, etc. While there is therefore some ground to say that a morphometric study of these vessels in isolation from their specialist counterparts would be highly informative, this cannot be attempted here and instead it will probably suffice to state that these vessels were intended for a variety of

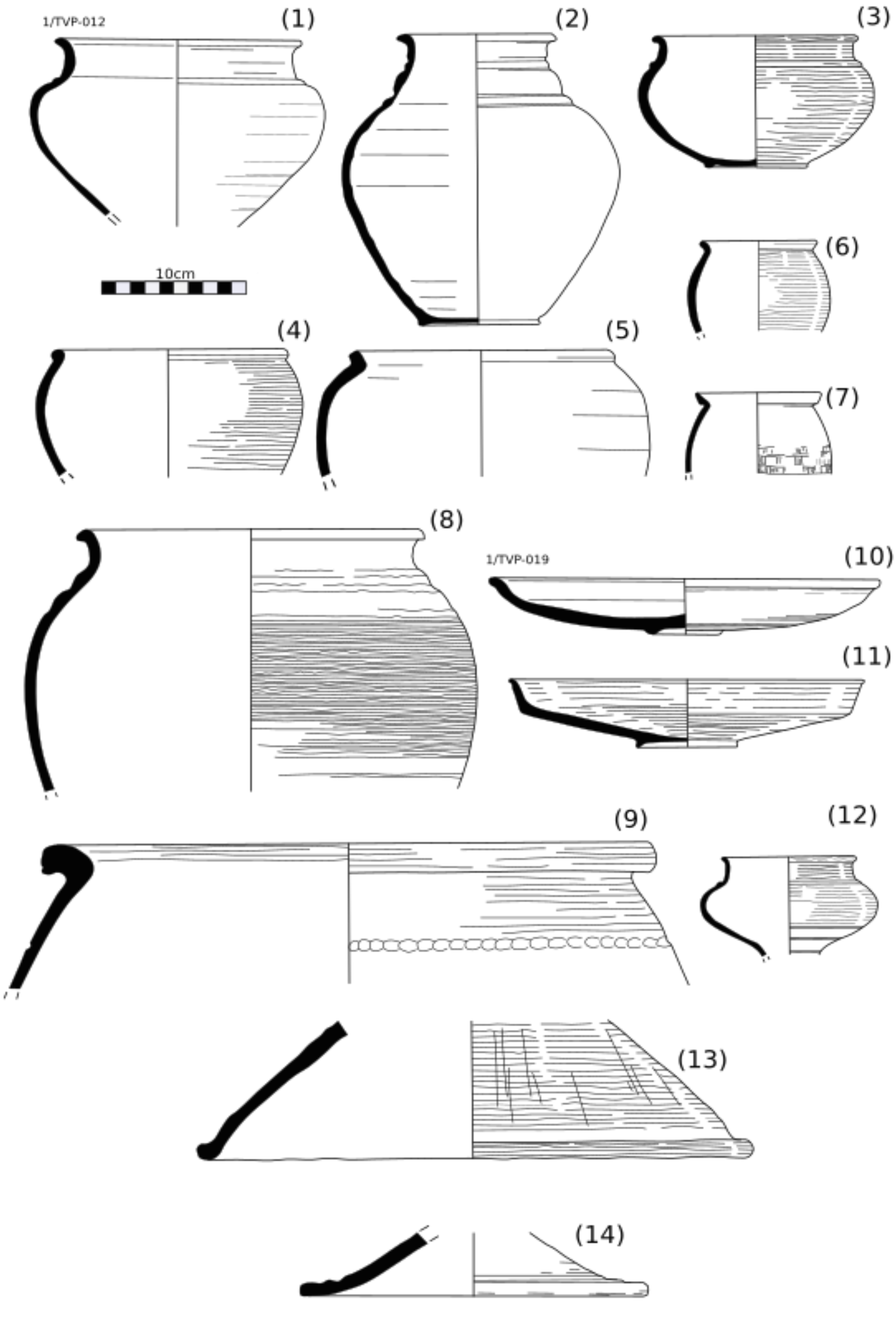


Figure 4.40. Selection of Grog Group forms. 1-3: Necked jar/bowls. 4-5: Bead-rim jar/bowls. 6-7: Beakers. 8-9: Storage jars. 10-11: Platters. 12: Pedestal jar. 13-14: Lids. Nos. 1, 10, & 14 redrawn from Mepham 1997 nos. 12, 11, & 37 respectively (©Trust for Wessex Archaeology). Nos. 2-9, 11-13 redrawn from Timby 2000 nos. 415, 351, 243, 246, 454, 459, 312, 300, 388, 352, & 403, respectively (©Society for the Promotion of Roman Studies).

different, probably primarily utilitarian, roles within the spheres of food and drink storage and preparation.

It can therefore probably be said that while there is clear evidence for the specialisation of vessel function in the LIA types associated with the Grog Group, this does not appear to be universal, with many vessel types probably still simply being perceived as utilitarian containers. This, combined with the breakdown of the relationship between rim diameter and vessel volume that is implicit in the introduction of such variety (Hill 2002, pp.144–145), means that we are far less able to easily interrogate the relationship between intended function and manufacturing techniques than we are when dealing with MIA pottery. In this situation it is appropriate to revert to simple typological distinctions in order to interrogate the available dataset. In terms of form, the dataset contains two broad groupings – jar/bowls and 'specialist' forms. The former category includes the three categories defined for the MIA group (bead-rim, everted-rim, and saucepan pot types) as well as two additional categories (necked jar/bowls and storage jars). The storage jar category is an effort to try to include size variation in this analysis, and in the case of the Grog Group is comprised mainly of the Thompson C6-1 type. While not an ideal solution, the use of a typological division rather than a metric one is to be preferred to simply failing to acknowledge any size differential amongst the jar forms. The necked jar/bowl category, meanwhile, is an entirely new addition, accounting for the abundance and variety of La Tène-inspired necked-and-cordoned vessels that are a new introduction during this period.

<u>A note on tempering</u>

The Grog Group represents the introduction of the widespread use of grog temper to Region 1. As discussed above, the use of grog is only a very occasional occurrence during the MIA, being known at only two sites in Region 1 and in a small minority of vessels. Petrographic analysis confirms that the argillaceous particles in these fabrics are in fact crushed ceramic

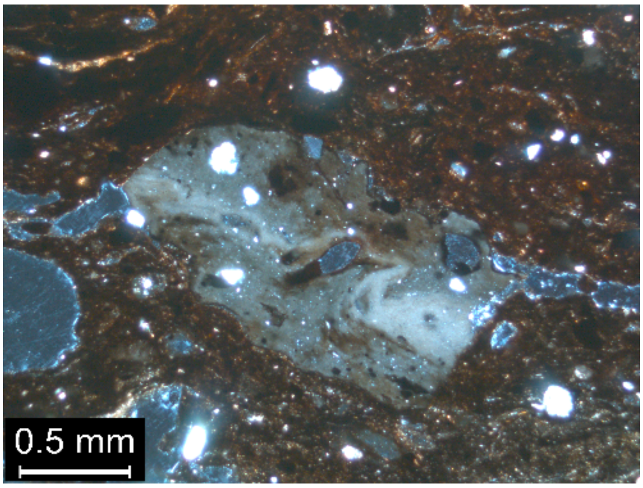


Figure 4.41. Thin-section photomicrograph of a vitrified grog grain (SIX-11). Note the continuous glassy structure and presence of bloating pores.

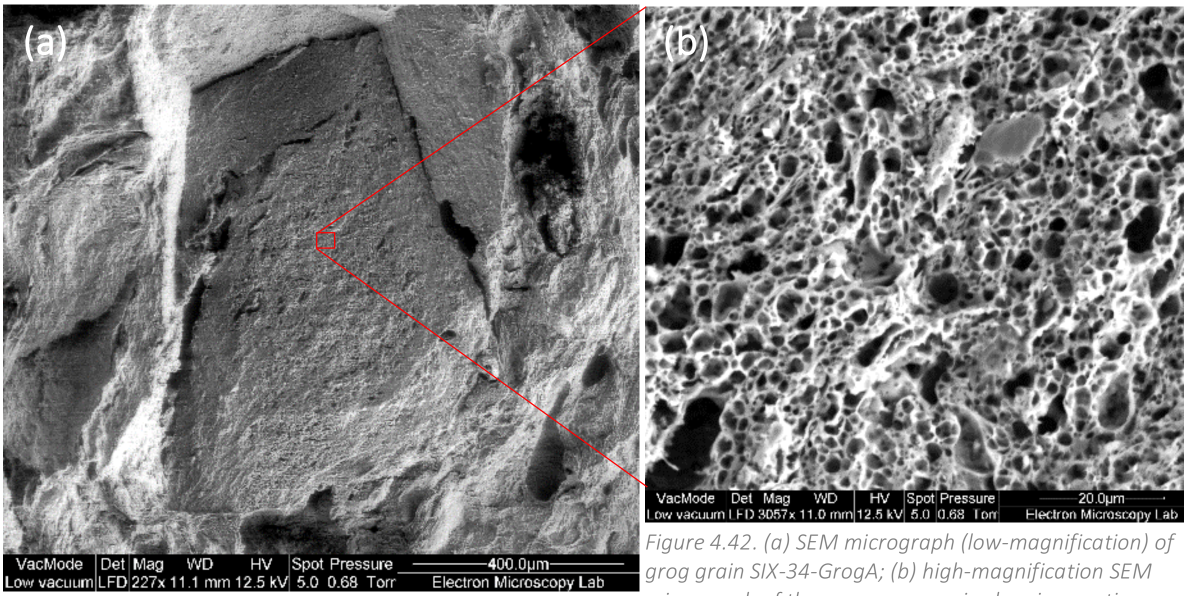


Figure 4.42. (a) SEM micrograph (low-magnification) of grog grain SIX-34-GrogA; (b) high-magnification SEM micrograph of the same grog grain showing continuous vitrification of the microstructure.

matter rather than mudstone, siltstone, clay pellets or other argillaceous clasts (cf. Whitbread 1986).

Following the initial identification of glassy appearances to a number of grog inclusions seen in thin-section (fig.4.41), observation of several such inclusions in the SEM shows that many of the grains have highly porous, glassy microstructures indicative of the partial or total vitrification of the clay (fig.4.42: see Appendix H). Vitrification of the kinds observed in these glassy grains is suggestive of exposure to temperatures in the range of 800-1,000˚C, equivalent with Maniatis & Tite's (1981) 'extensive' and 'continuous' vitrification stages. Complete vitrification (i.e. formation of an uninterrupted glassy phase: Maniatis & Tite's (*ibid.*) 'continuous' stage) was not observed in any of the associated clay matrices, although 'extensive' vitrification was found in two examples, indicating exposure to temperatures up to 900˚C. The majority of the matrices observed showed only incipient vitrification, or no evidence of vitrification at all, and this is consistent with exposure to temperatures no higher than 800˚C in these cases. The findings that (a) at least some of the grog used in tempering was found to have been fired to high enough temperatures to vitrify the clay minerals; and (b) that the associated clay matrices do not follow this pattern, suggest that in many cases the grog was fired at significantly higher temperatures than that to which the pot into which it is incorporated was. This strongly suggests that at least some grog was derived from production waste that had been produced as a result of over-firing. The notion that overfired, potentially distorted, pottery will have been recycled as temper goes some way to explaining the absence of finds of such wasters on potential production sites (cf. Thompson 1982, p.23). However, *contra* Barton (1975, p.28), the situation appears to be that LIA kilns could indeed produce temperatures capable of over-firing a vessel, and that they did so often enough to create sufficient waste pottery to produce a significant proportion of the grog required for tempering. It may have been that an increase in the amount of waste ceramic is reflective of experimentation with firing procedures.

A final observation regarding tempering concerns the precise ‘recipes’ adhered to by potters. Grain-size data have already been used in the case of the MIA Sandy Group to suggest the idea that much pottery outside of the Flint Group was relatively unprocessed clay combined with varying amounts of different tempering materials, these being added until the ‘feel’ of the clay was deemed right, and in some cases not being considered necessary at all. Grain-size data for 11 Grog Group samples suggest that similar may be true of these wares. Fig.4.43 illustrates that grog-group samples contain a significant fine-fraction composed predominantly of quartz, iron oxides, and occasional small mineral inclusions analogous to those known from the unprocessed clay samples. However, the coarse fractions in the Grog Group samples are of mixed nature. Grog is present in widely varying amounts, from 14.9% by area (SIX-13) to 2.1% by area (SIX-02). Similarly, in LLR-01, plant matter is present at 4.7% by area, whereas in four of the five other samples it is present at less than 1%. This suggests that potters were augmenting the feel of the clays with which they were working by including only as much tempering material as was necessary to create a subjectively appropriate texture, as opposed to following a strict ‘recipe’. What is significant is that many potters in the LIA were choosing to use grog for this purpose, rather than the potentially wider variety of materials in evidence in the MIA Sandy Group fabrics. The wheel-made Sandy Group wares may, in this context, be untempered variants of these fabrics. A full record of the grain-size data is provided in Appendix F.

This suggests that tempering strategies were executed similarly in the LIA Grog Group to how they were in the production of Sandy Group wares in the MIA – i.e. with varying amounts of temper being added (and with varying mixes of materials: flint in the case of glauconitic wares; iron in the case of ferruginous wares, etc.) to subjectively modify the ‘feel’ of the clay until it was of a texture and plasticity deemed appropriate for production.

<u>Analysis of manufacturing techniques</u>

Vessel forming

The Grog Group sample consists of 58 vessels, primarily of the necked jar/bowl variety (28) but also including bead-rim (2) and everted-rim (5) jar/bowls, storage jars

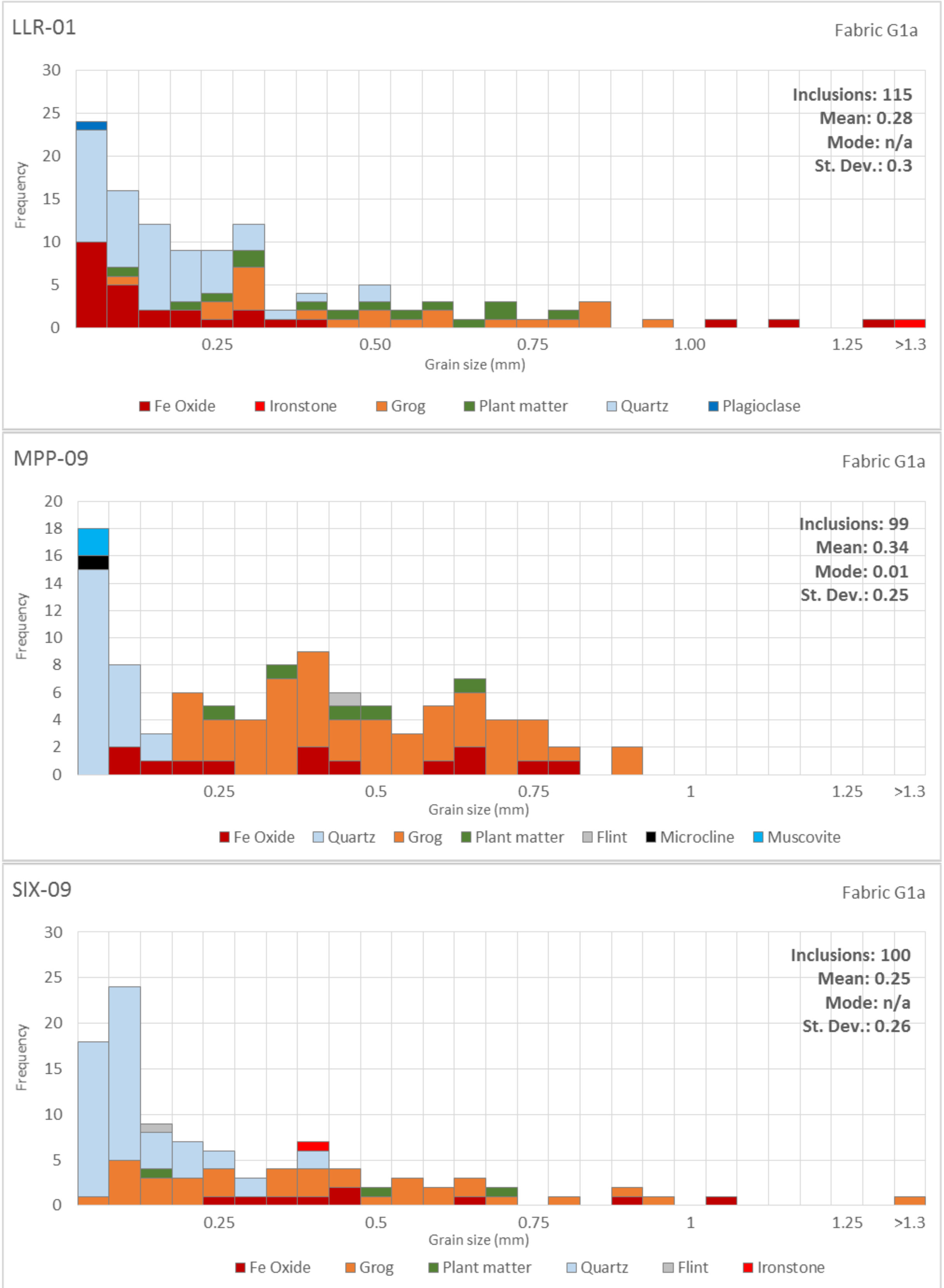


Figure 4.43. Region 1, LIA. Grain-size histograms for selected Grog Group samples.

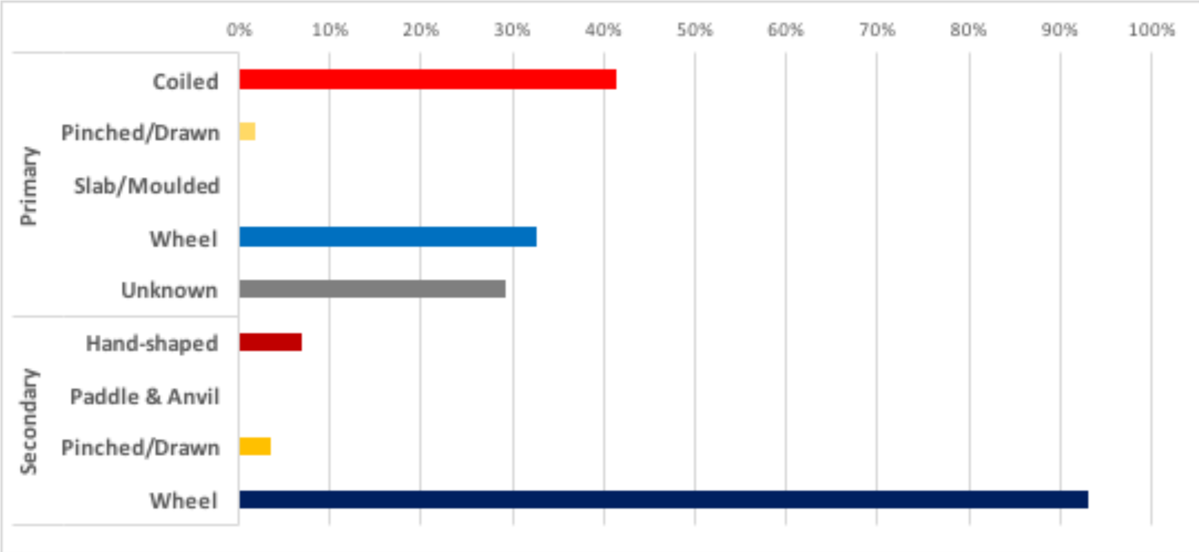


Figure 4.44. Region 1, LIA, Grog Group. Forming techniques as proportions of vessels.

(4), and a limited range of specialist forms (11). Eight vessels could not be allocated to a type.

Fig.4.44 presents the primary and secondary forming techniques found amongst the Grog Group sample. The Grog Group differs from the other groups in that it is the only one wherein coiling is not completely predominant over the primary forming techniques identified. Coiling was evidenced in 24 (41%) of the 58 vessels, while evidence of wheel-throwing was found in 19 vessels (33%). This introduces fundamental variety to the Grog Group which has not been considered in detail previously.

Similarly, the Grog Group differs from what has been observed in other groups in that hand-shaping is a very ephemeral component of secondary forming. The vast majority of Grog Group vessels were found to have been finished using rotary motion, the tools and fingers used to conduct this work leaving their marks on the vessels in the form of various horizontally-oriented rills and striations. Two additional vessels were found to have evidence of pinching or drawing: 1/SIX-012, a small, crude vessel of form Cunliffe JB4.1 that may have been the product of an early-stage apprentice or a child; and 1/TVP-004, the base and lower body of a large jar of unknown type.

Fig.4.45a shows the coiling technique, broken down by vessel body-part within the grog-group vessels classified as jars or bowls only. In these cases it can be seen that coiling was found to be common regardless of the body-part it was being used to craft, although it was found to be least popular in forming vessel bases. This may, however, be due to a more general difficulty identifying hand-making techniques in

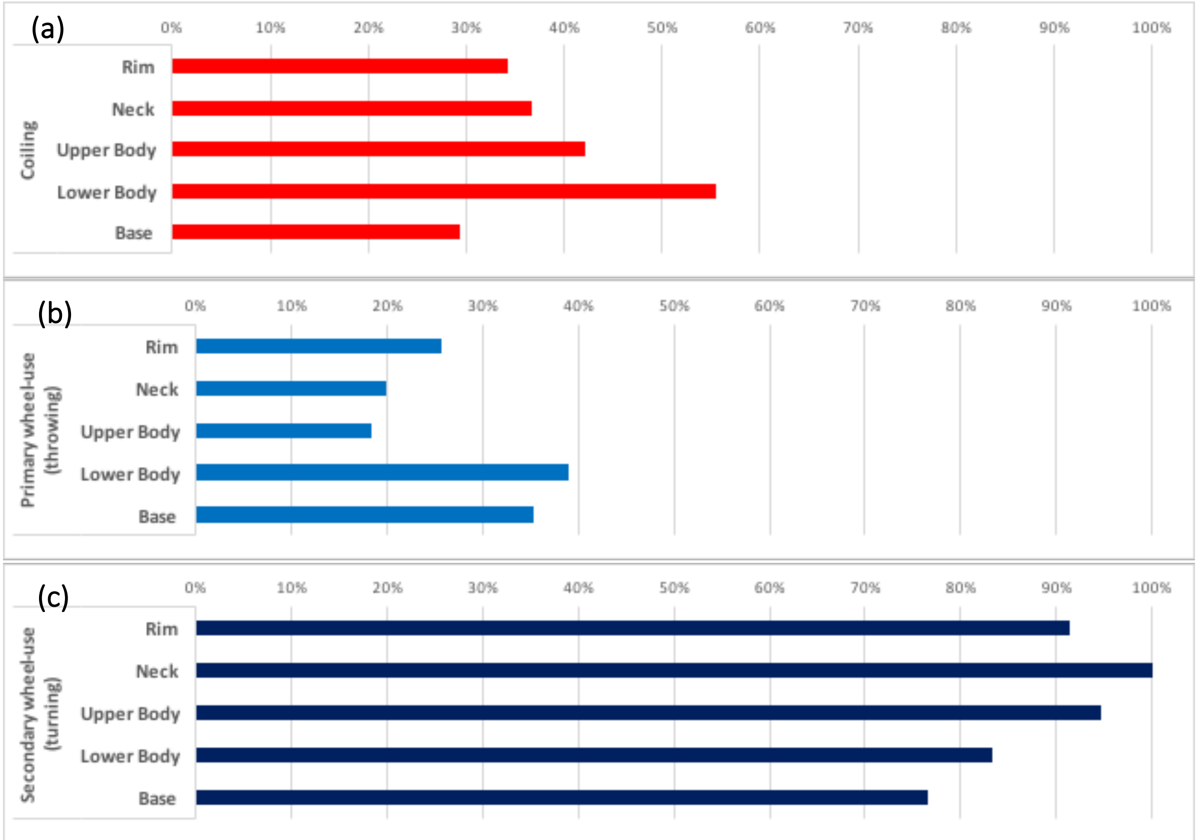


Figure 4.45. Region 1, LIA, Grog Group. Occurrence of selected forming techniques according to vessel body-part. Totals: Rims n=38; Necks n=31; Upper bodies n=42; Lower bodies n=21; Bases n=20.

bases – 8 (40%) of the 20 bases were assigned to the 'uncertain' category. Multiple examples of the full range of jar/bowl types were found to have been coiled, suggesting that – like in the other groups – coiling was an unspecialised technique found appropriate for use in the case of all jar/bowl types.

Primary wheel-use ('throwing') was also found to be fairly common in the case of all vessel body-parts where jar/bowls are concerned, but more so in the bases and lower bodies of vessels (fig.4.45b). This may indicate that composite forming techniques were relatively common in the Grog Group, with, in some cases, the lower parts of vessels being thrown before coils were added to the thrown lower body, the resulting hybrid preform turned on a wheel to finally shape it. However, it is worth noting that this notion is mostly based upon inferences from the remains of fragmented vessels rather than from a collection of complete vessels found to be composites. Only one Grog Group vessel was directly observed to be a composite of coiled and thrown components: 1/SIX-017, the only example in the group of a Thompson E3-5 'flask'. This is a small, necked form, the body of which was concluded to have been thrown, following which the neck was added as a coil of clay that was manipulated using rotary motion into a cylindrical shape (fig.4.46). Otherwise, it may be that this pattern is a function of variable ease-of-recognition of the different forming methods in different body-parts. Nevertheless, 1/SIX-017 proves the point that some composite vessels are amongst this group.


Figure 4.46. Radiograph of 1/SIX-017. The body of the vessel exhibits diagonally-oriented voids indicative of wheel-throwing, but a seam is clearly visible at the join between neck and body, implying the upper part was added following production of the body.

Jar/bowls found to be at least in part wheel-thrown were limited to the ‘necked’ and ‘everted-rim’ categories. No storage-jars were found to have been thrown and this is probably related to the large size of these vessels: none had a rim-diameter smaller than 250mm. By contrast, a size differential between thrown and non-thrown jar/bowls (storage jars excluded) could not be detected; the difference between the average rim-diameters for these two groups being less than 20mm and, in any case, suggesting that, if either, the handmade preforms were generally the smaller (wheel-thrown average: 153.4mm; non-wheel-thrown average: 136.1mm).

Wheel-shaping was also found to be very popular for crafting all of the vessel body-parts, though with some differentials between body-parts (fig.4.45c). Wheel-shaping of the neck was found to be most common, all 31 of the necks encountered showing signs of wheel-shaping. From the neck downwards on the vessels there is a downward trend in the commonality of evidence of wheel-shaping, with only 80% of bases showing evidence of rotary shaping. This differential is probably related to the use of the wheel in crafting the fine rims, necks, and neck-cordons that are the hallmark of the necked jar type so popular in the Grog Group. Importantly, this observation suggests that the wheel was being used primarily as a tool to create vessels with particular aesthetic qualities – specifically, those associated with the novel vessel types.

Method	No.	% (n=27)
1/2	23	85.2%
3	3	11.1%
4	1	3.7%

Table 4.1.Region 1, Grog Group. Roux & Courty methods identified amongst the 27 wheel-coiled vessels.

Analysis of the Roux & Courty methods observed in the subsample of wheel-coiled vessels shows that the vast majority of wheel-coiling was conducted using one of the simpler variants of the method, i.e. those involving relatively sparing use of rotary motion and more reliance on manual manipulation of the preform (table 4.1). Specifically, methods 1 and 2 – those found to be most popular – utilise the wheel only for shaping the preform and/or thinning the coils. This is again consistent with the notion that the wheel was used primarily to achieve vessels with particular outward qualities, rather than as a tool to speed up the production of pottery.

Where vessels have been wheel-thrown, these have also by necessity been wheel-shaped. These vessels will have received their even surfaces and smooth contours as a result of the primary forming process. No secondary forming will have been required, unlike coiled vessels which in all cases have received some form of treatment in order to – at the very least – smooth the surfaces and thereby obscure the visibility of the clay coils. However, of the 27 jar/bowls that showed no evidence for wheel-throwing, but that did show evidence for wheel-shaping, 15 (56%) were either confidently or tentatively identified as having been made from preforms that were at least partially coiled. No other primary forming techniques were identified amongst these 27 wheel-shaped jar/bowls.

Aside from the jar/bowl forms represented in the Grog Group, there are several other distinctive vessel-types that present interesting grounds for discussion of variability. The most common 'specialist' vessel type represented is the platter, of which 5 were analysed. 3 of these are of Thompson's G1-10 or 11 type, making them either of indigenous stylistic derivation and therefore a LIA innovation (G1-11), or copies of the Cam.16 type, originally made in Gallo-Belgic fineware fabrics (Thompson 1982, pp.469–473). One further platter is of an unknown type with a foot-ring, and a final one is of Thompson's G1-3 form, a loose imitation of the Cam.1 form. These latter two are in the G5 fabric proposed to have been produced at Thames Valley Park, Reading. Identification of forming techniques is inconsistent and made difficult by variable fragmentation between the vessels, meaning that only a rough idea of the norms of production can be ascertained from these vessels. However, it is clear that in all cases the wheel was utilised: always for shaping the vessel and sometimes for throwing at least part of it. 1/TVP-016 – one of the G1-10/11 types – seems to have a wheel-thrown 'wall' section whilst its 'plate' is of uncertain technique. According to G.

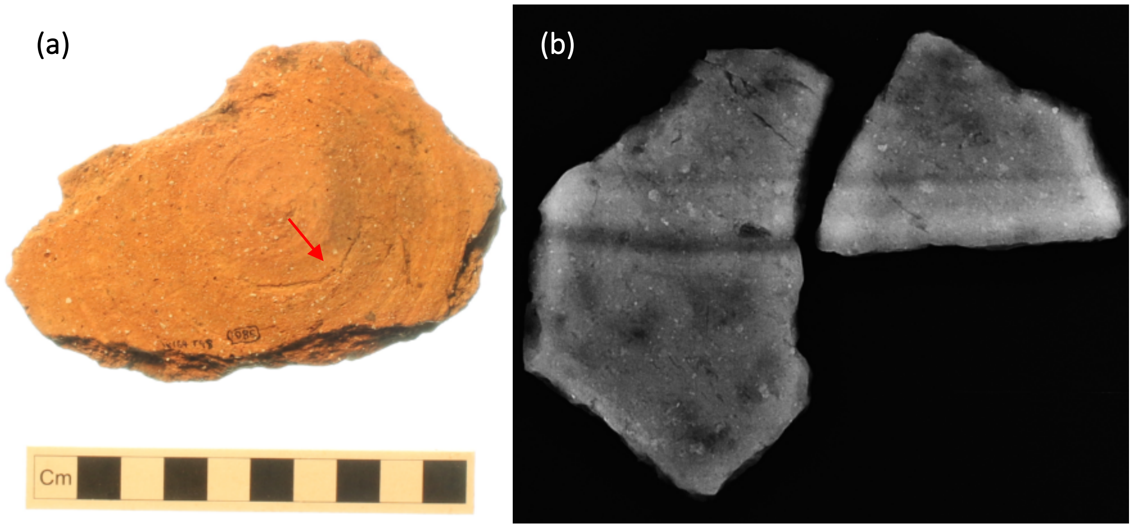


Figure 4.47. (a) Photograph of interior surface of platter 1/TVP-016, showing line of a concentric coil (permission to use image kindly provided by Reading Museum); (b) Radiograph of beaker 1/BHS-011, showing clusters of diagonally-oriented voids, indicative of wheel-throwing.

Taylor this may result from the relatively low amount of energy input into throwing the plate of a platter relative to the more concerted effort that is applied when crafting its wall, which is required to be freestanding (pers. comm.). In this interpretation, the platter would be fully wheel-thrown. However, in two other examples coil-seams are visible on the surfaces of the plates, and this speaks against full wheel-throwing in these cases, at least (fig.4.47a). This evidence for coiling is particularly interesting, as it represents – even in the context of a completely novel vessel-type – the blending of established craft techniques with less-established techniques and new ideas of their combination. If indeed the suggestion that other platters are fully wheel-thrown holds true, this presents an even more interesting picture of variability around this novel vessel-type and potters' negotiation of how to create it.

Other specialist forms represented include three Thompson G5-2 decorated butt-beakers, one Thompson L4 lid, one pedestal-base, and one Thompson E3-5 flask. The flask has been referred to above and is a composite vessel formed of a thrown body with a neck added as at least one coil, subsequently wheel-turned. The lid is of uncertain primary technique but has certainly been wheel-turned to shape it; the pedestal may have been fully wheel-thrown as it exhibits clear diagonally-oriented features when viewed in radiograph. Two of the beakers (1/BHS-011 and 1/SIX-004) are clearly wheel-thrown as clusters of diagonal voids are visible in the radiographs (fig.4.47b). Analysis of the third beaker proved inconclusive; although in hand-specimen the walls are again found to be very thin, undulating with the contours of the cordoned decoration where the potter's fingers have been used to press the clay outwards from within, with exterior shaping taking place with the aid of a template or tool. This is suggestive of wheel-throwing, but this cannot be proved.

Surface treatment

Surface treatment was found in 43% (25) of the Grog Group vessels. In all cases this involved burnishing: primarily of the exterior surfaces. There is little suggestion that burnishing served a functional role in these vessels. The most commonly-burnished vessel category is the necked jar/bowl (16 vessels), but this appears to be a reflection of the generally high numbers of this vessel type represented in the Grog Group. One example of a platter was found to have been burnished all-over, while an additional two platters were decorated with zone-burnishing. Similarly, while no beakers were provided with all-over burnishing, one of the three represented had been provided with zone-burnishing. This suggests that burnishing was regarded as a decorative technique rather than a way in which specific properties could be imparted to a vessel. In particular, if the hypothesis that beakers were primarily used to hold liquids is true then one would expect to find burnishing on these vessels, as burnishing can help to close porous surfaces and therein make vessels more waterproof (Rice 1987, p.232). However, burnishing is not present at all on two of the three beakers, and the zone-burnishing found on the third beaker is more likely to have been decorative. This is corroborated by the fact that burnishing was commonly found on the exterior surfaces of other vessels: although this may have had a role in making these vessels easier to clean, it will have also provided a good shine to the surfaces of the pots, particularly where the surfaces are even and smooth as a result of having been turned on a wheel.

Figure 4.48. Necked jar 1/BFD-007, showing cordoned decoration formed by two moulded/tooled lines with a bulge in-between. Permission to use image kindly provided by Reading Museum.

Decoration

Decoration is very popular on Grog Group vessels, though the nature of this decoration is markedly different to that characterising MIA vessels. Decoration was found on 42 vessels (72% of the sample), of which 31 (53%) had been decorated with one or more cordons. In all cases where vessels had been decorated with cordons, evidence of wheel-use was found. This demonstrates that the application of cordoned decoration can be associated with wheel-use; the crafting of cordons is easily facilitated by the use of rotary motion, probably being done in conjunction with a tool or template (such a procedure resulting in even, sharply-defined decoration that will have been relatively easy to execute). Meanwhile, the cordoned decoration (fig.4.48) accentuates the curving shapes produced with the wheel by constricting the lines of the walls at various places; most commonly at the join between the body and neck areas. Cordons were therefore found to be most common on necked forms, although two examples of cordon-decorated storage jars were also found.

In addition, burnished-pattern decoration was found on 12 vessels (19% of the group). This is mostly accounted for by zone-burnishing; however, in four examples there are decorative motifs in evidence. Two of the three beakers represented (1/SIX-004 and 1/BHS-011: fig.4.49) have burnished line decoration in the bands between cordons, with these being present in the form of cross-hatched motifs. The third beaker (1/SIX-022) is instead decorated with a rough form of rouletting. Other burnished patterns include spirals on the bases of two vessels – 1/SIX-009 and 1/UFT-019. Significantly, both of these bases were found to have been wheel-thrown, and so the decoration may have had some significance in indicating the forming technique that had been used, or perhaps acted as a maker's mark of some kind, serving to emphasise the fact that the potter was a competent wheel-user. Finally, one of the platters was found to have been decorated with an incised band around the inner surface of the plate.

Figure 4.49. Butt-beaker 1/BHS-011, with linear cross-hatched burnishing on the zone beneath the incised cordon.

Firing

Again, predominantly reduced patterns predominate in the Grog Group. These are a mixture of well-executed (R1 – 15 vessels: 26%) and poorly-executed (UR – 18 vessels: 31%) firing patterns. Well-executed surface oxidation producing 'red-surfaced' wares was found in 12 cases (21%). These vessels will have been fired with a greater degree of control of the oxidation state of the firing atmosphere, probably by allowing the free flowing of air over the surfaces of the vessels at the very end of the firing.

<u>Summary</u>

Like the MIA Sandy Group, the Grog Group is likely to represent a dispersed tradition of potters. Production at Thames Valley Park, Reading (fabric G5) is discernible, but appears to represent a small-scale episode of potting that is not associated with any contemporary domestic remains, or with an identifiable ceramic distribution. The circulation and precise production circumstances of these wares therefore remains ambiguous. The chronology of the group is limited to the LIA aside from in a very small number of grog-tempered sherds known from MIA sites near Basingstoke.

The group incorporates numerous elements of novel technical practice, most prominent among which are the use of the potter's wheel (in varying forms), production of novel vessel types, and widespread use of grog temper. Analysis has also served to highlight particular elements of technical practice that appear to have been continuous with MIA production. Prominent among these are the identification of similar tempering regimes for the Grog Group wares to those utilised by Sandy Group potters. These presumably derive from shared or passed-down knowledge of how to deal with the silty clays found in the London Basin, with which most of the wares of both groups appear to have been made. In this context, grog was an addition to a pre-existing technological strategy rather than a wholesale technological change. Similarly, coiling continued in those vessels identified as having been wheel-coiled, and in this context the use of the potter's wheel was an addition to a pre-existing *chaîne opèratoire* rather than an entire revolution of it (although the implications of this technology are particularly complex – see ch.6.3). These strands of evidence – coupled with the continuation of features such as the exploitation of specifically ferruginous raw materials – serve to highlight potential connections between the LIA Grog Group and the MIA Sandy Group, the latter seeming to provide much of the inspiration for the former. It may be fair to say that the Grog Group emerged as the technologically-augmented descendent of the MIA

Sandy Group. By comparison, relatively few links are evident between the Grog Group and either the MIA or LIA Flint Groups.

4.2.4 Other fabrics

Fabric S3

One sample. A hard, black fabric, densely packed with glassy or white, rounded quartz up to 0.5mm, along with larger (up to 1.5mm), angular particles of shell, and rounded iron oxides. Some quartz grains can be seen to have been dislodged, leaving a porous texture in places. In thin-section the inclusions can be seen to be dominated by monocrystalline quartz up to 0.6mm, and oolitic iron oxide pellets up to 1.6mm, these being set in a homogeneous dark brown matrix. Shell is common and distinctive, being present in a wider size-range (up to 2.5mm). This inclusion does not appear to have been a deliberate addition to the clay, but along with the oolitic iron is representative of a Jurassic source for the clay (J.R.L. Allen, pers. comm.). The closest sources of Jurassic geology to Region 1 are those of south Oxfordshire, on the other side of the Chilterns. In particular, ferruginous soils associated with Jurassic or oolitic deposits are noted in the Vale of White Horse, in the region of Hatford near Faringdon (Jarvis 1973, p.87) and further east near Shippon (*ibid.* pp.107-108): this region therefore seems a likely candidate for provenance. The single sample (LLR-08) is LIA in date (fig.4.50).

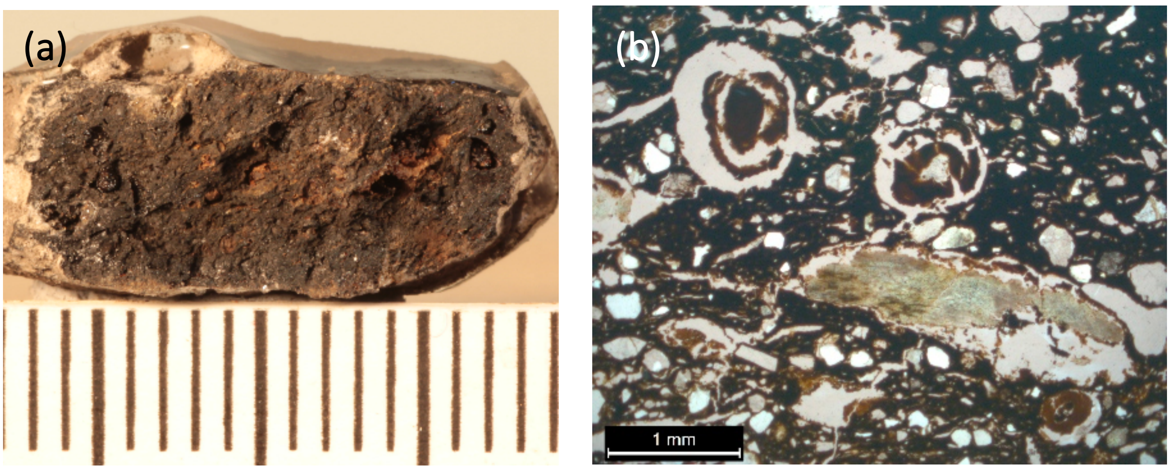


Figure 4.50. ***Fabric S3****. (a) Photograph of fresh break; (b) photomicrograph, x40, PPL.*

Fabric BG1

A hard fabric. The clay matrix is reduced to dark brown/black in all cases, and has a soapy feel. Breaks are irregular and show common inclusions of a rounded-to-angular off-white substance up to 3mm, confirmed in thin-section to be bone. This is alongside sparse-to-common angular dark grey grog up to 2mm, and common silt-sized quartz, mostly monocrystalline but some polycrystalline also being present. Iron oxide pellets may also be present. Some very fine elongated voids may suggest the presence of a certain amount of organic matter, but this could not be confirmed petrographically due to the darkness of the matrix. This fabric is unprovenanced due to a lack of diagnostic mineralogy. It appears to have been rare in Region 1, although at least one example of a similar fabric has been found in Region 2 (BAL-08), and a

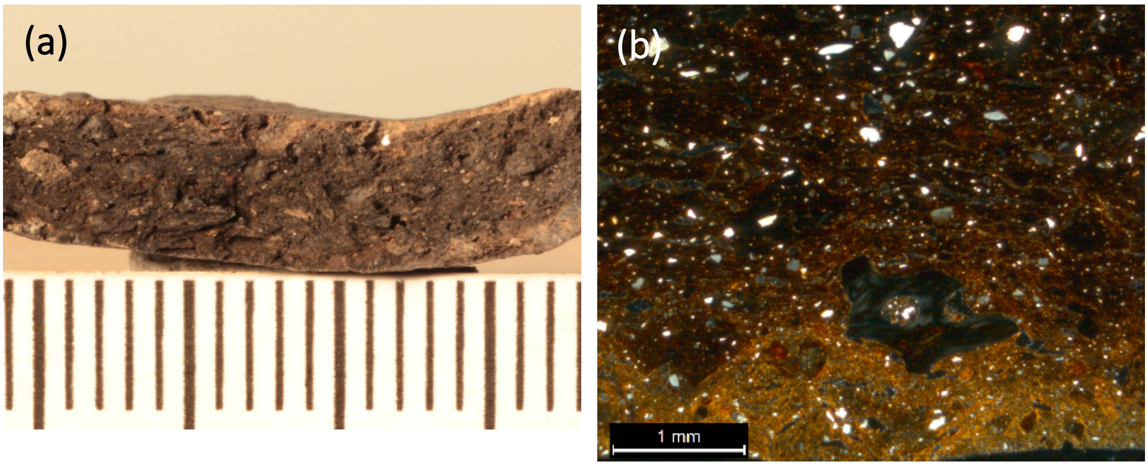


*Figure 4.51. **Fabric BG1**. (a) Photograph of fresh break; (b) photomicrograph, x40, XPL.*

similar bone-tempered fabric is reported in Region 1 at Little London Road near Silchester, where it is hypothesised that the fabric is transitional between the MIA and LIA (Timby 2011: fabric BO1)(fig.4.51).

<u>Fabric F2</u>

A moderately fine, hard fabric with soapy-to-sandy feel. Breaks are irregular and show an abundance of red-brown iron oxide inclusions up to 2mm, alongside moderate angular calcined flint, also up to 2mm. Some fine quartz sand and silt, in both mono- and polycrystalline varieties, is also present: up to 0.5mm. The flint was certainly added as a deliberate temper, as may have been some of the larger quartz

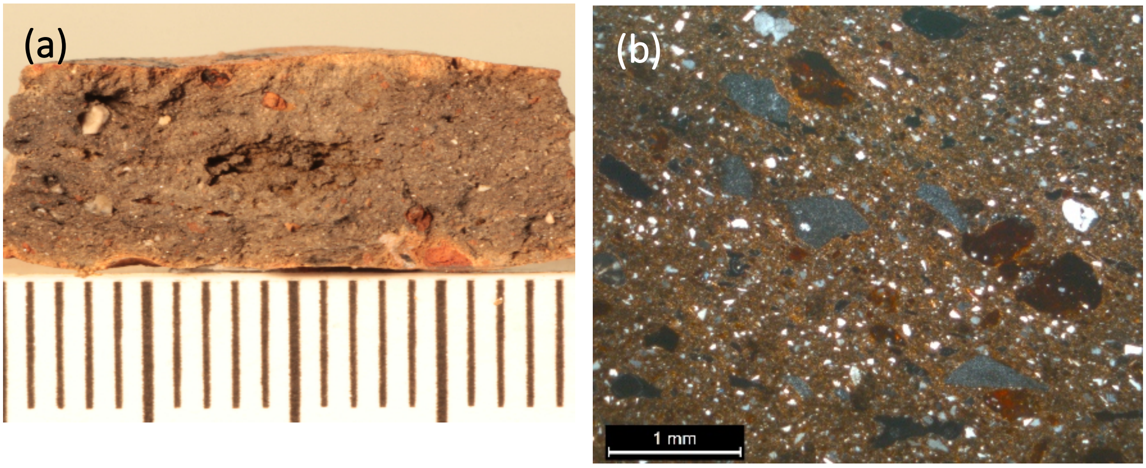


*Figure 4.52. **Fabric F2**. (a) Photograph of fresh break; (b) photomicrograph, x40, XPL.*

grains. Thin sections also show rare elongated organic matter up to 1.6mm, probably derived from the raw clay on the basis of its rarity and generally small size. The one sample is predominantly reduced to a dark grey, but has thin zones of surface oxidation that present as even, reddish-brown colours. This fabric is unprovenanced due to a lack of diagnostic mineralogy. It seems to have been very rare, only being known as the single sample thin-sectioned. This sample is LIA in date (SIX-26)(fig.4.52).

4.3 SUMMARY

Analysis of the MIA pottery of Region 1 provides a picture of relatively clear-cut definition between at least two different ceramic 'groups': these are interpreted as representing the divisions between at least two – and possibly more, cf. the Glauconitic and Ferruginous Sandy groups – 'communities of practice' (Wenger 1998; Wendrich 2012). At the broadest levels, each of these groups has a recognisable suite of material culture associated with it that, on a number of sensory levels (visual, tactile, etc.), will have served to distinguish the products of one community from another. This was so despite the fact that both of the major groups operating in this period were producing pottery repertoires that appear to have been functionally comparable. Additionally, within the sphere of production, the techniques used to make these distinctive repertoires will have differed, in so doing serving to differentiate the members of one community of practice from another. This notion is linked to the performativity inherent in technological acts, acknowledging that production will not have been conducted in isolation from the rest of society (Dobres 2000).

These features are likely to have been of importance to potters wishing to situate themselves within broader societal structures. Pottery that was recognisably the produce of one group rather than another may have created an associative link between producer and consumer, serving to bind people together through the memories surrounding the acquisition of pottery and situating the potter as a fundamental part of the life-history of the objects they created. These potters and/or the communities of which they were a part may have played an important role in how people interpreted and interacted with these objects in different sociocultural contexts.

In addition to defining the links between people – potentially across great distances and both within social groups and between them – such tightly-defined knowledge networks will have served to make grouphood distinct between different communities of potters. Modern interpretations of the MIA in southern Britain (e.g. Sharples 2010) often see communal identity (normally through monument creation) as of paramount importance to the reaffirmation of social structure, and the sharing of knowledge and practice in the context of easily-defined traditions of pottery production appears to have been part of this in Region 1, serving as the basis into which any technological change had to be integrated.

Technological change in the LIA was a complex process. Technologies such as the potter's wheel and grog tempering found themselves bound up with other aspects of novelty (such as the new forms they were most often tasked with creating) as well as their incorporation into pre-existing social, economic, and technological structures. This resulted not only in increased technological complexity in many cases, but also in increased variety. Key in this is the Flint Group, which shows little evidence of effort at integrating technological or stylistic novelty into itself; indeed, such rejection of newness highlights probable active efforts to define this tradition as anachronistic in this period. Similar may be said of elements of the Sandy Group. Other potters operating in the Sandy Group tradition, meanwhile, appear to have made active decisions to engage with the prospects offered by new technologies and designs. This in itself was not a simple process. Many degrees of integration of these new technologies are in evidence: some potters persisted in their use of sandy fabrics, for example, apparently disregarding the use of grog or finding no use for it; others utilised the new temper extensively. Similarly, many potters utilised the wheel only in the secondary forming of their vessels, continuing the long-standing tradition of making coiled roughouts; others embraced the use of the wheel for throwing clay bodies and may have used coiling only sparingly, or not at all. Suggestions of at least some composite forming procedures indicate that even this grey area will have had many shades during the initial decades of wheel-use.

A key implication of these data is that we should now perceive the various traditions of Later Iron Age wheelmade pottery emergent from those known in the MIA of the same regions, although – as the Flint Group warns – not all discernible social groups will have engaged with new technologies with the same enthusiasm or endorsement. In fact, this is true of all groups producing pottery in the LIA – among these are probably represented potters operating under different production modes, cultural or ethnic affiliations, degrees of socioeconomic status, and/or closeness to prevailing political forces. All of these factors and more are likely to have influenced how and if potters would have had (or wanted) access to new forms of technical know-how.

CHAPTER 5: CHARACTERISING TECHNOLOGICAL CHANGE IN REGION 2 (HERTFORDSHIRE AND THE NORTH CHILTERNS)

5.1 INTRODUCTION

5.1.1 Location and geology

Region 2 is defined broadly as the modern county of Hertfordshire, and corresponds to Thompson's 'Zone 7' (1982, pp.15–16). The county includes the modern towns of Hitchin, Letchworth, Stevenage, Watford, St Albans, Hertford, and others. The landscape is heavily occupied by modern development in its southern half, the southern edge of the county bordering the Greater London area. The northern part, meanwhile, is of a more upland character and remains predominantly rural.

Two river-systems occupy much of Hertfordshire, both flowing southwards into the Thames. In the south-west, one includes the rivers Bulbourne, Gade, and Ver, which flow into the Colne; the other occupies the eastern part of the county and includes the rivers Mimram, Beane, and Ash, which flow into the Lea. These rivers mostly originate in the Chiltern Hills, the south-east facing dip-slope of which dominates the north-western part of the county.

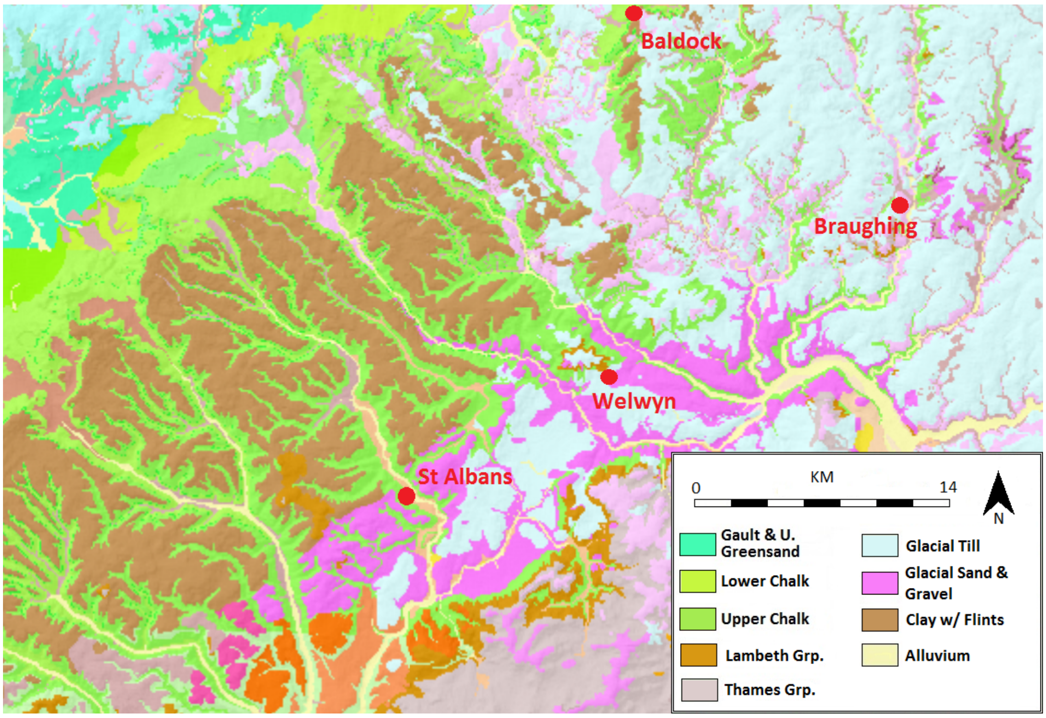


Figure 5.1. Region 2 bedrock and superficial geology (http://mapapps.bgs.ac.uk/geologyofbritain/home.html?).

The bedrock geology of the region is broadly chronologically successive from the north-west to south-east. The oldest extensive deposit in the region is the Gault Clay, which outcrops only in the northernmost and westernmost extremities of the county (Hopson et al. 1996, pp.22–24; Catt 2010a, pp.31–35; fig.5.1). Succeeding the Gault comes the wide variety of Cretaceous chalk deposits that characterise the Chiltern dip-slope. These include marls and grey chalks in their lower layers, and nodular chalks with common flints in their middle and upper layers. In addition, interbedded layers of glauconitic and phosphatic material can be found mainly in the upper chalk, while discrete shell beds occur throughout the sequence (Bailey & Wood 2010; Hopson et al. 1996). The palaogene clays of the Lambeth and successive Thames Groups complete the bedrock sequence for the region, the former occurring sporadically at the surface, at the very edge of the Upper Chalk; the latter more extensively, stretching southwards into the London Basin (Ellison 2004, pp.22–51; Catt & Doyle 2010; Hopson et al. 1996).

The tertiary clays of the Lambeth and Thames Groups occupy only a relatively small area of the county, being confined to its southernmost limits. Far more extensive surface deposits are represented by the clay-with-flints that cap the Chiltern Hills, overlying the chalk in these areas (Catt 2010b, pp.85–90; Hopson et al. 1996; Ellison 2004), and the quaternary glacial deposits that are widespread in the east of the county; these include the glacial till, and the sands and gravels which characterise the river terraces (Catt & Cheshire 2010; Hopson et al. 1996; Ellison 2004).

While Hertfordshire is dominated by the calcareous geologies of the Chiltern dip-slope, this is not to say that clays useful for potting or brick-making have not been able to be procured in the area. The Lambeth- and Thames-Group clays are well-known for their suitability for ceramic manufacture and have been exploited here, as have the clay-with-flints and glacial deposits: most prominently the extensive glacial till (Catt, Edmonds, et al. 2010, pp.306–307; Hopson et al. 1996). The Gault is the only calcareous material reported as having been exploited for ceramics, this indeed being the only deposit that is currently dug for brickmaking (Hopson et al. 1996; Catt, Edmonds, et al. 2010). 'Brickearths' (loessial) are also known in the lower Lea valley (Catt 2010c, fig.1.4), and in the area around the modern town of Hitchin (Hopson et al. 1996).

5.1.2 The Middle Iron Age (MIA) – c.400/300 – 150/50 BC

Until quite recently there was little evidence of a 'middle' Iron Age in Hertfordshire. Bryant (1995, p.26) states that in his survey of the evidence for the north

Chilterns he could find record of only ten sites with MIA occupation compared to a total of around two hundred that could be attributed to the LIA. Both Bryant (*ibid.*) and more recently Thompson (2015a, p.120) attribute this not to an absence of settlement during the MIA but to a lack of familiarity with the ceramic traditions dating to this period. While the increase, in recent decades, of developer-funded excavation has greatly increased the body of material available for study (MIA pottery of "Little Waltham type" (*ibid.* p.119) now being fairly well-known in this area), Thompson (*ibid.* p.120) notes that the pottery reports in which this material is dealt with are mostly contained in grey literature, meaning that knowledge of the forms and fabrics are restricted to only a handful of specialists. Furthermore, despite slowly increasing familiarity with the MIA of Hertfordshire it seems that, compared to the LIA, MIA settlement was relatively sparse here (compare *ibid.* figs.6.1 & 6.2), with the quantities of material known from these sites also being relatively small (*ibid.* p.121).

A survey of the literature for MIA occupation shows that the majority of sites can be characterised as isolated rural settlements, although with a suggestion that sites were sometimes arranged in clusters, often in the vicinity of areas that would later be host to *oppida* (e.g. near Baldock – Wilbury Hill; Blackhorse Road; A505 Baldock Bypass Area 4, etc., or the several recently-discovered sites near the modern town of Buntingford (I. Thompson pers. comm.)). In addition, Catt et al (2010, p.248; Table 8.2) list 15 certain or possible hillforts in Hertfordshire and its adjoining regions, of which at least three can certainly be said to have been occupied during the MIA (Cholesbury Camp (Kimball 1933), Wilbury Hill (Applebaum 1949; Moss-Eckardt 1964), and Ravensburgh Castle (Dyer 1976)). A further three *may* have been occupied during this period (Kilbury Camp (undated: Central Bedfordshire HER no.11021), Whelpley Hill (undated: NMR 346313), and Sharpenhoe Clappers (an enclosure with limited known evidence of Iron Age date: NMR 360055). Additionally, cursory specialist analysis of material collected from the Arbury Banks hillfort in North Hertfordshire confirms that this site was occupied during the MIA (K. Fitzpatrick-Matthews, pers. comm.). The sites now known are scattered throughout the landscape of Hertfordshire (fig.5.2) with occupation tending to be sited within a few hundred metres of the putative routeways that would later become Roman roads (Thompson 2015a, pp.121–122).

5.1.3 The Late Iron Age (LIA) – c.150/50 BC – AD 43

The archaeology of Region 2 changes drastically going into the LIA. As referred to above, Bryant (1995, 26) noted around two hundred LIA sites in his north Chilterns study area relative to ten MIA, and while this may not be a quantitatively accurate

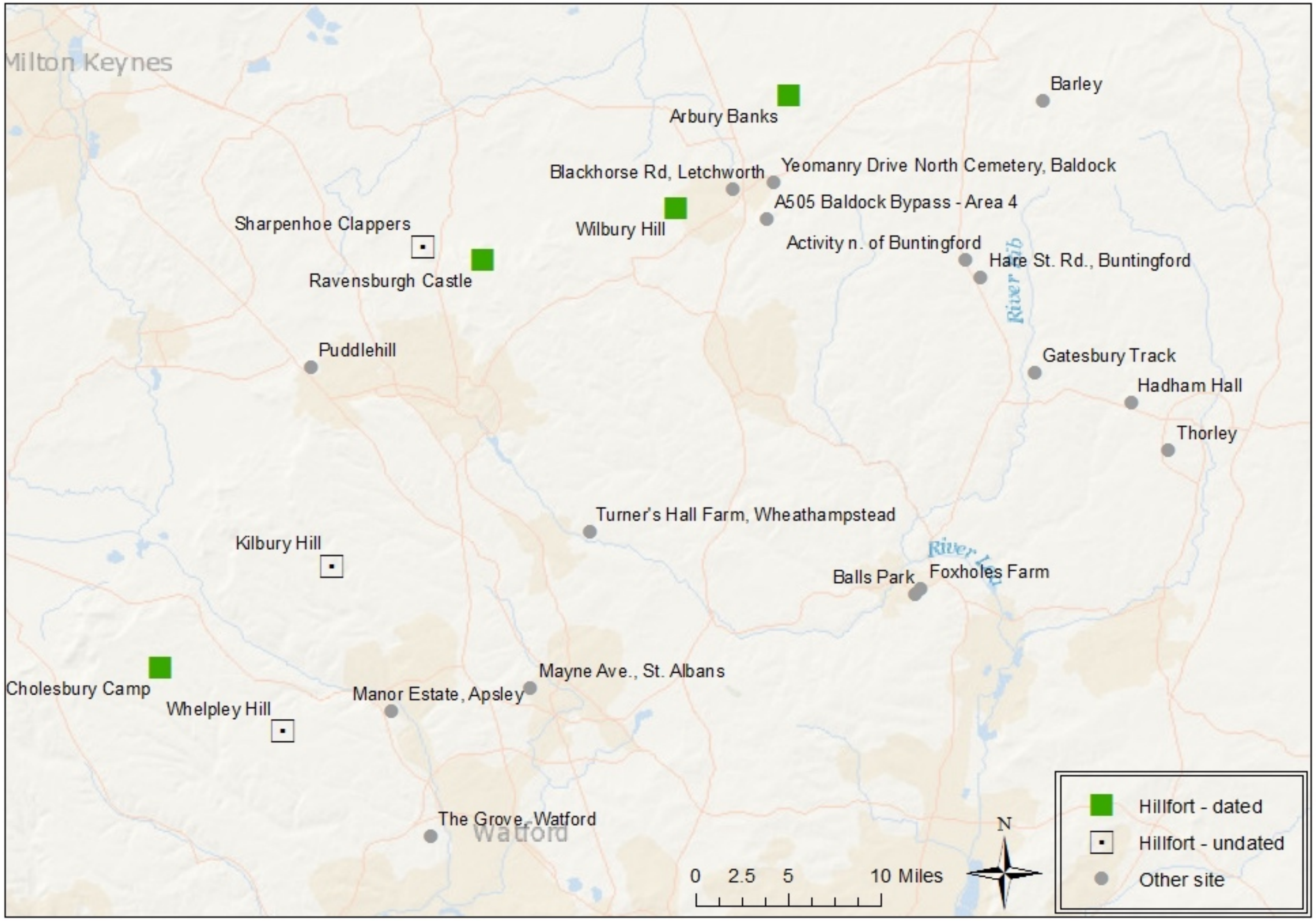


Figure 5.2. Region 2, MIA, Major sites.

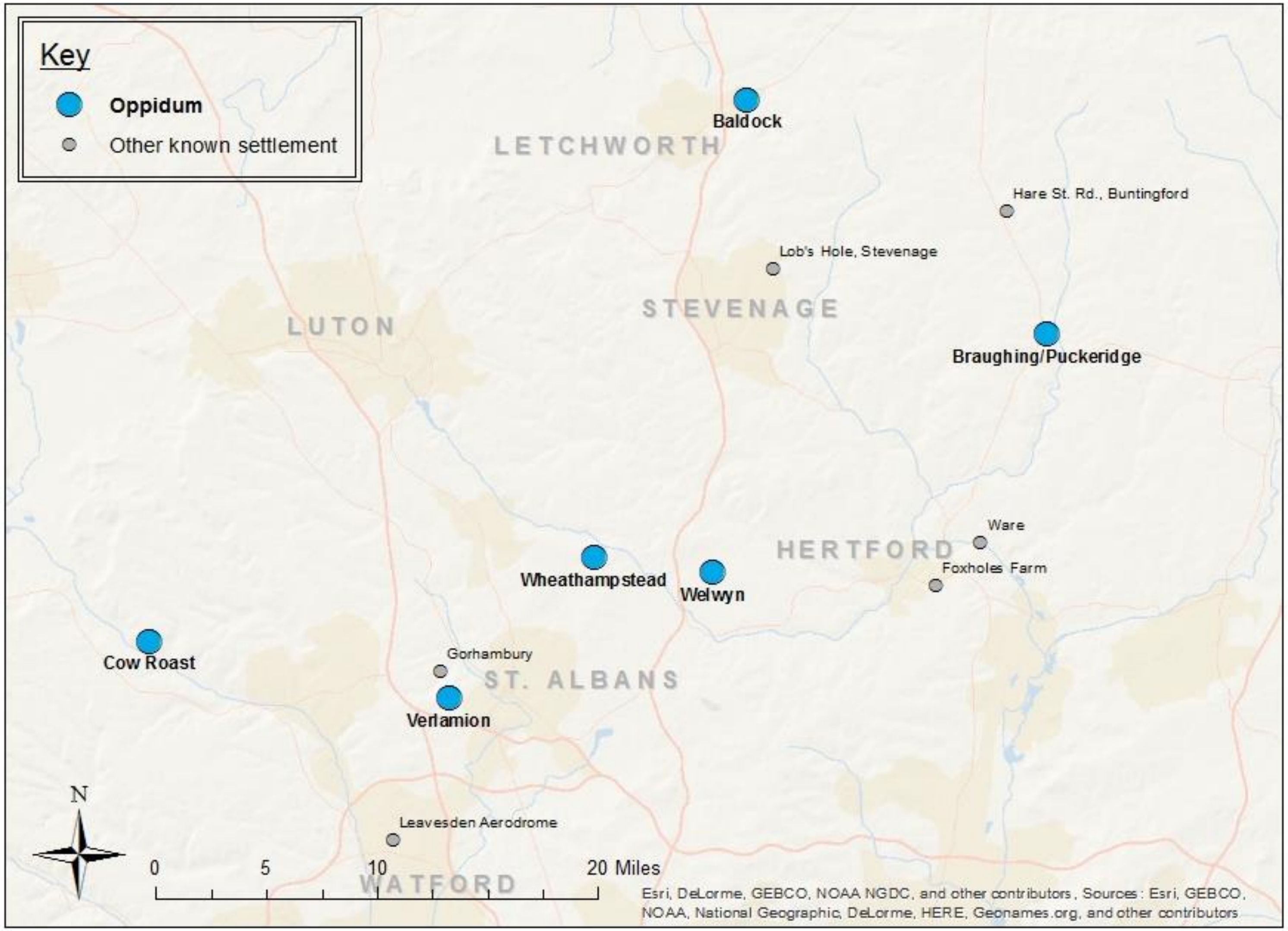


Figure 5.3. Region 2, LIA, Major sites.

overview of the expansion of settlement, the situation is certainly one of massive change and intensification of occupation.

The most significant change to the settlement pattern is the appearance of several large, nucleated settlement complexes traditionally known as '*oppida'*. Bryant and Niblett (2001) note six such settlements in Hertfordshire and the north Chilterns: Cow Roast; Verlamion (St Albans); Welwyn; Braughing/Puckeridge; Baldock; and Wheathampstead. These settlements vary greatly in character. The arrangements of sites such as Baldock (Burleigh 1995; Fitzpatrick-Matthews & Burleigh 2007, pp.33–7) and St Albans (Bryant & Niblett 2001, pp.101–3; Niblett 2001, pp.46–48) suggest that occupation was highly structured, with different areas reserved for different activities such as agriculture, industry, and burial. This contrasts with what may be said of settlement in the area of Welwyn, for example, where occupation appears to be more akin to a conglomeration of several discrete settlements, with little apparent structure in the pattern of occupation (Bryant & Niblett 2001, p.103). The enigmatic evidence at Cow Roast/Ashridge differs again, apparently representing occupation based around the production and working of iron (Morris & Wainwright 1995; Bryant & Niblett 2001, pp.100–1). The settlement at Braughing is thought to have been based around long-distance exchange, possibly via an *entrepôt* represented by occupation remains at Ware (Partridge 1981, pp.351–352; Bryant & Niblett 2001, pp.103–5).

Despite the fundamentally different nature of the LIA settlement pattern compared to what came before, Thompson (2015a, p.121) notes that almost all of the MIA sites currently known continue to be occupied during the LIA. This suggests at least some degree of continuity between the two periods, with this observation applying equally to sites of a rural character (e.g. Foxholes Farm, Hertford (Partridge 1989) or Puddlehill near Dunstable (Matthews 1976)) as well as those which went on to develop specialised, nucleated occupation (e.g. Mayne Avenue, St Albans; the numerous MIA sites around Baldock). Although no more detailed analysis can be done until the settlement pattern of the MIA is better understood, the implications of this are far-reaching for our appreciation of the changes associated with the LIA period in this region. In particular, J.D. Hill's theory of occupation in LIA Hertfordshire resulting from the movement of groups into the area from regions further north (2007) is relevant in considering the changing nature of occupation at the interface of the MIA and LIA.

5.2 ANALYSIS OF FABRIC GROUPS

The fabric series was defined on the basis of analysis of 87 fabric samples. Of the 18 fabrics defined for the two study-regions 12 are present in Region 2, these incorporating 19 distinguishable variants. These have subsequently been grouped into four fabric groups: the Sandy-Organic, Flint, Shelly, and Grog Groups. Two fabrics (incorporating five variants) are allocated to the Sandy-Organic Group; one to the Flint Group; two to the Shelly Group; and five (incorporating ten variants) to the Grog Group. A further two fabrics were not able to be easily allocated to one of the fabric groups, and these are left as standalone fabrics (section 5.2.5).

5.2.1 Sandy-Organic Group

The Sandy-Organic Group incorporates two fabric types (including five fabric variants), defined on the basis of the analysis of 19 fabric samples. The Group corresponds with a well-defined tradition of identifiably MIA pottery in Hertfordshire that is known in several counties north of the Thames at around this date. In particular, the Sandy-Organic tradition is also known in Essex and its typology initially described in the report for the site at Little Waltham (Drury 1978). The group can now be recognised to be a variant of the wider East Midlands Scored Ware tradition most thoroughly studied in the counties to the north of Hertfordshire (e.g. Elsdon 1992; Woodward & Blinkhorn 1997; Hill & Braddock 2006). The related wares without scored decoration have been distinguished from their scored counterparts, being termed East Midlands Plain Ware (Hill & Braddock 2006); under this distinction much of this kind of pottery is also present within the Sandy-Organic Group. The typological range incorporates a limited set of principally open jar and bowl forms of various sizes, with a relatively minor component of constricted vessels. The most common types have upright rims or s-sided profiles, slack-shouldered or rounded bodies, and flared bases. This basic form is commonly decorated with simple incised slashes (“scoring”): randomly arranged or, more commonly, vertically up the body of the pot. Additional slash-marks, finger- or nail-impressions may also decorate the tops of rims. Less common types – which may also exhibit this range of decoration – include a kind of saucepan pot or squat ‘barrel’ (defined as Hill & Braddock forms K and P); and variants of jar/bowl forms with distinctive ‘hammerhead’ rims (e.g. at Puddlehill: Matthews 1976 Fig.99 Nos.64-5: Hill & Braddock rim type 8).

While efforts have previously been made to describe and define the fabric series for the MIA sandy wares known in Hertfordshire, these have been conducted exclusively on an individual-site basis (e.g. Birley 1984). This is therefore the first time that a multi-site study of this type of pottery has been conducted, as well as the first time that petrography has been employed to define the MIA fabrics found in Region 2.

Fabric Q1

Six variants of Q1 are defined, of which four are known from Region 2. All are united by their sandy-to-very-sandy texture and irregular-to-hackly fracture, as well as by the presence of moderate-to-abundant quartz sand and silt, rare-to-sparse angular flint of varying colours (exclusively non-calcined except for in Q1d), and varying amounts of subrounded reddish-brown iron oxide. It should not, therefore, be expected that sources can be assigned in the majority of cases; rather these, like the G1 and G2 fabrics discussed below, seem to be the products of a geographically-dispersed tradition of clay preparation.

The four varieties present in Region 2 are:-

- Q1a – the usual features of the fabric are present and nothing else. Inclusions consist only of common-to-abundant quartz sand and silt, rare-to-sparse flint, and moderate iron oxide (fig. 5.4a & b).
- Q1c – as Q1a, but with additional calcareous inclusions.
- Q1ei – Q1a with moderate-to-abundant elongated blackened voids indicative of burnt out organic material (fig.5.4c & d).
- Q1eii – as Q1ei, but with additional calcareous inclusions.

Fabric O1

A soft, soapy fabric normally found with patchily-oxidised, light orangish-brown surfaces over a mid-grey reduced core. Breaks are hackly and show little other than quartz silt and common-to-abundant elongated blackened voids (up to 3mm) signifying organic inclusions. Petrography reveals an apparently bimodal fabric with organics, quartz, and iron in the coarse fraction, and quartz with muscovite, iron, tourmaline, and common rounded glauconite fragments in the fine fraction. The matrix is heterogeneous owing to the differences in oxidation between the surfaces and core - colours in XPL are typically light reddish buff-browns, turning redder where oxidised at the surfaces (fig.5.4e & f).

Provenance

Of the five fabric variants allocated to the Sandy-Organic Group, two (Q1c and Q1eii) contain calcareous inclusions that may be used to suggest a provenance. While

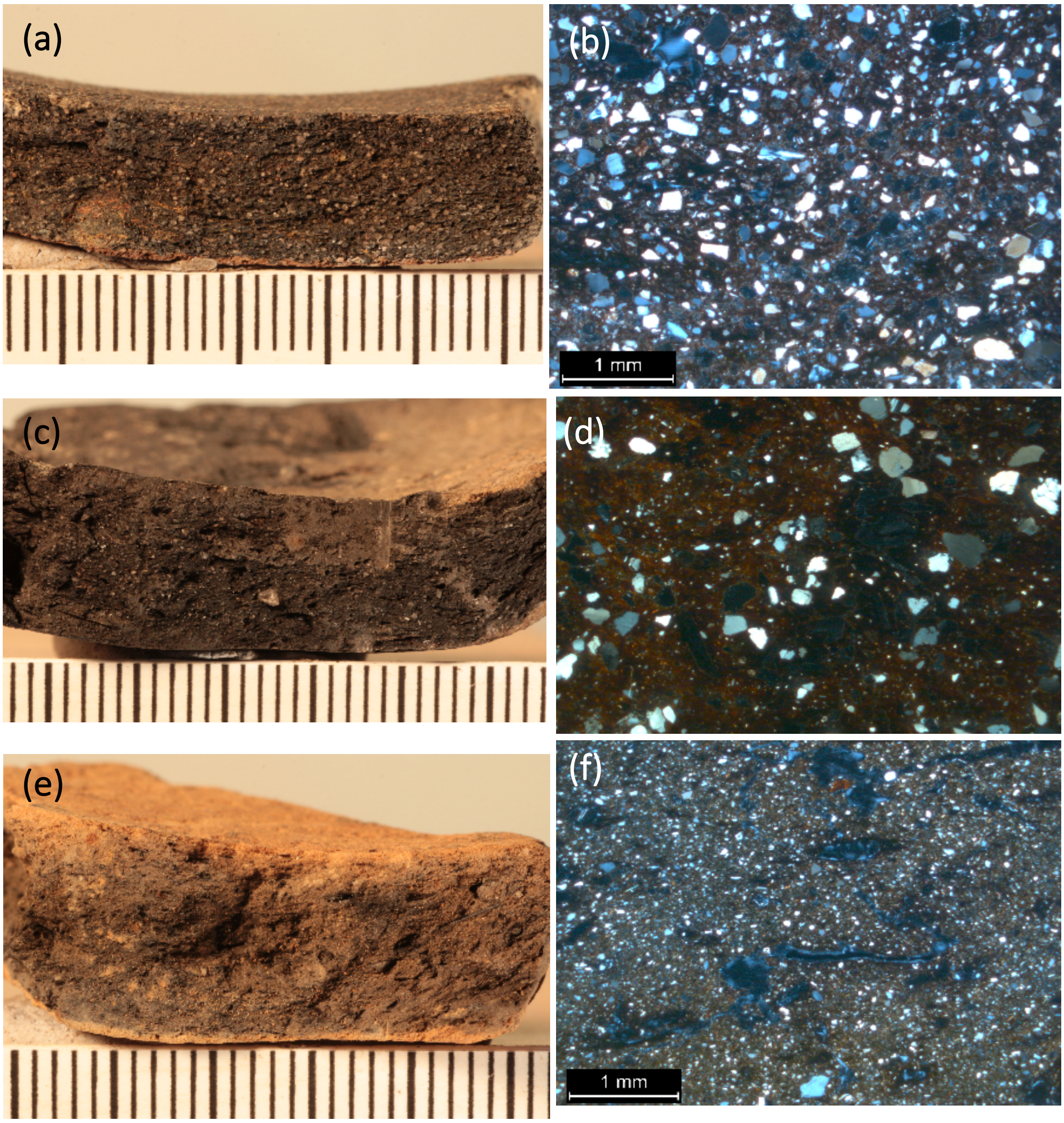


*Figure 5.4. **Fabric Q1a**: (a) photograph of fresh break; (b) photomicrograph, x40, XPL. **Fabric Q1e**: (c) photograph of fresh break; (d) photomicrograph, x40, XPL. **Fabric O1**: (e) photograph of fresh break; (f) photomicrograph, x40, XPL.*

calcareous geologies dominate the surface outcrops of Region 2, historical exploitation of Hertfordshire clays for brickmaking indicates that few, if any, clays suitable for ceramic production derive from the chalk deposits of the Chilterns. In fact, only two calcite-bearing deposits are known to have been exploited for ceramics in recent times: the Gault of the northernmost part of the region, and the extensive glacial till. The till is described as “an unsorted, matrix-dominant, stony clay” with inclusions of chalk, quartz, quartzite, sandstone, and more rarely fossils and rocks of Jurassic and Cretaceous ages, carboniferous limestones and glacial erratics (Hopson et al. 1996). This description matches that of these fabrics, which are poorly-sorted and include the siliceous minerals (principally rounded, seemingly as a result of glacial transportation) and chalk referred to, as well as bioclasts of the correct age (J.R.L. Allen, pers.

comm.). However it should also be noted that the Gault clay broadly matches this description also: Hopson et al. even comment that the latter has been misidentified as till on occasion (Hopson et al. 1996). Prof. Allen also notes that a possible source from slightly further afield is the Woburn Sand, which outcrops to the north-west of Region 2 near Leighton Buzzard and is associated with the lower Gault, itself being of early Cretaceous derivation (*ibid.* pp.16-19). In short, while it is difficult to provide a specific geological provenance, a local origin can reasonably be assumed for these fabrics.

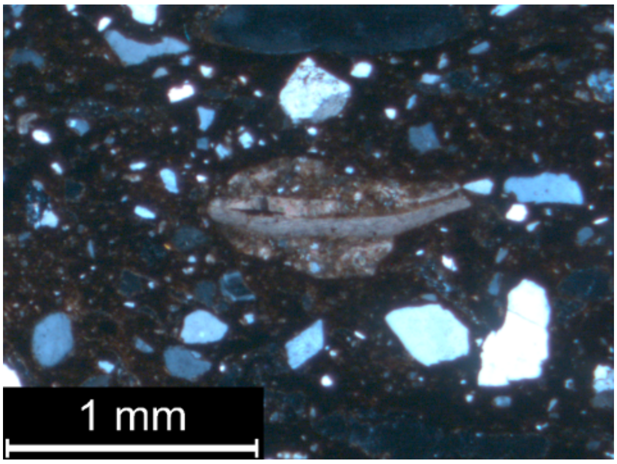


Figure 5.5. Fragment of shelly limestone, BHR-01 (fabric Q1eii), x40, XPL.

O1 was found to be particularly abundant in the assemblage from Mayne Avenue, St. Albans (unpublished, but viewed by the current author). While fabrics with organic inclusions are well-known at MIA dates in Region 2 (e.g. at Foxholes Farm, Hertford (fabric not coded, but organics are referred to extensively in the catalogue: Partridge 1989, pp.166–169); Blackhorse Road, Letchworth ("Fabric C": Birley 1984), and the A505 Baldock Bypass ("Fabric F19": Wells 2009)), these are either poorly-represented (as at Blackhorse Road and the Baldock Bypass excavations) or seem to better match the description of a sandy fabric with organics, here coded as fabric Q1e (as at Foxholes Farm). Fabrics matching the description of O1 – i.e. very soft, soapy, commonly-oxidised fabrics with abundant organic inclusions and little else – appear to be thinly-distributed based upon the published fabric descriptions, and as such their apparent abundance at Mayne Avenue may suggest that they were a local product of the St. Albans area that saw no great degree of distribution away from the source. Petrographically, O1 is a very fine-grained, silty clay with added organic matter. Its fine-grained nature suggests derivation from an alluvial source (J.R.L. Allen, pers. comm.), and its origins can therefore be associated with one of the local river-courses. The presence of what may be a form of altered glauconite might suggest derivation from glauconitic geology, or that glauconite was transported by riverine action as part of the formation of the alluvium. The origins of this possible glauconite are unclear, however: most of the rivers of the region rise in the Chilterns and do not cross the Gault; nor is any association with the Lambeth Group clays clear from the published geological

Figure 5.6. Region 2, Sandy-Organic Group. Representative grain-size histograms.

maps. Therefore, while a provenance associated with the river Ver would seem probable based upon the alluvial nature of the clay and the apparent distribution of wares in this fabric, the possibility of glauconitic inclusions complicates the assignment of provenance, which must for now remain uncertain.

A note on tempering

Grain-size analysis of eight of the Sandy-Organic Group fabric samples confirms the distinctive nature of the fabrics identified (fig.5.6). The Q1a samples are characterised by unimodal distributions dominated by quartz, with mean grain-sizes of 0.16mm in both cases. The two O1 samples exhibit similarly uniform unimodal distributions, with quartz and iron oxide pellets characterising the smallest grain-sizes, and significant amounts of poorly-sorted plant matter in the larger grain-sizes. The four Q1e samples are somewhat less uniform, but are all characterised by quartz in the smaller size-ranges and plant matter in the larger. In all cases there are suggestions of bimodal distributions, and particularly in the two samples from Hare Street Road, Buntingford. In these cases the fabrics include significant amounts of coarse, poorly-sorted plant matter, and are significantly sandier in the coarser grain-sizes (from c.0.2mm upwards) than any of the other samples.

In the case of Q1a there is little ground to suggest that a temper was deliberately added, the sandiness of the paste resulting from a scatter of quartz that was probably present in the natural clay. Not so in the case of O1 and Q1e. In the case of the latter in particular, hints of bimodal grain-size distributions may suggest the addition of a temper consisting of plant matter and possibly some quartz sand. O1 is somewhat more difficult to interpret on the basis of grain-size data, but based on qualitative assessment it seems likely that the organic matter present in the fabric was added as a temper on the basis of its coarseness and abundance.

Fig.5.7 shows the percentage-by-area statistics for the proposed tempering agents (y-axis) against the proposed natural inclusions (x-axis) for the eight Sandy-Organic samples analysed quantitatively. The former ‘temper’ category encompasses plant matter (organics) and all quartz with a long-axis grain-size measurement of 0.2mm or greater. The latter, ‘natural’ category includes all quartz with a long-axis grain-size measurement of less than 0.2mm, as well as all other inclusions found in that sample. The plot clearly shows a linear trend demonstrating a negative correlation between the proposed natural inclusions and tempers: where a large proportion of the fabric is taken up by natural aplastic grains there is less likelihood of encountering significant amounts of inclusions that appear to be of anthropogenic origin, and vice-

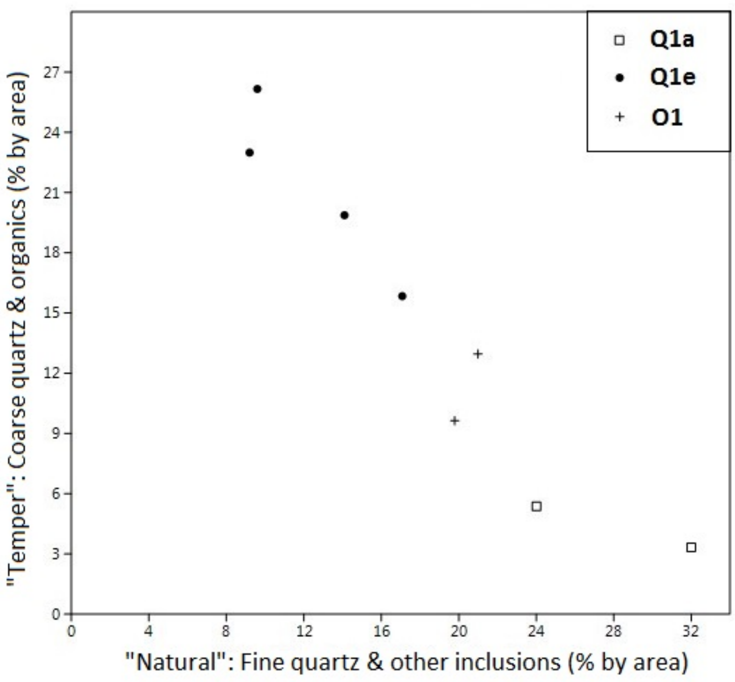


Figure 5.7. Region 2, Sandy-Organic Group. Percentage by area plot of "temper" vs "natural" inclusions.

versa. This suggests that where relatively few aplastics were naturally present in the clay, these were added by the potter in the form of coarse quartz grains and organic matter in order to improve the texture of the clay in preparation for potting, and that this was done proportionately to the perceived siltiness of the natural clay. The Q1a samples show minimal representation of the proposed tempering agents and have the highest proportions of natural silt; the Q1e samples show the highest proportions of proposed temper and the lowest proportions of natural silt; and the O1 samples occupy an intermediate space.

<u>Distribution</u>

The significance of the distribution of Fabric O1 has already been discussed above. There is little to be said of the distribution of the other four fabric variants within Region 2. Thompson (2015a, p.119) describes sandy wares of the ‘Little Waltham type’ as being the key chronological marker of the MIA in Hertfordshire, and the distribution of sites shown in fig.5.2 demonstrates that finds of this type of pottery have been made throughout the county. There is also little ground to identify distributions on the basis of form. The published assemblage from Foxholes Farm, Hertford, (the easternmost of the published sites) is directly comparable to those allocated to Groups 4-6 at Puddlehill (Matthews 1976, pp.146–148) in that it is dominated by rounded, upright-rim or s-sided jars or bowls, and forms with pronounced, splayed bases. Ditto the assemblage from Blackhorse Road, which also includes parallels for the high-shouldered jar (Hill & Braddock forms H & J) illustrated as No.64 from Foxholes Farm. These forms are also known from Hare Street Road, Buntingford (Percival forthcoming), while the assemblage from Mayne Avenue, St. Albans, differs again in that forms with simple rims and near-straight-sided bodies (Hill & Braddock forms K & P) are predominant amongst the diagnostic pieces. These are often decorated in the typical MIA style, i.e. with finger- or nail-impressions at the rim-top and/or with vertical incised lines running up the body, and may again highlight the apparent difference of the pottery traditions of the St. Albans area in the MIA.

Chronology

The chronology of the group is almost entirely limited to the MIA. As Thompson has discussed, Flint Group pottery was common into the EIA (and possibly as late as 400 BC), while Grog Group wares had certainly become prevalent by the 40s BC at the very latest. There is an argument, on the basis of updated brooch chronologies (cf. Haselgrove 1997) to say that Grog Group wares became predominant far earlier, perhaps even into the second century BC. Meanwhile, the handmade, typologically LIA pottery from Baldock has been given dates as early as the early-to-mid first century BC (Stead & Rigby 1986, pp.273–279), and this appears to be generally accepted.

The precise dating of the MIA Sandy-Organic tradition is difficult to judge based on available evidence – absolute dating evidence is required for much of the Later Iron Age in this region. Thompson (2015a, p.119) suggests that Flint Group wares may have been in use until c.400 BC, but, as is discussed in the commentary on the Flint Group (section 5.2.2, below), there is evidence from several sites that there was an overlap between the currency of the Flint Group and that of the Sandy-Organic Group, with the sequence from Puddlehill (Matthews 1976, pp.140–149) providing the clearest progression. There is even less evidence for the end of production of Sandy-Organic Group wares. Sandy-Organic wares are only rarely found alongside typologically later (i.e. Grog Group) pottery (Thompson, *ibid.*). Puddlehill Storage Pit 32 (Matthews 1976, pp.126–127) may be a rare example, s-sided and upright/beaded-rim MIA forms being found alongside at least one example of a Thompson C3 combed jar. This jar may be a function of the relatively late MIA date of this feature, although the fabric of the vessel is uncertain and the current author has not viewed the piece personally. Either way, it seems that the transition from the predominance of Sandy-Organic Group wares to the earliest LIA types must have been fairly rapid, with little evidence for chronological overlap, or even residuality of the earlier types.

Function

Functional studies of MIA pottery from eastern England, including Hertfordshire (Hill 2002, pp.144–145; Woodward & Blinkhorn 1997; Hill & Braddock 2006) have established that a similar, direct relationship between rim diameter and vessel height exists for wares of the scored-and-plain sandy wares discussed here as it does for other varieties of prehistoric British pottery (see Chapter 4, above, and Woodward

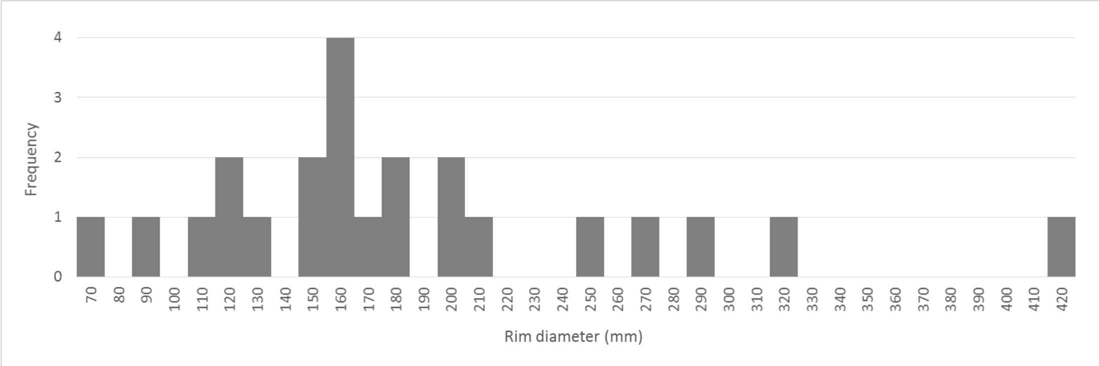


Figure 5.8. Region 2, Sandy-Organic Group. Rim-diameter distribution.

1995; 1997). This means that rim diameter can be used as a proxy for overall vessel size in a manner identical to the analysis conducted for MIA vessels in Region 1.

The previous functional studies led by J.D. Hill concluded that, also like the pottery of this date from Region 1, MIA vessels of the kind discussed here were subject to little functional specialisation. Vessel type was not found to be sensitive to functional variation (Hill & Braddock 2006, pp.169–175), with Hill (2002, p.145) stating that “the impression given is of multi-purpose pottery vessels; the same size, even the same bowl/jar, used for a range of functions”. Analysis of rim diameters of Sandy-Organic Group vessels corroborates with the notion of a general lack of specialisation. Fig.5.8 shows the distribution of the 23 rim diameters able to be measured in this group, and it can be seen that these form a unimodal distribution, with a mean of 185.7mm and a mode of 160mm. This demonstrates a single continuous size-distribution for these vessels, with one size-category being most common and a significant number of outliers, and tallies with the overall rim-diameter distribution of contemporary vessels from Haddenham V, Cambridgeshire (Hill & Braddock 2006). Essentially, most vessels seem to have been made in sizes ranging up to rim diameters of around 200mm, with only a few being made in larger sizes. In the analysis from Haddenham V, however, it was shown that certain elements of functional preference were detectable. In particular, vessel size and surface treatment/decoration may have had functional relevance. Burnished vessels were found to only rarely have carbonised residues attached to them, while scored (incised) and plain vessels had such residues more often, suggesting that burnished vessels – which were also more commonly made in finer fabrics – were more often used for service than for cooking, while plain and scored vessels were more commonly found appropriate for cooking (Hill & Braddock 2006). The same study also found that within the overall unimodal distribution of vessel sizes, those vessels found appropriate for cooking (i.e. those with carbonised residues) and those probably best suited to service (i.e. those that had been burnished) had distributions that overlapped almost exactly. This suggests that within the overall pattern of multipurpose jars and tubs, some preferences existed with regard to the actual and/or intended functions of certain categories of vessel (*ibid.* pp.169-175). Some of these functional variables can be seen to have been the result of technological choices: for example, the choice of whether or not to burnish a vessel, or the choice of how large to make a vessel.

It should be noted, however, that in the case of Region 2, no distinction was able to be made between fabrics on the basis of coarseness, the principal distinguishing factor between the fabrics being the presence or absence of organic matter, proposed (alongside the coarser-grade quartz sand) to have been an added temper. This contrasts with the fabrics from Haddenham V, which were mostly shelly: at this site the secondary component of sandy wares were more commonly burnished and therefore perhaps were intended as service vessels rather than cooking wares (*ibid.* pp.169-171). Clearly we should not expect the whole of the Region 2 Sandy-Organic Group to represent service wares to the detriment of vessels intended for cooking, storage, or otherwise. It may be that there was some functional relevance to the presence or absence of temper, and this is indeed suggested by the fact that, of the group analysed here, only one (4%) of the 25 vessels with an organic-tempered fabric was found to have been burnished, compared to five (36%) of the 14 vessels without an added temper.

<u>Analysis of manufacturing techniques</u>

Vessel forming

Forming analysis was conducted on 38 complete or semi-complete vessel profiles in Sandy-Organic Group fabrics. One additional sample – a handle – was also analysed, but was omitted from the quantitative results due to the lack of any clearly-associated body (the handle might derive from one of the other vessels analysed, and should not, therefore, be counted separately). Vessels analysed exclusively include everted-rim and ‘saucepan’ or ‘tub’-class vessels – 13 of the former and 14 of the latter. All other vessels were unable to be assigned to a type. Most of the vessels were basically open types with slack shoulders, only two vessels in the group being allocated to one of Hill & Braddock’s ‘closed’ types (B and C).

Fig.5.9 presents the summary of primary and secondary forming data as the proportion of vessels in which each technique was found. Primary forming is overwhelmingly dominated by coiling. This was the only primary technique noted in vessel bodies in this group, the single example of possible slab-moulding coming from the base of a vessel (2/BHR-013) which appears to have subsequently been built

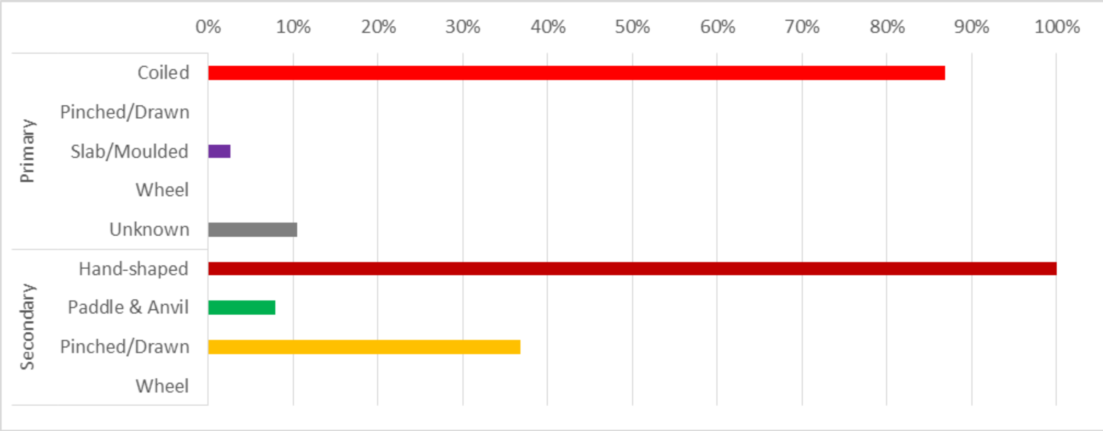


Figure 5.9. Region 2, Sandy-Organic Group. Forming techniques as proportions of vessels.

around, probably with coils. The proportion of vessels of unknown primary forming technique is remarkably low in this group (11%), this being a function of the ease with which primary forming can be assessed when dealing with vessels made in fabrics containing elongated inclusions of organic matter, as are many here (cf. fig.5.10). While this is of great benefit to the dataset for this group, it should be remarked that the elevated incidence of coiling should not be regarded quantitatively when comparing the Sandy-Organic Group to other groups – relative popularity here is a function of ease-of-identification, and not of actual occurrence.

All of the vessels analysed appeared to have been shaped, at least in part, using no more specialist a technique than simple hand-smoothing and thinning. However, a significant subgroup of the vessels did exhibit more specialised techniques. Pinching or drawing was found in 14 (37%) of the vessels, and evidence of paddle-and-anvil use in 3 (8%). The use of the paddle-and-anvil technique is particularly interesting as the three vessels in which this technique was detected are all of a similar variant of large, open tub or saucepan – form K – which has a short, upright rim. These vessels all have relatively large rim diameters, ranging from 280mm (2/MAY-010) to the largest of the group (2/MAY-004), with a rim diameter of 420mm. Further, fig.5.12b shows that, when the data are broken down by body-part, all evidence for paddle-and-anvil use in these three vessels comes from the vessel bodies. The paddle-and-anvil technique therefore appears to have been chosen as a result of the decision to create this type of large tub, the more specialised technique presumably being selected in order to more easily and efficiently thin and shape the walls of the vessels, which will have had a significantly larger

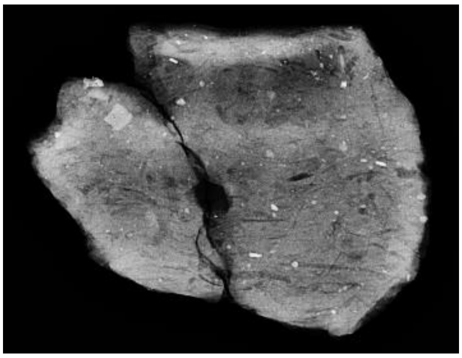


Figure 5.10. Radiograph of 2/BHR-001, showing numerous elongated voids representing burnt-out organic matter.

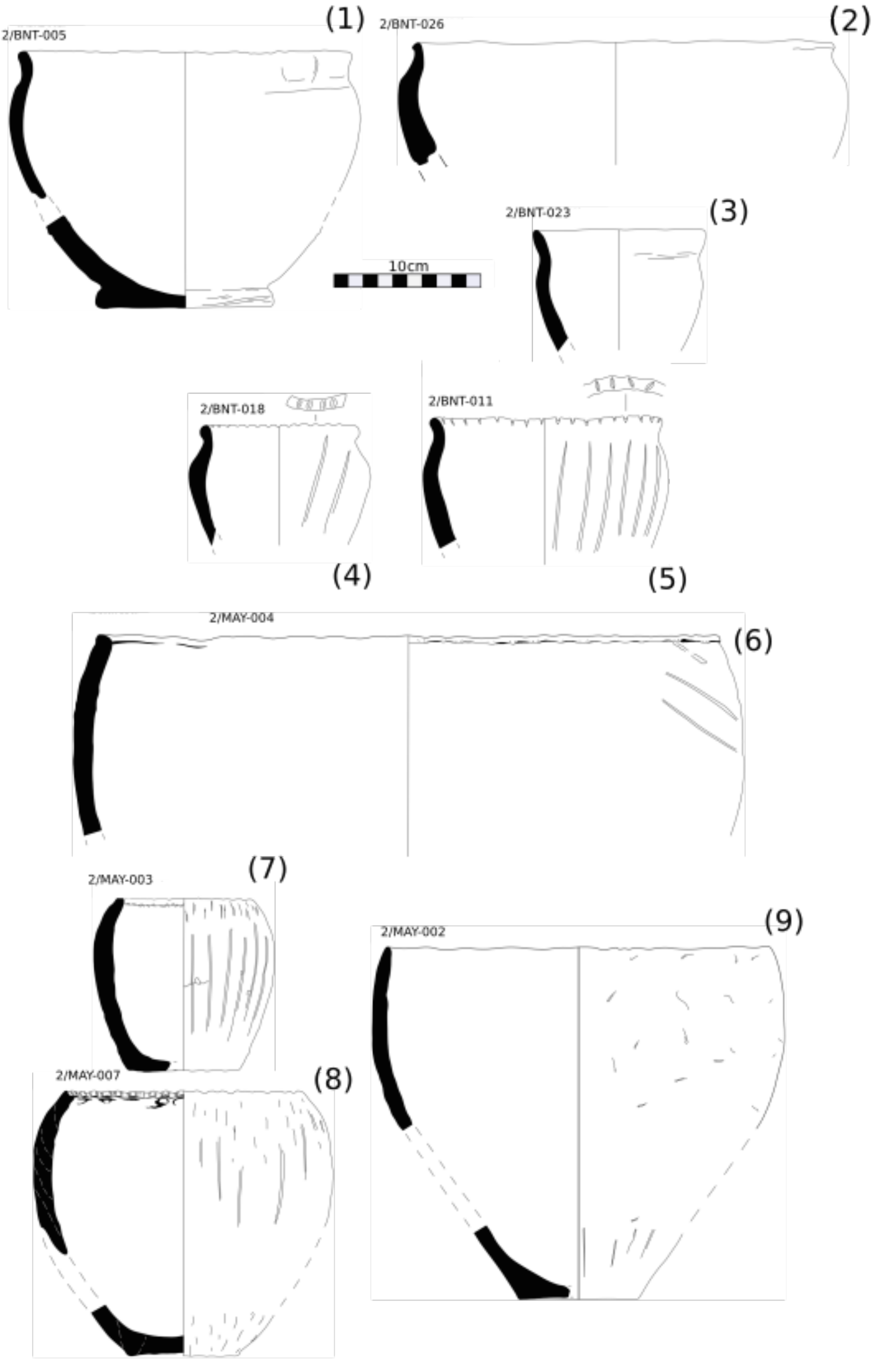


Figure 5.11. Sandy-Organic Group forms. 1-6: Open jar/bowl forms. 7-9: Barrel/saucepan forms. Nos. 1, 3, & 4 redrawn from Percival 2016, nos. 4, 5, and 6, respectively (©Oxford Archaeology Ltd.). All other vessels illustrated by the author.

Figure 5.12. Region 2, Sandy-Organic Group. Occurrence of secondary forming techniques according to vessel body-part. Totals: Rims n=26; Necks n=13; Upper Bodies n=24; Lower Bodies n=20; Bases n=17.

surface-area than the more common, smaller jars, and would have therefore been far more labour-intensive to craft by hand.

Fig.5,12c shows that there is also a locational preference for the use of pinching/drawing techniques. Interestingly, use of such techniques is found in two separate areas of vessels. Identical proportions (23%) of rims and necks were found to have evidence of pinching/drawing, in these cases the technique being used clearly involving the compressive force applied by finger and thumb to quite crudely thin and shape the opening of the vessel. Clear thumb-prints can be seen on many vessels without the aid of a radiograph and these are clear testament to the use of such a technique (fig.5.13). This technique does not appear to have been specialised in any way, appearing on

Figure 5.13. Exterior of both sherds of 2/BHR-001, showing pinch-marks used to shape the rim and neck. Permission to use image kindly provided by North Hertfordshire Museums Service.

Figure 5.14.. Radiograph of 2/MAY-003. Near-vertical void orientations are apparent in the lower-left sherd, while horizontal orientations can be seen in the upper sherds.

both everted-rim jars and tub/saucepans; it seems to have been utilised as a simple way of making a distinct rim and neck, possibly as a surface used for the attachment of a cover of textile or leather (Hill & Braddock 2006, p.171).

The evidence for pinching/drawing of the lower bodies is somewhat more difficult to interpret, but appears to represent a distinct technique more analogous to the traditional understanding of the 'drawing' technique. Void orientations in these areas were often seen to run near-vertically or diagonally where the lower body joined the base of the vessel (figs. 5.14 & 5.15). It is suggested that these distinctive orientation-patterns result from the strong distortion of the horizontal orientations produced by coiling. Under this notion the lower body would have been coil-built in its preform stage, being built around a pre-made base. The preformed lower body would then have been drawn up, smoothing and thinning the wall of the vessel in the process, and also building up its height. Alternatively, these patterns may result from the drawing of a clay lump, although distinctive diagonal orientation patterns in some vessels may warn against this. Examples such as 2/MAY-003 demonstrate that following the use of this technique, any additional height will have been built up with the addition of further clay coils. This technique is identified in ten vessels, those able to be allocated to a type primarily being tubs or saucepans of the K and P types, whilst a further vessel is a high-shouldered E-type vessel with a conical form. It may be that this technique was reserved for a specific type of body-shape, i.e. the more elongated, near-straight-sided forms of these tub-like vessels.

Figure 5.15. Radiographs of base and lower-body sherds of 2/BNT-011. The top (lower body) sherd shows clear vertical void-alignments proposed to result from a form of pinching or drawing action.

Finally, the single handle that was analysed is thought to have been made using a single, thick coil of clay which was slotted into a hole made in the side of the vessel. The wet clay of the coil was then pressed against the outside of the wall to bond the two components together. This is evident from the shape of the fracture, the 'plug' that would have slotted into the body being clearly visible and showing a portion of the original interior surface of the vessel (fig.5.16).

Figure 5.16. Profile view of handle 2/BHR-016, showing the 'plug' slotted into the body of the vessel, and the original interior surface of the vessel. Permission to use image kindly provided by North Hertfordshire Museums Service.

Surface treatment

23% of the group (9 vessels) were found to have been provided with some form of surface treatment. The most common form of treatment was burnishing, being found eight times. In all cases this appeared to take the form of an all-over burnish, rather than patterned or zoned burnishing; however in the absence of complete vessels it must be noted that the original treatment may have only been to part of the exterior surfaces. In addition, two of the nine vessels appeared to have been trimmed externally with a knife in order to even out the surfaces. This was indicated by what appear to be cut-marks on the external surfaces, these being distinct to what would be expected had the vessel been used as a board upon which to cut or chop food items.

Decoration

An additional 21% of the group (8 vessels) had some form of decoration. It is particularly notable that there was no overlap between those vessels found to be decorated and those with surface treatment. The most common form of decoration was 'scoring' (7 vessels), taking the form of vertically-incised lines of varying depths, arranged around the vessel body. 6 of the 8 vessels had also been decorated on the rim, this taking the form of either slashing the rim at regular intervals with a sharp implement (3 vessels), or the regular application of fingertip-impressions (3 vessels).

The sharp distinction between decorated (i.e. 'scored') vessels and those with surface treatments echoes findings from Haddenham V, where this difference was asserted to relate to functional differentiation of different vessel types: scored vessels being generally more appropriate for cooking; burnished vessels for serving. This situation may also be the case in the pottery from Region 1, and represents a degree of technological involvement in the sphere of intended function, resulting in the apparent specialisation of vessels to a limited extent.

Firing

All but three (92%) of the samples exhibited predominantly reduced firing patterns. Of these, uneven reduction was by far the most common, being found in 21 examples (54%). However, ten vessels (26%) exhibited the R1 firing pattern. This suggests a mixture of poorer- and better-quality firings to produce these vessels. Firing patterns R1 and UR do not tally well with any particular subgroup of the vessels: as such, the quality of firing does not appear to have been deployed on a specialised basis. Differences in quality may simply relate to those vessels that were positioned towards the centre of a load during firing, versus those on the edges; the vessels nearer the centre receiving less oxidation from draughts circulating around the kiln, and receiving more of the smoke from the fuel load around them.

Figure 5.17. 2/BNT-011, with vertical-scored decoration and incisions on the rim-top.

<u>Summary</u>

The Sandy-Organic Group probably represents a geographically-dispersed tradition of potting. While – as in the majority of fabric groups dealt with in this study – provenance data are rare, Sandy-Organic wares are known throughout Hertfordshire during the MIA, and have been shown to be made from a limited range of silty clays for which local provenances are likely. The assemblage from Mayne Avenue, St Albans is particularly revealing in containing a relatively high proportion of the otherwise-rare O1 fabric, and this is taken to suggest small-scale production and distribution of pottery in the case of this site, at least.

The local clays used to make Sandy-Organic fabrics have been shown to have been tempered with variable proportions of sand-grade quartz and organic matter. Forming was based upon the coiling technique. Coils were arranged around bases formed either of concentrically-arranged coils or a plug-like 'slab'. Some may have been started as drawn lumps to which coils were later added, but the evidence is somewhat ambiguous: some lower bodies with evidence of pinching/drawing show void orientations that allow coiling to be identified. In any case, coiling was most often used to build up the bodies of vessels, these being smoothed out by hand or – in the case of some larger vessels – using paddle-and-anvil. Where definite rims were to be made these were crafted by pinching around the vessel opening with finger and thumb. Surface treatment and decoration were rarely applied: when they were, they took the form of all-over burnishing and incised (“scored”) lines on the body and/or rim. Vessels were mostly fired under uncontrolled conditions and in reducing atmospheres.

The evidence is suggestive of Sandy-Organic Group wares being a limited range of basic, utilitarian, multipurpose vessels. Little specialisation is in evidence either in production or intended use. Rare examples of specialisation are found in the use of paddle-and-anvil for shaping larger vessels, and (potentially) in the use of burnishing and scoring to distinguish vessel types intended for different functions related to food preparation. There appears to be a lack of emphasis on the aesthetic or decorative qualities of these vessels.

The Sandy-Organic Group appears to be a localised version of the wider ‘Scored Ware’ and ‘East Midlands Plain Ware’ groups. These groups define assemblages over a far wider area of eastern England and appear to have formed a larger-scale body of knowledge from which potters took their know-how at a local level. Certain features hint at the kinds of localised knowledge-systems that may have defined smaller-scale communities of practice. For example, while much pottery in the areas to the north and west was naturally shelly (and thus effectively ready-tempered), the Sandy-Organic Group potters appear to have devised a system for subjectively modifying the clays of the Thames Basin with the addition of quartz sand and/or plant matter. This may have been related to a similar technique used by contemporary Sandy Group potters known in Region 1. These potters were also mostly working with London Basin clays, and also had a tradition of pinching the rims of their pots into shape. The Sandy-Organic Group therefore has technical elements that look in two directions – north to the Scored Ware producers, and south to the Thames Valley. A similar interpretation may therefore be proposed to that offered for the Region 1 MIA groups: the Sandy-Organic ‘tradition’ appears to have been derived from a combination of technical elements with links to different, wider systems of knowledge. The net effect will have been the definition of a distinctly localised form of potting.

5.2.2 Flint Group

The Flint Group is a significant subgroup of MIA date in Region 2. The fabric and forms indicate derivation from EIA pottery, which probably continued in use at least partway into the period of currency of the typologically MIA Sandy-Organic wares. One fabric is represented, defined on the basis of two fabric samples and 12 samples analysed by radiography. Forms were all able to be paralleled amongst the Hill & Braddock typology, the main morphological difference with these vessels being the sharpness of the shoulder-angles, which are a carry-over from the carination present in earlier types.

Fabric F3

A soft-to-hard fabric, distinguished by inclusions of common-to-abundant rounded quartz silt and sand (up to 0.5mm) and moderate-to-common larger (up to 5mm) flint, shown in thin-section to be exclusively calcined and therefore of anthropogenic origins. Some iron oxides may also be present, as well as small (up to 0.5mm) burnt out organics. Minor inclusions visible in thin-section are tourmaline and plagioclase, both rare and small (<0.6mm). The fabric may also be sparsely micaceous (muscovite). Breaks are always hackly and the feel may be soapy or sandy, depending upon the amount of inclusions and the presence of any surface treatment (e.g. burnishing)(fig.5.18).

Provenance

Petrography reveals little that can be used to source fabric F3. The suite of minerals is insufficiently diagnostic to allocate the fabric to a geological source; although the absence of any calcareous matter or glacial erratics warns against a provenance on the chalk or associated with any of the glacial clays. The leading candidates are therefore the tertiary clays of the London Basin (i.e. the Lambeth and Thames Groups), or possibly the clay-with-flints that caps the Chiltern dip-slope. Flint

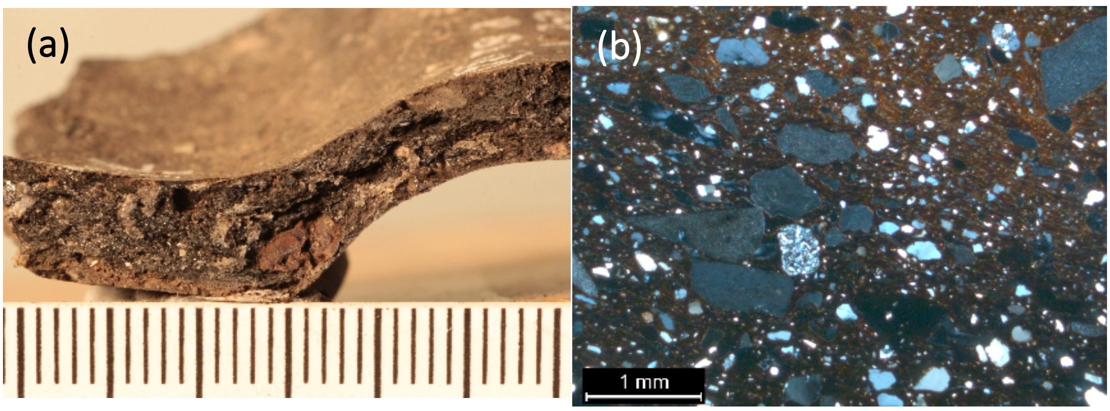


*Figure 5.18. **Fabric F3**. (a): photograph of fresh break. (b): photomicrograph, x40, XPL.*

nodules useful for tempering may have also derived from this latter source, or alternatively from the Middle and/or Upper Chalk (Hopson et al. 1996) or from any of the Anglian gravels that under- or overlie the glacial till that is common in the east of the region (*ibid*. pp.79-80).

Distribution & chronology

Flint-tempered fabrics are common throughout Region 2 in contexts dating to the EIA and earlier, perhaps even back to the Neolithic (Thompson 2015a, p.119). While the MIA in Hertfordshire sees an increase in the diversity of fabrics being used at some sites (e.g. the A505 Baldock Bypass site, cf. Wells 2009, p.48), and a particular rise in the popularity of Sandy-Organic Group wares, some specialists still report the presence of fabrics which continue to include flint as a significant component (e.g. Foxholes Farm nos.65-66 and 68-73: Partridge 1989, pp.166–169). Similarly, Matthews (1976, pp.140–149) states in the commentary on the Puddlehill sequence that there was an overlap between the use of flint-tempered and sandy fabrics, the latter eventually superseding the flint-tempered wares completely. The picture differs at nearby Blackhorse Road, however (Birley 1984; Moss-Eckardt 1988), where analysis conducted by the current author shows that flint-tempered wares were common in the earliest contexts on the site (sites GL II and III), while the later contexts were dominated by fabrics of the Sandy-Organic Group, with minimal evidence of overlap.

Function

Like the Sandy-Organic Group wares, the vessels of the Flint Group probably had limited functional specialisation and are best interpreted as a range of simple and primarily utilitarian vessels that will have been found useful for a range of purposes within the Iron Age home. Though insufficient Flint Group vessels have been consulted as part of this study to provide a similar metric analysis to that offered for the Sandy-Organic Group, in all cases the flint-tempered pottery encountered both in the vessels submitted for radiographic analysis, and in those encountered in the published literature, can be said to exhibit similar formal characteristics to those found in the Sandy-Organic Group. More specifically, Flint Group vessels are typically unconstricted shallow jars or deep bowls with vertical or slightly out-turned rims. This most common form is decorated in ways also commonly found in vessels of the Sandy-Organic Group, most commonly with finger- or nail-impressions on the rim-top. Vertical-sided vessels with simple rims – akin to a form of saucepan pot – are also known: for example vessel 2/BHR-007 (a Hill & Braddock type K).

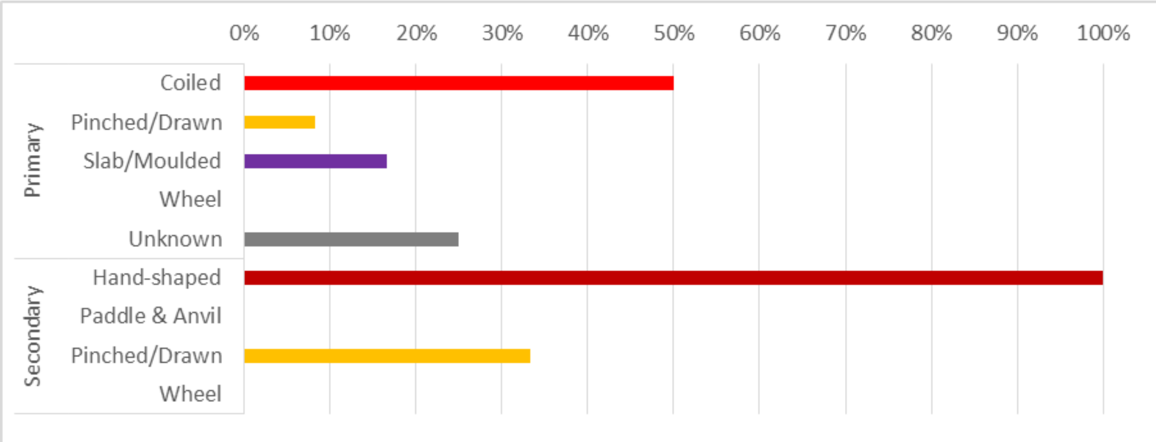


Figure 5.19. Region 2, Flint Group. Forming techniques as proportions of vessels.

While it is possible that the differences in fabric that distinguish the Flint Group vessels may have been of functional rather than technological relevance, this is a difficult hypothesis to substantiate. It may be said that the pattern of apparent chronological overlap followed by progressive obsolescence of the Flint Group is a pattern more akin to technological change than the co-existence of two kinds of functionally-distinct vessel. This notion is also corroborated by the typological parallels between the two traditions, which suggest that while changes in production were occurring at this time, these do not appear to have been linked to changes in the intended uses of pottery, which required the same basic shapes in the MIA to those that were required in earlier periods.

<u>Analysis of manufacturing techniques</u>

Vessel forming

A small sample of Flint Group vessels from Region 2 MIA sites was analysed for evidence of forming methods using the techniques described in Chapter 3. This sample comprised 12 vessels consisting of a mixture of types, including four everted-rim, one bead-rim, and two saucepan-pot forms.

Fig.5.19 shows the basic breakdown of forming types identified, presented as proportions of vessels in which techniques were found or suspected to have been found. Coiling was identified in half (6) of the vessels, and slab/moulding was tentatively identified in a further two. Slab/moulding was again only found in the case of vessel bases, and so these patterns – of common use of the coiling technique and possible occasional use of slab/moulding for making bases – echoes what was found in the larger Sandy-Organic Group. However, one vessel – 2/BHR-007, a K-type saucepan pot – appears to have been drawn, its radiograph showing clear, vertical void orientations (fig.5.20). Primary drawing was not noted in the Sandy-Organic

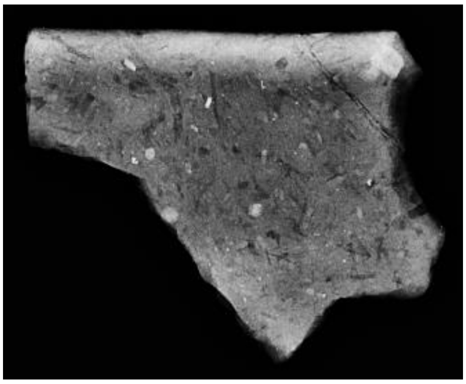


Figure 5.20. Radiograph of 2/BHR-007, showing vertical void orientations.

Group, although it is possible that this technique was related to the 'drawn coils' technique proposed for several of the Sandy-Organic vessels. However this cannot be confirmed in this case, the vessel being represented by nothing more substantial than a large rim-sherd.

In terms of secondary forming, again 100% of the vessels showed evidence of being thinned, smoothed, or shaped, at least in part, by simple, non-specialised hand-done methods. No evidence of paddle-and-anvil use was found. Pinching/drawing was found to be fairly common, though, represented in four (33%) of the vessels. These vessels do not appear to represent the use of a homogenous technique, however. Along with the example of primary drawing referred to above, they seem to represent variable use of localised compressive and/or shear stresses, applied through various motions of the unaided hand, to thin, smooth, or shape clay. For example, two vessels (2/BHR-008 and -031) showed evidence of the use of pinching to craft the rim and/or neck of the vessel, and this also is an echo of the use of this technique by potters working in the Sandy-Organic Group tradition. Meanwhile, 2/BHR-023 showed a pattern of diagonal 'drawing' voids at the join between the lower body and base, which may also represent a parallel with the Sandy-Organic Group as a version of the drawn coils method. Finally, 2/BHR-005 shows three clear thinned patches c.1-1.5cm in diameter on its radiograph, and these almost certainly represent pinches applied to the wall of the pot during the process of thinning and smoothing (fig.5.21). Therefore, while there is some suggestion of technical variability, the forming methods evident in the Flint Group suggest that there are many parallels to be made between this group and the Sandy-Organic Group, the forming of pots by Flint Group potters therefore involving substantially the same methods as were used more generally in the MIA of Hertfordshire.

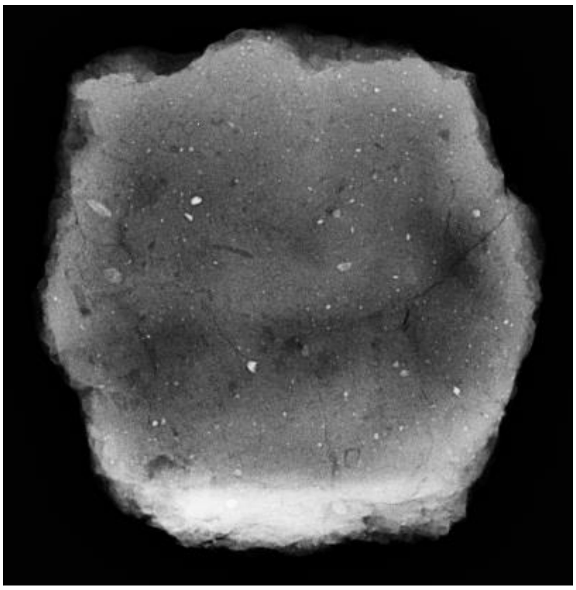


Figure 5.21. Radiograph of 2/BHR-005, showing discrete thin patches around the lower body.

Surface treatment

Only 3 of the 12 vessels (25%) had had some form of surface treatment applied. These comprise two examples of burnishing and one of knife-trimming. There is little to be said on the basis of this evidence, but suffice to say that this proportion put the Flint Group roughly in line with the relatively low investment in surface finishing that is displayed by contemporary groups such as the Sandy-Organic Group.

Decoration

No examples of decoration were found. Again, while the significance of this in such a small sample should not be overestimated, the implication seems to be a generally low investment in the aesthetic qualities of these vessels.

Firing

Firing patterns among the Flint Group were predominantly reduced, only one example of a predominantly oxidised pattern being found. Eight of the twelve vessels were allocated to firing pattern UR, and another one to UO, evidencing the generally poor quality of the firings and suggesting a similarly low investment in the finishing of these vessels as is hinted at by the occurrence of decoration and surface treatments.

Summary

MIA Flint Group pottery appears to be a carry-over from Early Iron Age traditions. Analysis of a limited number of these vessels suggests that they were made from similar, local clays to those identified in the Sandy-Organic Group, these being tempered with crushed, calcined flint in order to render them suitable for potting. Vessel forms echo those that were standard in the EIA. Forming appears to have been substantially similar to the kinds of techniques used in crafting the later Sandy-Organic wares, with evidence for the use of coiling, hand-shaping, and pinching/drawing in several vessels. Similarly little effort appears to have been applied to surface treatment, decoration, and the even colours that could be imparted by firing; overall, as little emphasis on the aesthetics of these wares is in evidence as in the Sandy-Organic Group. In essence, Region 2 Flint Group pottery appears to be a simple carry-over from earlier traditions: there is no evidence that the vessels' fabrics afforded a specialised functional role, and the wares appear to have gone out of use at some point after the introduction of Sandy-Organic pottery.

5.2.3 Shelly Group

The Shelly Group is another significant subgroup in the Later Iron Age contexts of Hertfordshire. The chronology of the group overlaps the MIA and LIA, and incorporates interesting typological and functional variation between these two periods. It is also argued that these wares are predominantly regional 'imports', deriving from source materials not native to Region 2. The group includes two fabrics defined from six fabric samples, with ten samples having been analysed by radiography.

Fabric S1

A usually hard, sandy-feeling fabric, commonly fired a reduced black but with patchy surface oxidation with shades of light-to-mid brownish orange. The irregular breaks show undulating patterns of common-to-abundant white shell fragments and a little quartz. Thin-section analysis shows that the shell is accompanied by common-to-rare iron oxide, muscovite, and fossiliferous limestone in a homogeneous clay matrix with very occasional variegated streaks and ferruginous zones (fig.5.22a & b). (PWD-12) has no shell as this appears to have leeched out at some point: elongated voids are visible in the hand-specimen.

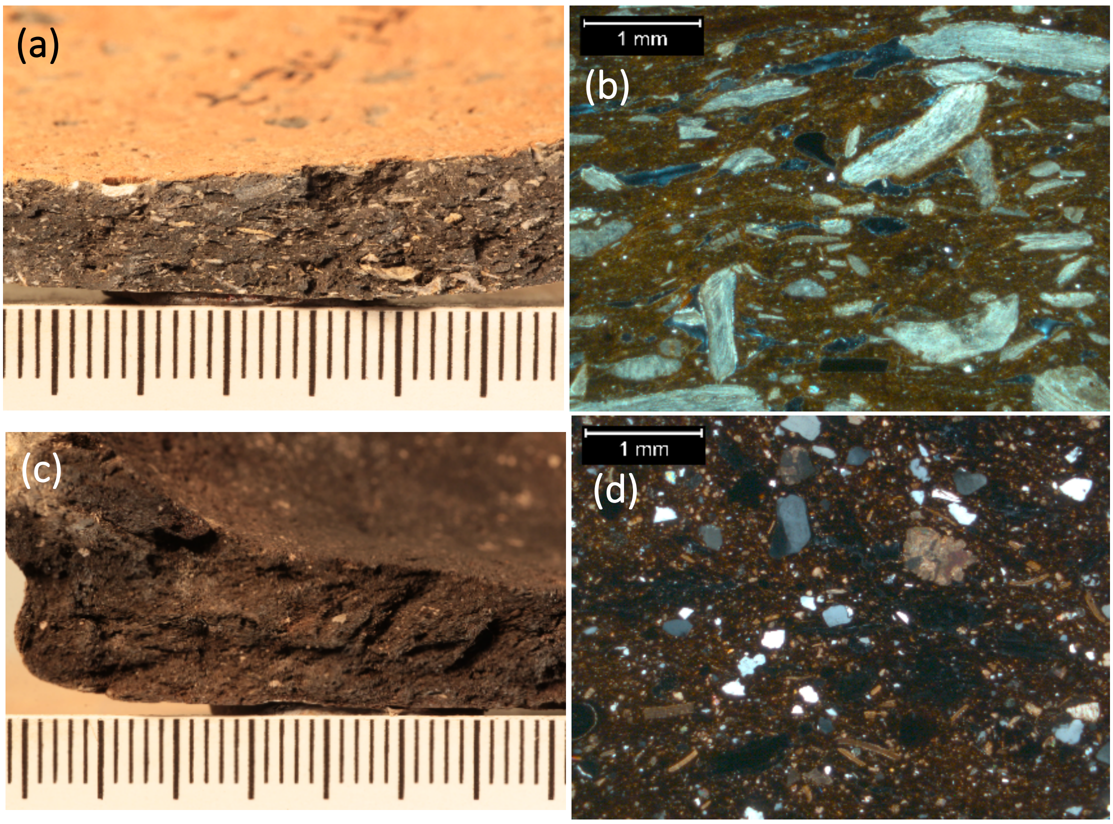


*Figure 5.22. **Fabric S1**: (a): photograph of fresh break. (b): photomicrograph, x40, XPL. **Fabric S2**: (c): photograph of fresh break; (d) photomicrograph, x40, XPL.*

Fabric S2

A hard, soapy-to-sandy fabric predominantly fired to very dark browns and blacks. The irregular or hackly breaks expose a silty clay with a moderate scatter of small-to-medium (up to 2mm) shell with occasional calcite (chalk/limestone). Petrography shows a moderately bimodal petrofabric with minor inclusions of iron oxide, fossiliferous limestone, muscovite, and tourmaline (fig.5.22c & d).

Provenance

Shelly fabrics are known in many areas of southern Britain during the Later Iron Age. Of greatest relevance to the groups from Hertfordshire are the shelly wares of M-LIA date found in variable proportions at sites to the north of the region, e.g. at Haddenham V, Cambridgeshire (Hill & Braddock 2006), and those that dominate some assemblages from southern Essex, e.g. at Mucking (Thompson 2015b). The former are likely to derive from local outcrops of Jurassic clays, while the latter probably have their origins in the Woolwich Formation, part of the Lambeth Group which outcrops intermittently in the Thames Estuary.

Petrographic analysis reveals that the Region 2 fabrics contain not only abundant shell, but also numerous calcareous rock fragments (limestones and/or chalks). In the case of S1 the shell debris was found to include fragments derived from echinoids, bryozoa, and molluscs: an assemblage of animal remains that supports the notion that the raw materials used in the fabric were derived from geological sources of Jurassic date (J.R.L. Allen, pers. comm.). Aside from erratic inclusions in the glacial tills (which do not otherwise match these fabrics), Jurassic geology is not found in Hertfordshire itself but to the north and west of the county, making it likely that these fabrics are (a) regional imports, and (b) related to the shelly wares of the Cambridgeshire-Bedfordshire region (Thompson's zones 8 and 9 (1982, pp.16–17)). Closer inspection of the reports for sites in the Cambridgeshire-Bedfordshire region reveals that many MIA fabrics here are made from shelly clays, and can be broadly divided into those fabrics that are dominated by shell fragments, and those that also include substantial amounts of quartz sand. This division equates to that made for Region 2, the former matching fabric S1, the latter matching S2. In the assemblage from Haddenham V, shelly fabrics made up over half of the assemblage by weight while sandy shelly fabrics made up an additional 26% by weight (Hill & Braddock 2006). The evidence is therefore strongly suggestive of the Shelly Group wares being regional imports from the areas northwest of Region 2.

Distribution and chronology

As noted above, shelly fabrics based on raw materials derived from Jurassic deposits are common in the counties bordering Hertfordshire during much of the Iron Age. Published assemblages have widely varying proportions of these fabrics, and it is possible that there are some chronological factors involved in this. However, it is certain that fabrics that are petrographically very similar to those known from Region 2[3] have been found in both MIA and LIA contexts at numerous sites in areas outside the region. Examples include Pennyland and Hartigans, Milton Keynes (Knight 1993; Marney 1993); Cat's Water, Fengate, Peterborough (Pryor 1984, pp.133–161); West Stow (West 1989, pp.60–68); Wardy Hill (Hill & Horne 2003); and Haddenham V (Hill & Braddock 2006).

MIA groups find shelly wares in the usual full range of East Midlands Scored/Plain Ware referred to in section 5.2.1 on the Sandy-Organic Group. Significant such groups are known from, e.g., Cat's Water and Haddenham V. In Region 2 these never dominate assemblages, but are known in MIA contexts at, e.g., the A505 Baldock Bypass (fabrics F16 and F18: Wells 2009, p.48), and Blackhorse Road, Letchworth (Birley 1984). In the LIA, the typological range of the shelly wares becomes somewhat more limited as the more general repertoire of fabrics diversifies. The typical forms are Thompson's C5-1 and -2, both kinds of lid-seated jars based on the high shouldered bead-rim form (Thompson 1982, pp.244–251). Thompson's corpus showed these forms to have a patchy distribution, entirely north of the Thames and apparently centred on her 'zone 8' (immediately west of Hertfordshire's 'zone 7', in the vicinities of modern Bletchley and Northampton). Marney notes that shelly-ware groups from Milton Keynes were also dominated by lid-seated jars when found in likely first-century AD contexts (1989, p.58). However, this is not universally the case, as groups from, for example, Cat's Water, Fengate, were found to have a range of late La Tène-style cordoned bowls in a range of shelly fabrics, while Thompson also reports (1982, p.17) that coarse forms such as the C6-1 storage jar are commonly found in shelly fabrics at, for example, Moulton Park, Northampton, and Emberton, as well as in Milton Keynes.

In Region 2, LIA Shelly Group vessels are normally of the lid-seated jar types reported above. Such vessels are known from, for example, Hare Street Road, Buntingford (Percival 2016), Skeleton Green (Partridge 1981 Fig.24 No.100; Fig.44 Nos.18 & 19; Fig.49 Nos. 110-113, etc.), Baldock 1968-72 (Stead & Rigby 1986

[3] Petrographic analyses reported in, e.g. Williams (1984; 2003; 2006).

Fig.116 No.144; Fig.117 No.152; Fig.119, No.182, etc.), and the Baldock Bypass (Wells 2009, p.72). It is notable that at the latter two sites these forms do not appear in contexts earlier than the mid-first century AD (*ibid.*). Rarer forms include the unusual 'tub' from Skeleton Green (Partridge 1981 Fig.31 No.89), and the buckets or cauldrons from the Baldock area (Stead & Rigby 1986 Fig.112 No.107; Wells 2009, p.72); these latter vessels being paralleled at sites in Cambridgeshire, Essex, and Northamptonshire (Stead & Rigby 1986, p.287), as well as Silchester (Timby 2000 Fig.140 No.850).

<u>Function</u>

As stated above, the MIA repertoire of Shelly Group vessel types is fairly said to encompass the full range of East Midlands Scored/Plain Ware types. The functional analysis conducted by Hill & Braddock (2006) was done on an assemblage comprised mostly of shelly wares, and as such their analysis stands as the best assessment of the functional characteristics of the fabrics and their vessels. In summary, their analysis showed little evidence for the functional specialisation of the shell-tempered fabrics, although a lower proportion of shelly wares was found to be burnished relative to the proportion of burnished wares in sandy fabrics (*ibid.* Fig.5.69), burnishing more commonly being associated with serving vessels than with cooking or storage vessels. However, burnishing was found on a significant proportion of both shelly- and sandy-fabric vessels, hinting that the functional significance of fabric may be fairly minimal. One of the main functional criteria was found to be size (*ibid.* pp174-175), and Hill and Braddock report no functional significance associated with the specific nature either of the broad fabric groups or their respective form/size repertoires. It is therefore likely that the occurrence of generally limited or isolated occurrences of Shelly Group vessels in MIA Region 2 contexts resulted from the occasional movement of these vessels from their heartland to the north and west, wherein they were primarily produced from local clays for local consumption.

The far more restricted repertoire of forms in which LIA Shelly Group vessels are found is suggestive of a more specialised role for these wares in this period. The most common form – the C5-1/2 – may have served as a vessel to transport limited quantities of some commodity, its lid-seated rim suggestive of the use of a cover to keep the contents of the vessel secure. Alternatively, they may have been subject to informal exchange or gift-giving, signifying a different kind of tie between communities living either side of the Chilterns. Meanwhile, clear specialisation is evident in the case of the buckets/cauldrons from the Baldock region. Stead & Rigby note that their illustrated example exhibited heavy sooting on the exterior surfaces, and comment that the form of the lugs suggests that a wooden handle was threaded through them in order to suspend the vessel. It therefore seems likely that this kind of vessel was made with the intention that it would be used as a kind of large cooking pot. In reference to Iron Age and Roman metal cauldrons, Joy (2014, pp.341–343) has highlighted the capacity of the vessels, and their rarity, as features indicating that such vessels would not have been in everyday use, but may have been used specifically for feasts. This argument may be extended to these ceramic versions, bringing into question the significance of Baldock as a settlement with an apparently-disproportionate number of cauldrons; and potentially also the producers of these shelly wares, who appear to have been the only producers making such vessels despite their wares being by no means the most common in this period.

<u>Analysis of manufacturing techniques</u>

Vessel forming

A small sample of ten vessels in shelly fabrics was analysed to interrogate the forming methods used in their manufacture. These included four MIA and six LIA vessels, of which nine could be allocated to a type. Types represented included two saucepan forms (Hill & Braddock forms K2 and L2) and one everted-rim jar/bowl of MIA date, and three Thompson C5-1 jars, two C5-2s and one L6 lid, all of LIA date.

Fig.5.23 presents the forming techniques identified, displayed as proportions of vessels in which techniques were identified. As usual, coiling was found to be the primary technique that was most commonly found, identifiable in 5 of the 10 vessels. All four of the MIA vessels showed signs of primary coiling. One vessel (2/BNT-028) may have been pinched or drawn during the manufacture of the preform, based upon the identification of vertical inclusion/void orientations throughout this (admittedly small)

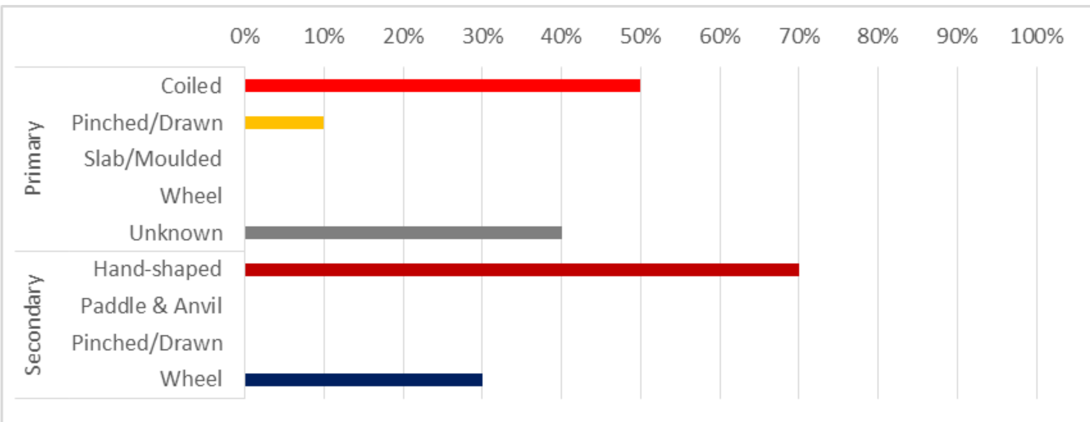


Figure 5.23.. Region 2, Shelly Group. Forming techniques as proportions of vessels.

sample. This vessel – one of the LIA C5-1s – was certainly secondarily wheel-fashioned, showing fine horizontal striations on its exterior surfaces.

Wheel-use was noted in three of the vessels, in all cases in the form of secondary wheel-fashioning rather than throwing. As expected, all of these examples dated to the LIA, and all are of Thompson's C5-1 type. However, not all LIA vessels in the sample showed evidence of being shaped on the wheel: the L6 lid and two C5-2 bead-rim forms appeared to have been wholly handmade, the lid in particular showing signs of coiling in the radiograph. It therefore seems that the wheel was only selectively used by Shelly Group potters during the LIA, and there may be an association with the C5-1 bead-rim jar.

Figure 5.24. 2/BAL-018, a C5-1 jar showing horizontal external striations indicative of wheel-use. Permission to use image kindly provided by North Hertfordshire Museums Service.

Surface treatment

Only two examples of surface treatment were found on the Shelly Group vessels analysed. In both cases, an all-over burnish appeared to have been applied to the exterior surfaces of lid-seated jars. Caution is necessary when considering this, as the sample being dealt with is small. Nevertheless, the observation may be made that the occurrence of surface treatments appears to be of a similar frequency to that found in the Sandy-Organic and Flint groups, signifying a generally low investment in the finishing of these vessels.

Decoration

Two examples of decoration were found; in both cases the slashing of the rim-top at regular intervals with a sharp implement. This is a recognised feature of the C5-2 jar. The occasional nature of such decoration, and its nature as a process that will not have proved labour-intensive, highlights a similar lack of attention to the decorative qualities of these vessels.

Figure 5.25. Slashed-rim decoration on 2/PWD-038.

Paradoxically, this is at odds with the use of the potter's wheel to craft some examples of the C5-1 form, which seems to suggest some attention was being paid to the crafting of these vessels in such a way as to make them fine, even and aesthetically pleasing.

Firing

As with the two exclusively-MIA groups, firing patterns were found to be predominantly reduced. The most common firing pattern, found in 6 of the 10 vessels, was R1: a thorough blackened reduction-firing. This may signify that many of the Shelly Group vessels were subjected to somewhat-controlled firings, with effort being made to ensure vessels became predominantly black in colour. This will have provided an unusual visual quality to the pots, the white of the shell inclusions being visible as flecks and streaks within the fabric. This may have served to signify these products apart from others, particularly in the LIA examples, which appear to have been sporadically moved into Region 2 from elsewhere.

<u>Summary</u>

The Shelly Group is the only Region 2 group to be known in both the MIA and LIA in significant quantities. In the MIA the group appears to represent the movement of a certain component of wider Scored Ware/East Midlands Plain Ware pottery into the region from the areas of Jurassic geology to the north and (possibly) east. In this period there is little suggestion that this movement was related to the production of specialised types, similar forms being represented in shelly fabrics to those associated with the Sandy-Organic Group. More likely is that these wares represent informal social ties between communities living either side of the Chilterns, with pottery being moved across this natural boundary in, for example, gift exchange. The distinctive even reduction firings applied to many Shelly Group vessels may have served to signify the social origins of these wares, the black, white-speckled fabric being distinctive compared to the fabrics of the Sandy-Organic Group. The production of such distinctive pottery, and with firing techniques tailored to its production, may well have been significant to the definition of another localised community of practice.

In the LIA the Shelly Group is distinctively different. Fabrics are near-identical and it is therefore proposed that production was continuous from the MIA. However, new forms were made, these being typologically restricted and apparently specialised in their intended functions (cf. lid-seated jars, cauldrons, etc.). In addition, the potter's wheel was utilised in making certain types, particularly the lid-seated jars which are often very competently tooled and show the use of rotary motion. This may all represent the emergence of a somewhat more specialised industry from a MIA forerunner.

5.2.4 Grog Group

The Grog Group is the predominant LIA fabric group in Region 2, corresponding with the grog-tempered 'Belgic' pottery of Thompson's corpus (1982) and being the counterpart to the Region 1 Grog Group (albeit with certain differences in fabric and typology). The group incorporates five fabrics, with a total of nine variants among these; fabric characterisation was done on the basis of analysis of 59 fabric samples from six sites.

Fabric G1

Four sub-types of the G1 fabric are defined, all of which are known in Region 2. All of the variants share certain features, the most crucial of which is the presence of grog temper in varying amounts alongside predominantly silt- and fine-sand-sized quartz and rounded iron oxides. In thin section it can be seen that the quartz is always accompanied by other silicate minerals and occasionally by rock fragments: these include muscovite mica, tourmaline, siltstones, and flint (non-calcined, often rounded, and therefore natural to the clay). Some examples also have sparse-to-common blackened voids resulting from burnt-out organics, and in some cases this may have been deliberately added. Textures are typically soapy although may also present as sandy; breaks are irregular or hackly.

The four varieties present in Region 1 are:-

- G1a – Either lacking in diagnostic inclusions aside from grog (up to 1mm), iron oxide and quartz, or only including up to moderate amounts of quartz sand, angular flint (calcined or not) and/or organics. Calcined flint seems to originate from the disaggregation of grog derived from flint-tempered vessels (fig.5.26a & b).
- G1b – Coarse variant of G1a, with exclusively hackly fracture and larger grog and accessory inclusions (up to 3mm) (fig.5.26c & d).
- G1c – Ferruginous variant of G1a. Defined on the basis of having a ratio of iron:grog perceptibly greater than 1:1. Is often, though not always, softer than other G1 variants (fig.5.26e & f).
- G1d - Calcareous variant of G1a. Defined by the presence of sparse-to-moderate angular-to-subrounded particles of calcite (chalk and/or limestone).

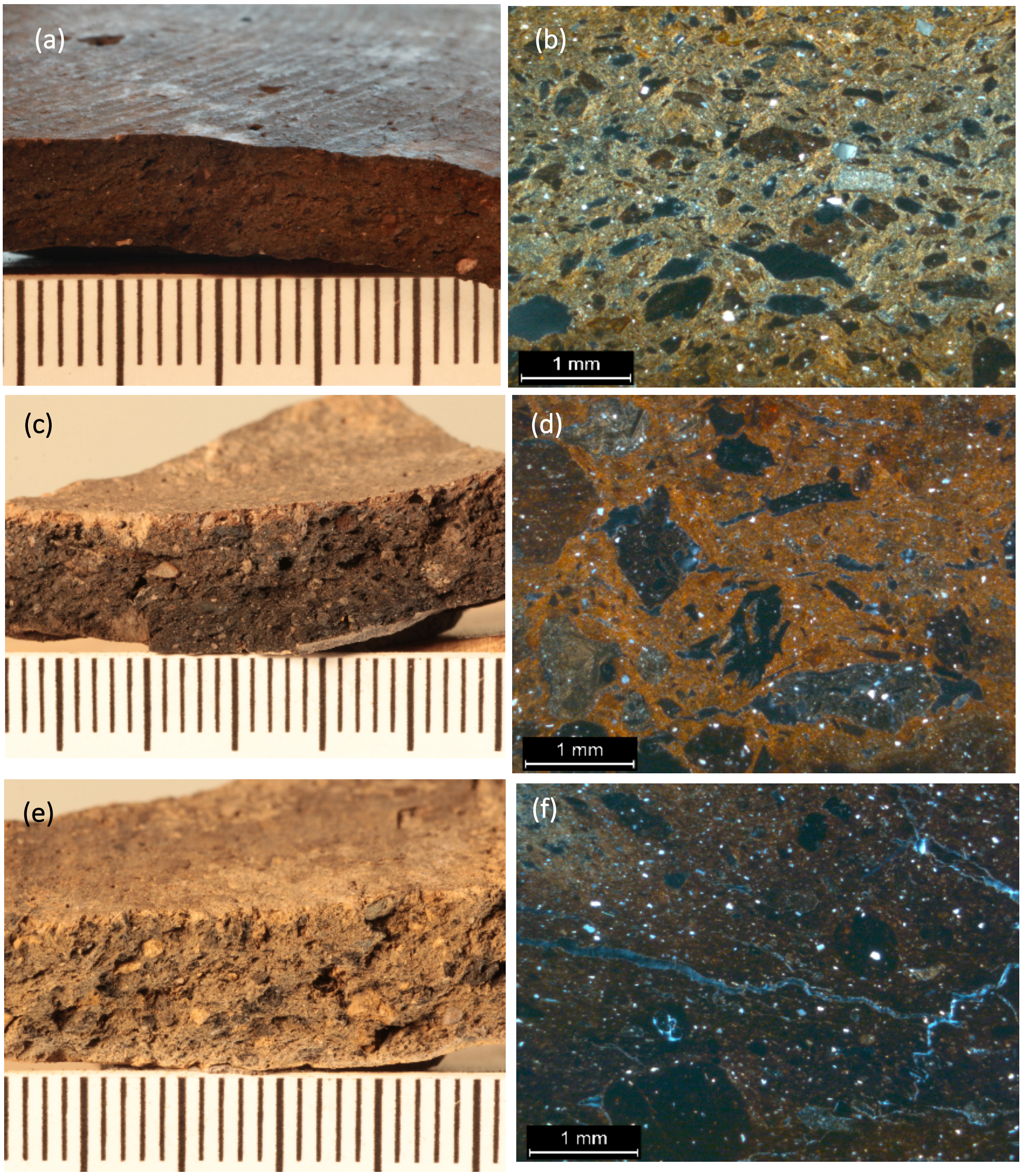


*Figure 5.26. **Fabric G1a**: (a) photograph of fresh break. (b) photomicrograph, x40, XPL. **Fabric G1b**: (c) photograph of fresh break; (d) photomicrograph, x40, XPL. **Fabric G1c**: (e) photograph of fresh break; (d) photomicrograph, x40, XPL.*

These inclusions may only be visible microscopically, and most clearly in thin-section (fig.5.27a & b).

Fabric G2

A generally coarse fabric: hard with an exclusively soapy texture and irregular or hackly breaks. Colours are usually limited to greys and browns in varying shades. These are usually heterogeneous within a given sample, with patchy firing patterns suggestive of a lack of control over firing. The clay is tempered with moderate-to-common grog in similar colour ranges to the samples themselves; there is very little

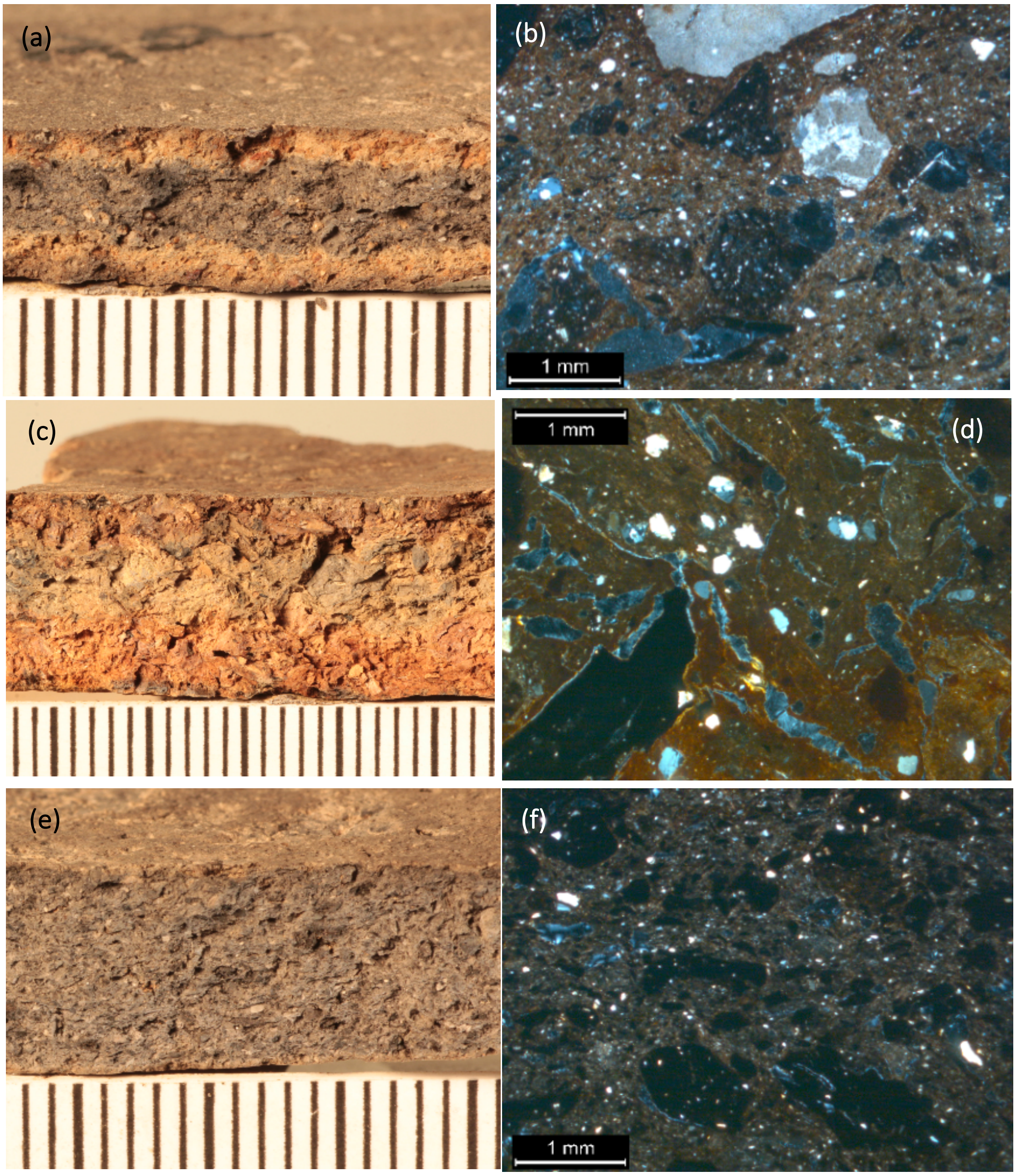


*Figure 5.27. **Fabric G1d**: (a) photograph of fresh break. (b) photomicrograph, x40, XPL. **Fabric G2**: (c) photograph of fresh break; (d) photomicrograph, x40, XPL. **Fabric G3a**: (e) photograph of fresh break; (f) photomicrograph, x40, XPL.*

else present in terms of inclusions. This is confirmed in thin-section, where grog was always found to predominate and only very small numbers of generally small (<0.5mm) mineral grains and rock fragments are present. These consist of silicate minerals/rocks such as mono- and polycrystalline quartz, muscovite mica, and flint, as well as ferruginous grains (fig.5.27c & d).

<u>Fabric G3</u>

While G3a has been noted in hand-specimen in Region 1, both an 'a' and a 'b' variant of the G3 fabric have been noted in Region 2. G3 is a relatively fine grog-

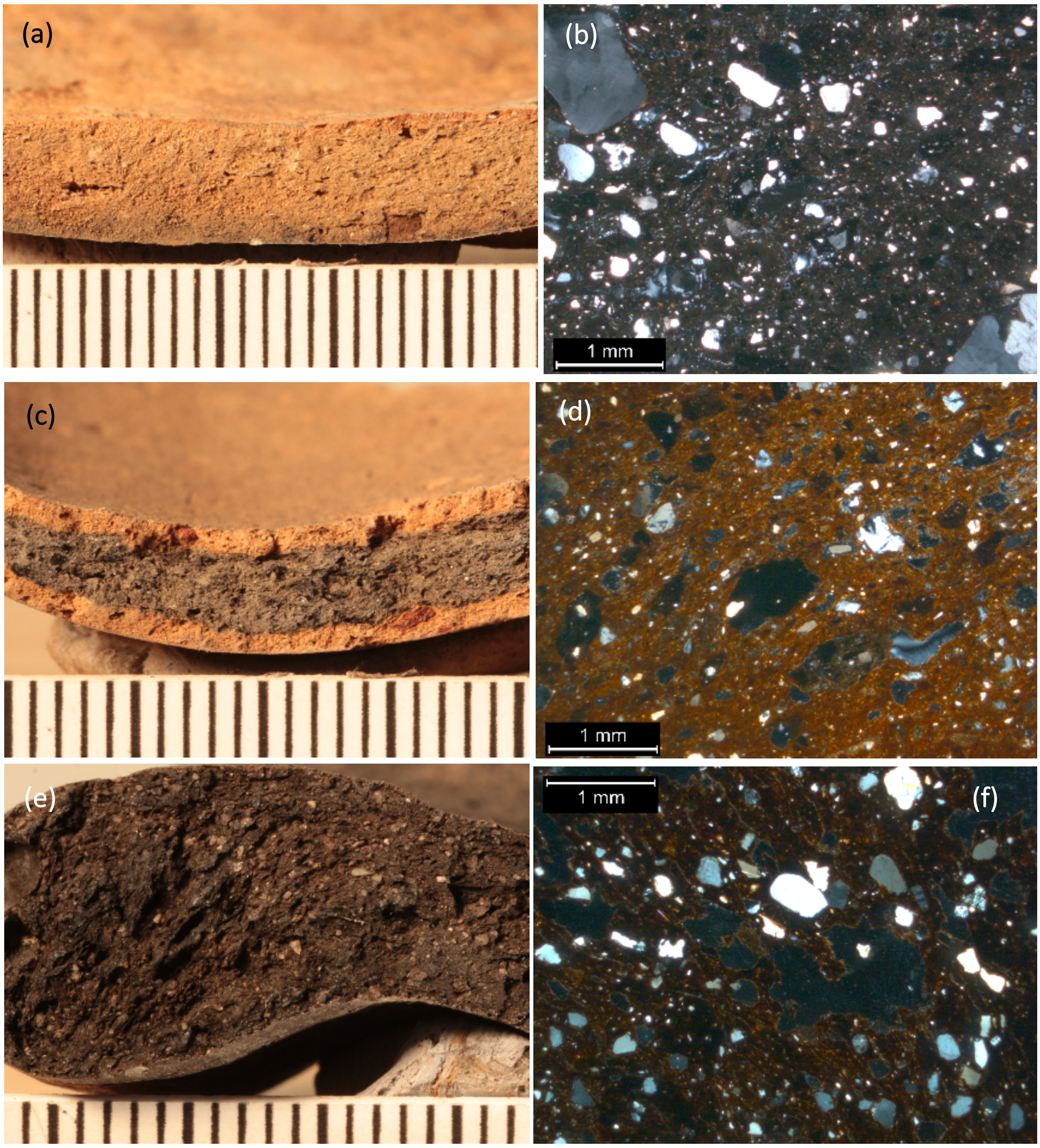


*Figure 5.28. **Fabric G3b**: (a) photograph of fresh break. (b) photomicrograph, x40, XPL. **Fabric G4**: (c) photograph of fresh break; (d) photomicrograph, x40, XPL. **Fabric Q4**: (e) photograph of fresh break; (f) photomicrograph, x40, XPL.*

tempered fabric that is defined by its distinctive light-grey colouration. The finer wares are also distinguished by their softness - being able to be easily scratched by a fingernail - yet still producing an audible 'ring' when tapped. Surfaces are sandy to the feel and breaks are irregular or hackly. Within, the temper of common-to-abundant, predominantly dark grey or black subangular grog can be seen alongside varying amounts of quartz silt and sand, and occasional small flint.

The two subtypes of G3 are:-

- <u>G3a</u> – defined by a higher proportion of grog relative to quartz sand (fig.5.27e & f).

- G3b – defined by a higher proportion of quartz sand relative to grog (fig.5.28a & b).

Fabric G4

A very sandy-feeling, soft fabric with irregular breaks that reveal moderate-to-abundant quartz silt and sand (up to 0.5mm) and moderate-to-common black and/or buff grog up to 2mm. Most samples exhibit a characteristic surface oxidation, surfaces being a light reddish brown colour: these examples may be termed a variety of 'red surfaced' grog-tempered ware. However, a minority of examples are reduced to dark grey, brown, or black throughout (fig.5.28c & d).

Fabric Q4

A fairly coarse fabric: hard, with soapy-to-sandy feel and irregular breaks. Breaks show a dense, common-to-abundant scatter of quartz sand and silt, along with common elongated voids possibly representing burnt-out organic matter. Sparse-to-moderate grog up to 2mm is also present. There is similarly little of value for provenancing in the suite of minor inclusions identified in thin-section, which include muscovite, flint, and polycrystalline quartz. This fabric was allocated a 'Q' prefix on the basis of the relative predominance of quartz (fig.5.28e & f).

Provenance

Grog Group fabrics have traditionally been regarded as very difficult to provenance. Thompson (1982, p.20) makes reference to petrographic analysis conducted by Lea Jones on LIA grog-tempered sherds from Brickwall Hill and Braughing in Hertfordshire, as well as from Nazeingbury (Essex) and Canterbury (Kent). The results were interpreted as confirming the homogeneity of the grog-tempered 'fabric', which was found to uniformly contain quartz sand, muscovite, and iron oxide pellets and apparently nothing of value to provenancing. Nevertheless, Thompson sees the typology as representing numerous production locations, all presumably using local deposits of mineralogically similar clay (*ibid.*). Freestone's petrographic analysis of the King Harry Lane cemetery assemblage (1989, p.265) concurs with Jones' mineralogical description, also noting that variable proportions of organic matter were added to the fabrics alongside the grog, and that the proportion of organic matter appeared to be lower in 'Roman' vessel types (i.e. import copies). No subdivisions of the basic grog-tempered fabric were offered, and it was assumed that the origins of all such wares were local. Most recently, in the analysis of pottery from Elms Farm, Heybridge, Essex, Williams (2016) stated that the fabrics from this site were identical in description to those reported from King Harry Lane, and that they may therefore derive from a common source.

Commentary on the Region 1 Grog Group has dealt with provenance in passing, but it is worthwhile noting that the Grog Group material from both regions discussed in this study broadly matches the descriptions offered to date: i.e. all consist of silty or sandy clays with muscovite mica, iron oxide, grog and organic matter in variable proportions, the latter two being added as tempering agents. These inclusions by themselves offer no ground for provenancing. In addition, there is no reason to believe that the apparent uniformity of these basic descriptions justifies the notion of common production over such a huge swathe of southern England. Thompson is undoubtedly correct in stating that the typology justifies the notion of numerous producers operating principally at a local level.

With this in mind, a re-examination of the Grog Group fabrics is appropriate, and – as can be seen from the fabrics defined – multiple fabrics can be perceived within the overall scheme of the grog-tempered wares of Region 2. G1 is used to define fabrics that broadly match the 'traditional' description, with subcategories reserved for coarse (G1b), calcareous (G1d), or particularly ferruginous (G1c) fabrics. All fabrics are generally far less ferruginous than their Region 1 counterparts, containing far fewer iron oxide pellets than fabrics proposed to originate from the Lambeth or Thames Group clays of the Middle Thames Valley (fig.5.29). This strongly suggests that the majority of wares from these two regions derived from separate sources. The presence of G1d also highlights a geological differential, with this calcareous variant not represented at all in Region 1, but being noted multiple times in Region 2 both in thin-section and hand-specimen. G2 characterises vessels with very fine fabrics that may be indicative of a different source again; and the G3 and G4a fabrics are distinctive

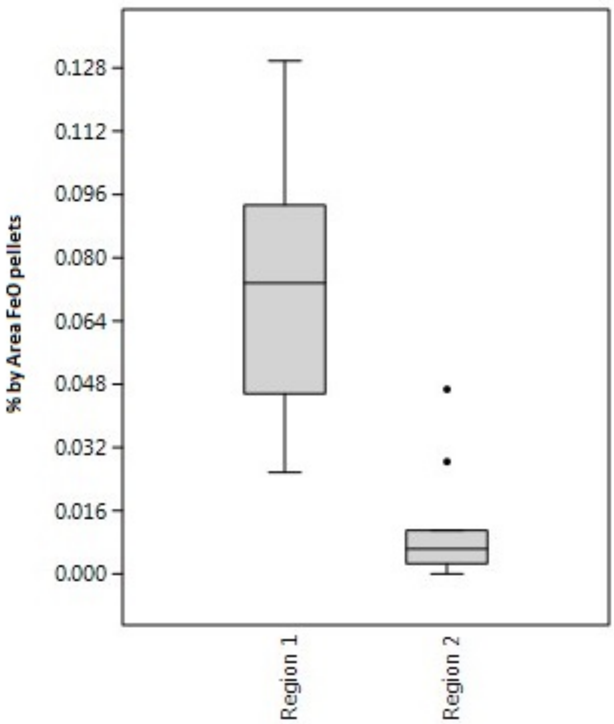


Figure 5.29. Box-and-whisker plot of iron content of Region 1 and Region 2 Grog Group fabrics, expressed as percentage-by-area of iron oxide pellets identified during point-counting.

fine fabrics that cannot easily be lumped in with the rest of the coarsewares. G4b and Q4 differ again in that their predominant inclusion type is quartz sand, with grog occurring only secondarily.

These wares are admittedly difficult to provenance. The sedimentary geologies that dominate southern England include few rocks or minerals that can be used to reliably source pottery. Discrete outcrops of distinct rock-types – such as those igneous rocks used to characterise fabrics in the south-western-based studies of Peacock and Morris (Peacock 1968; 1969; Morris 1981; 1982) are of very minor significance. Nevertheless, some conclusions pertaining to provenance may be offered for the fabrics defined. The calcareous fabric G1d is noted as having a very fine-grained clay matrix with little silt, and on this basis a provenance on the Chiltern dip-slope may be tentatively suggested, the clays being won from the deposits of clay-with-flints that cap the hills (J.R.L. Allen, pers. comm.). These deposits are locally highly variable and derive from different geological processes, but incorporate residues from the chalk and quaternary sediments that would be consistent with the minerals and rocks found in G1d (Hopson et al. 1996). G2 may also derive from the clay-with-flints, being of a similarly fine-grained clay with little else natural to characterise it.

A note on tempering

As in the thin-sections made of Region 1 Grog Group fabrics, several of the Region 2 samples showed examples of what appeared to be grains of grog with glassy, vitrified microstructures (signified by a continuous texture and low optical activity when viewed in XPL). Analysis of such grains in the SEM using the

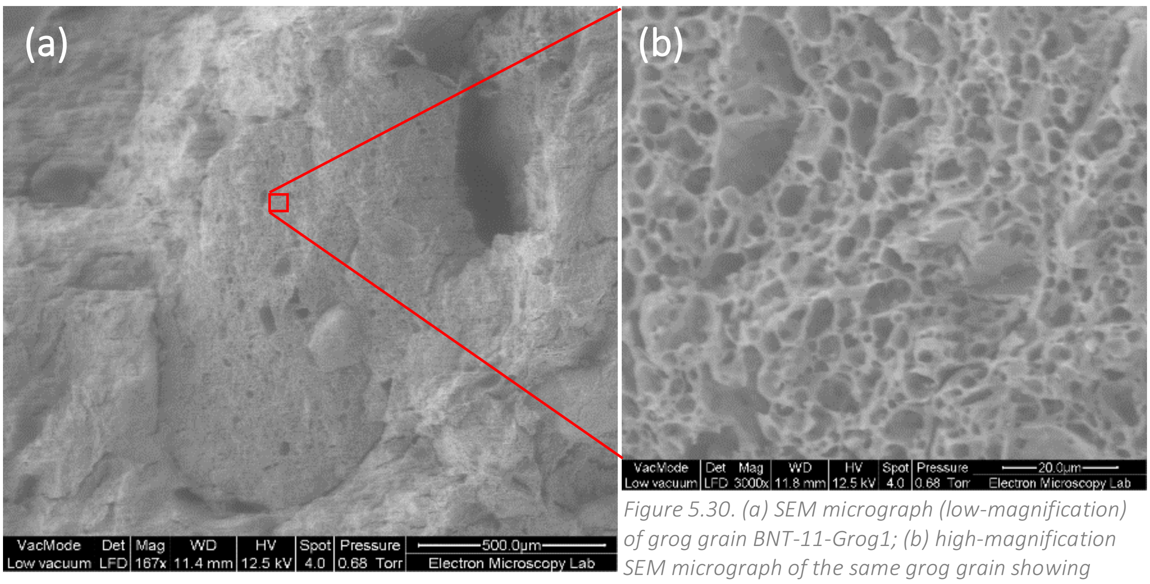


Figure 5.30. (a) SEM micrograph (low-magnification) of grog grain BNT-11-Grog1; (b) high-magnification SEM micrograph of the same grog grain showing continuous vitrification of the microstructure.

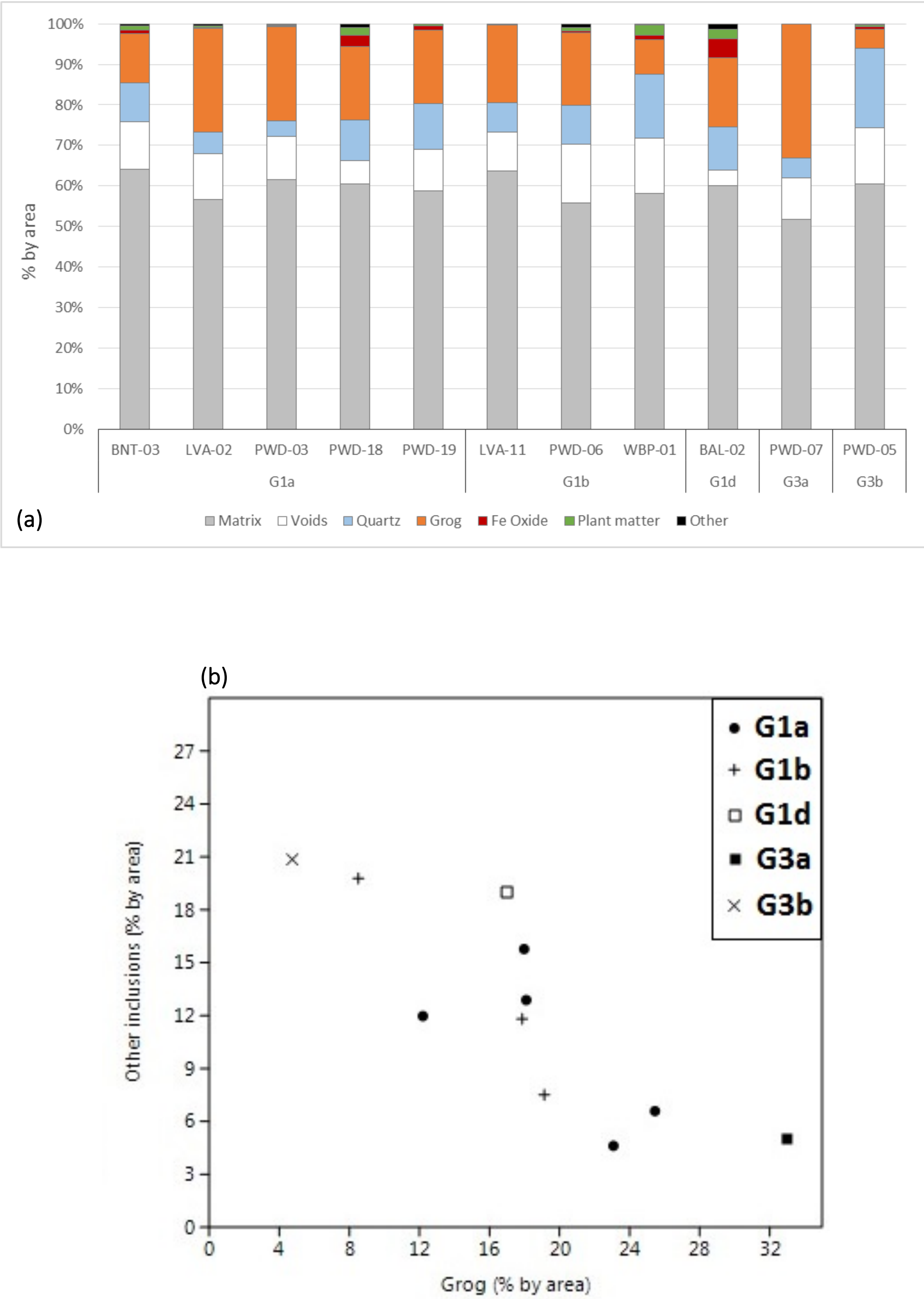


Figure 5.31. (a) Bar-chart illustrating compositions of 11 Grog Group samples analysed by point-counting. (b) Grog vs other inclusions as percentage-by-area statistics derived from the 11 samples analysed by point-counting.

methodology published by Maniatis and Tite (1981), and comparison between the microstructures exhibited by grog grains and nearby areas of clay matrix (see Appendix H) again support the conclusion that, occasionally, grog particles were derived from ceramics that had been fired to substantially higher temperatures (c.850-1,000˚C: indicated by Maniatis & Tite's 'extensive' and 'continuous' vitrification stages) than the ceramics into which they were incorporated as temper (typically fired to c.750-800˚C: indicated by Maniatis & Tite's 'no vitrification' and 'initial vitrification' stages). This is strongly suggestive of the recycling of over-fired waste pottery as the raw material for creating temper.

Fig.5.31a illustrates the percentage-by-area statistics for the 11 Grog Group samples subjected to PETROG point-counting analysis. Samples vary widely in their porosity and in the nature of their inclusions. In particular, grog – the only certainly anthropogenic inclusion in these fabrics – is present in highly variable proportions between samples: from 33% (PWD-07) to 4.74% (PWD-05). Quartz content is similarly variable – being dominant in WBP-01 (15.93%) and PWD-05 (19.59%), but relatively minor in, for example, PWD-03 (3.85%).

Looking at these compositional differences in more detail, fig.5.31b compares the 11 samples' grog content to the proportion of other inclusions recorded. The plot allows us to tentatively suggest that there is a rough, indirect correlation between the proportion of grog and the proportion of other inclusions in a given sample. This offers a similar situation to that identified in the Sandy-Organic Group, wherein it was proposed that tempers of coarse quartz and organic matter were added in variable amounts to variably silty clays: the less natural silt found, the more temper was added. A similar observation can be made here: where more naturally-occurring inclusions were present in the clay, less grog was added in order to prepare it for use in potting; where fewer natural inclusions were found, more grog was added. This implies a similar, subjective attitude to clay preparation as was practiced in the MIA Sandy-Organic Group, clays being tempered on an *ad-hoc* basis based upon a subjective appreciation of the qualities of the raw clay being used in each case, rather than through adherence to a strict 'recipe'.

Distribution

Grog Group vessels are known from all sites of LIA date in Region 2. The use of grog for tempering is a clear example of technological change, representing a shift in the knowledge and practice of mainstream pottery production going into this period, rather than the emergence of a specific producer using a bespoke fabric recipe.

As discussed, the widespread use of grog – an anthropogenic inclusion with no geological ties that can be used for provenancing – creates difficulty in ascertaining precise sources for the fabrics, in turn making an assessment of the movement of Grog Group vessels extremely difficult. In addition, the occurrence of quartz, flint, and calcareous rock fragments is of little help distinguishing between either fabrics or geological sources. However, qualitative differences between fabrics may hint at distribution patterns. Fabric G3 is a distinctive fine, grey fabric that has been noted as being particularly common in the assemblage from Prae Wood, St. Albans, but which has also been encountered at other sites throughout the region. While the characteristic typological diversity of the Prae Wood assemblage means that it is not necessarily sensible to treat the representation of this fabric here as indicative of a nearby source, it is worth noting the possibility that it *may* have a provenance near to the *Verlamion oppidum* on this basis. While in no way any more than suggestive, in this context it is worth reiterating that evidence of pottery production at *Verlamion* may have been identified at Pond Field in the form of an 'oven' excavated by the Wheelers in the earlier part of the 20th century (Wheeler & Wheeler 1936, p.44).

Consideration of form allows glimpses of distribution patterns. This is, however, generally only true in the case of the less common forms, which stand out against the 'background noise' of far more common types such as the ubiquitous necked jars and bowls. Thompson has considered these less common forms at some length in her corpus (1982, pp.15-16). In particular, her C7-1 cookpot is a local Hertfordshire type that is hardly found elsewhere (*ibid.* pp.15, 273-281), and this fact probably represents a combination of localised distribution patterns (certainly by more than one producer, based on the number of such vessels known) with the desire for such a coarseware cooking vessel by local inhabitants. In addition, the C7-4 variant of this cookpot is commented on as unique to the Braughing area (*ibid.* pp.15, 286-287) and therefore represents a tight, localised distribution pattern for wares evidently being made at or near to the *oppidum*. Thompson also identifies the plain, necked bowl type D1-5 as a localised Braughing type (*ibid.* pp.16, 316-317) that was therefore probably subject to a similarly localised distribution system as the C7-4; ditto those vessels of D1-1 type with multiple-wavy-line decoration (*ibid.* p.16). Prae Wood is also singled out as having its own local types, e.g. the B1-6, G1-4, and G4 (*ibid.* p.15). Collectively, this evidence indicates the activity of multiple producers coupled with the very restricted distribution of wares, occasionally only encompassing the settlement within or near to which they were produced. This may have resulted from the activity of specialist craftspeople developing their own type-variants as a result of personal style or in response to the desires of consumers; or from the presence of itinerant potters who tailored the repertoires they produced to the specific needs of the communities they visited.

<u>Chronology</u>

It has long been established (e.g. Thompson 1982) that grog-tempered pottery goes into the Roman period at sites throughout the south-east of England, including those in Hertfordshire. However, the earlier limits of this tradition deserve to be the subject of discussion for reasons related to those outlined in Chapter 4.2.3.

As in Region 1, pottery groups dating to the final quarter of the first century BC or later include imported Gallo-Belgic and samian finewares, and imitations of these in Grog Group fabrics. However, numerous groups are now known that are of a typologically earlier character, missing the finewares and imitations and including a range of coarse, handmade jars alongside La Tène-inspired cordoned types. The key forms for these groups are Thompson's C3 and C8-1 – both types of handmade jar. Tyers' stylistic analysis of the C3 type connects the form to his Kent-Boulonnais tradition which has numerous examples of similar plain- or thickened-rim jars with combed bodies (1981, p.237). However the C3 is known at Puddlehill in a context in which it was found alongside MIA types (Storage Pit 32: Matthews 1976, pp.126–127), and finds of very morphologically similar jars in definite MIA contexts at this site (ibid. Fig.98 Nos.50, 51; cf. Thompson 1982, p.235) suggest that the lineage of this vessel type may owe something to the indigenous tradition represented by the Sandy-Organic Group wares (specifically to the Hill & Braddock type P 'flower pot'). The C8-1, meanwhile, seems to be a prototype for the C7 cookpot, the key distinction between the two being the stabbed decoration on the shoulder of the C8 and the slightly more ovoid body of the C7 (Thompson 1982, pp.288–293). Examples of assemblages including significant numbers of these early types are known at Brickwall Hill (Ditch 1: Rook 1970a) and Grubs Barn, Welwyn (Period 1: Rook 1970b, pp.33–34; see also Thompson 1979, pp.180–181); Foxholes Farm, Hertford (particularly F.1 layers 2 & 3: Partridge 1989, pp.178–189); Gatesbury Track, Braughing (Partridge 1979, pp.116–128); and Ian Stead's excavations at Baldock (Stead & Rigby 1986, pp.273–279), among others. Tyers (1981, pp.236–238) was at pains throughout his consideration of these groups to point out what he perceived as marked variability within this early phase, noting that this may represent chronological or other subdivisions which do not carry on into the later decades of the LIA (*ibid.* pp.236-237).

While this early phase is therefore well-known, its absolute date has been the subject of some controversy. The *terminus ante quem* for these early groups is clearly somewhere in the 10s or 20s BC, by which point imports and copies had appeared and the C3 and C8-1 had declined somewhat in popularity (this is Tyers' "Prae Wood Phase": 1981, pp.238–242). Thompson's dating follows Birchall's contention that LIA-type pottery can be compressed entirely into the post-caesarean period, i.e. c.55/50 BC onwards, and the vast majority can be placed into the Augustan period and later (Birchall 1965; Thompson 1979; 1982, pp.1–5). Tyers broadly agrees with this, although he does entertain the idea that the brooch used to date the assemblage from Brickwall Hill Ditch 1 may be pre-Augustan (1981, p.234). Fitzpatrick robustly challenges this compressed dating, and – of particular relevance to Hertfordshire – claims that the Wheelers' assemblage from Wheathampstead is in fact slightly later than that from Brickwall Hill Ditch 1, Gatesbury Track F7 and F41, and the earliest contexts at Baldock, but that the assemblage from Grubs Barn Period 1 is probably roughly contemporary with it (1989a, pp.154–158). This echoes Tyers' suggestion that some of the variability in these groups is attributable to chronology. The implication of Fitzpatrick's reassessment is that the earliest of these groups – those from Brickwall Hill, Gatesbury Track, and Baldock – may be regarded as dating to the early first century BC: this is mainly achieved on the basis of the possible early dating of the brooch from Brickwall Hill Ditch 1. A similar line-of-argument – that continental chronologies can be used to push back established British dates – has been proposed by Haselgrove (1997), who suggests that the dates for the earliest wheel-made pottery in Britain are the same as, or perhaps even earlier than, those advocated by Fitzpatrick: potentially going back into the second century BC. This long chronology has been embraced by scholars such as J.D. Hill (2002, pp.145–146); Hill is cautious due to the comparatively slim strands of evidence that exist for the precise dating of this part of Iron Age chronology, but nevertheless rightly claims that the balance of probability is in favour of a long chronology. In summary, it is therefore now held that the inception of typologically LIA pottery (of which the Grog Group is the most significant component) lies in the pre-Caesarean period, and it may be said that there is far more evidence for such early dates than in Region 1, where there is no clearly identifiable pre-Caesarean phase.

<u>Function</u>

The nature of vessel function during the LIA has already been extensively discussed in section 4.2.3 on the Grog Group of Region 1. Suffice to say here that a similar expansion in formal and functional repertoire characterises the Region 2 Grog Group as it does its Region 1 counterpart (fig.5.32). This section will summarise what

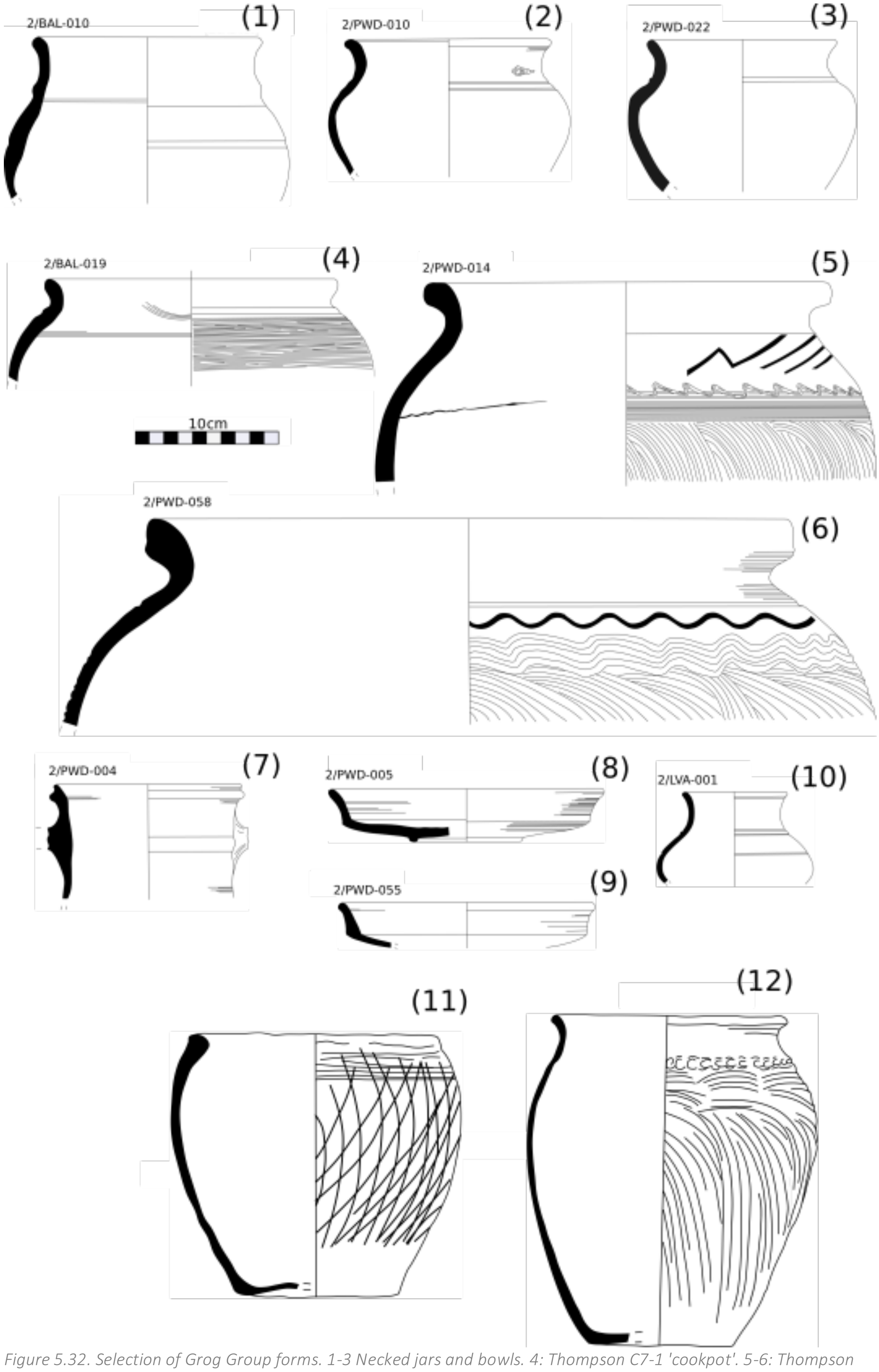


Figure 5.32. Selection of Grog Group forms. 1-3 Necked jars and bowls. 4: Thompson C7-1 'cookpot'. 5-6: Thompson C6-1 storage jars. 7. Flagon. 8-9: Platters. 10: Flask. 11: Thompson C3. 12: Thompson C8-1. Nos.1-10 illustrated by the author. Nos. 11-12 reproduced with kind permission of Isobel Thompson (redrawn from Thompson 1982 p.237 no.11 & p.291 no.16(17), respectively).

has already been stated for the Region 1 group, and add in commentary on some features that are particular to Region 2.

The two most important works on LIA vessel function are currently Hill's paper on the social significance of the introduction of the potter's wheel (2002), and the sixteenth chapter of Hilary Cool's *Eating and Drinking in Roman Britain* (2007), dedicated as it is to the pre-conquest period. Fundamental points emerge from these works. Firstly, Hill identifies the breakdown of the correlation between vessel height and rim diameter that characterises British prehistoric pottery in earlier periods; this being due to increased typological and morphological diversity that seems to have been connected to vessel function (2002, pp.144–145). Thompson's corpus of LIA grog-tempered pottery (1982) demonstrates this, with a huge variety of jars, bowls, cups, pedestalled forms, platters, beakers, flagons, and other forms represented. When her two-volume typology is compared to the fourteen Scored/Plain Ware types defined by Hill & Braddock, or the two pages of illustrations deemed sufficient to characterise the Little Waltham pottery, the enormous difference in stylistic and functional diversity between the two traditions appears stark. Cool's discussion goes into somewhat more depth in analysing individual forms, concluding that platters were used for individual servings of relatively dry dishes (Cool 2007, pp.156, 165); and that beakers were large enough to reasonably assume that their role was in beer consumption rather than that of other kinds of alcoholic beverages, their use possibly being communal (*ibid.* p.164). Hill suggests similar for pedestal urns (2002, p.148), while the functions of such specialist types as lids, flagons, and strainers are sufficiently clear from simple observation that no specialist work need be done to assess the broad nature of their intended use.

Among the variety of jars and bowls present in Thompson's corpus one is known to be particularly characteristic of Hertfordshire assemblages: the C7-1 jar (Thompson 1982, pp.272–281; fig.5.34, no.4). This is an everted-rim, typically ovoid-bodied form with distinctive combed decoration on the body that is generally considered as a coarseware cooking-pot (e.g. Hill 2002, p.147). Indeed, this notion would be consistent with its common appearance as a significant proportion of most LIA pottery assemblages in Region 2. In addition, the Thompson C6-1 is a very common, large form often represented as thick, heavy rim sherds and large body sherds decorated with curvilinear combed decoration on the exterior (*ibid.* pp.256-267). When found complete or semi-complete it is clear that these vessels were not meant to be moved often, being large and probably very heavy when full. They are best

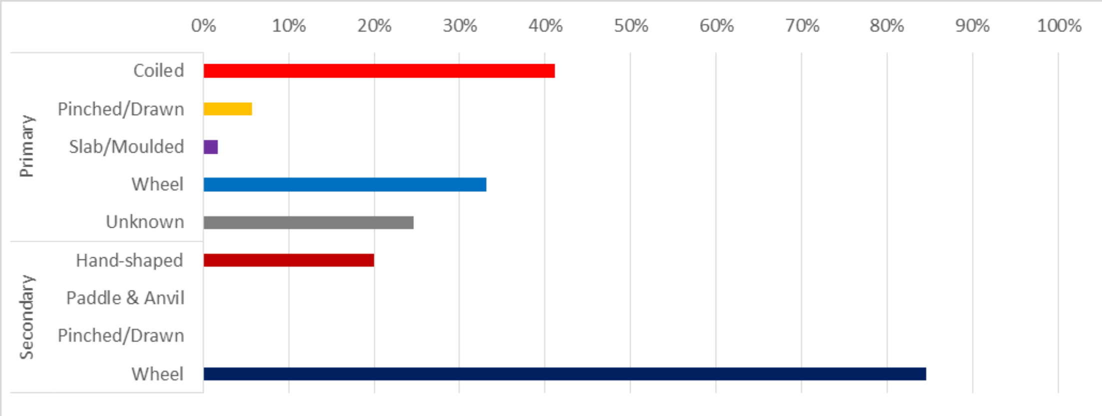


Figure 5.33. Region 2, Grog Group. Forming techniques as proportions of vessels.

interpreted as storage jars, their sheer volume providing another contrast with the MIA repertoire, which does not include such bulky vessels.

<u>Analysis of manufacturing techniques</u>

Vessel forming

Grog Group vessels are by far the most numerically significant in the Later Iron Age. This is reflected in the sample to which forming analyses have been applied, which incorporates a total of 175 vessels from seven sites. The size of this group permits a depth of analysis that has not been able to be achieved with the other fabric groups.

Fig.5.33 presents forming techniques as proportions of vessels in which each technique was found. In terms of primary forming, coiling and wheel-throwing were represented in 41.1% and 33.1% of the vessels, respectively. Slab-building was tentatively identified in three bases (8.6% of this body-part). Pinching/drawing was found in a minority of rims and necks only – 7 rims (5.4%) and 9 necks (9.3%). The use of both of these techniques therefore echo their use in crafting MIA vessels.

Pinching/drawing is worth considering in particular depth. The main identifier of this technique was the near-vertical orientation of voids found in the uppermost parts of vessels, this being indicative of the pulling of the plastic clay upwards. If this is the case, and this evidence is not in fact representative of a form of

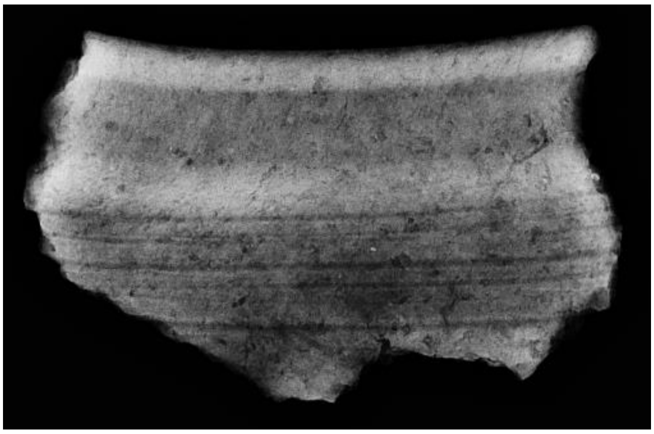


Figure 5.34. Radiograph of C7-1 jar 2/PWD-041, showing near-vertical void orientations at the rim and neck.

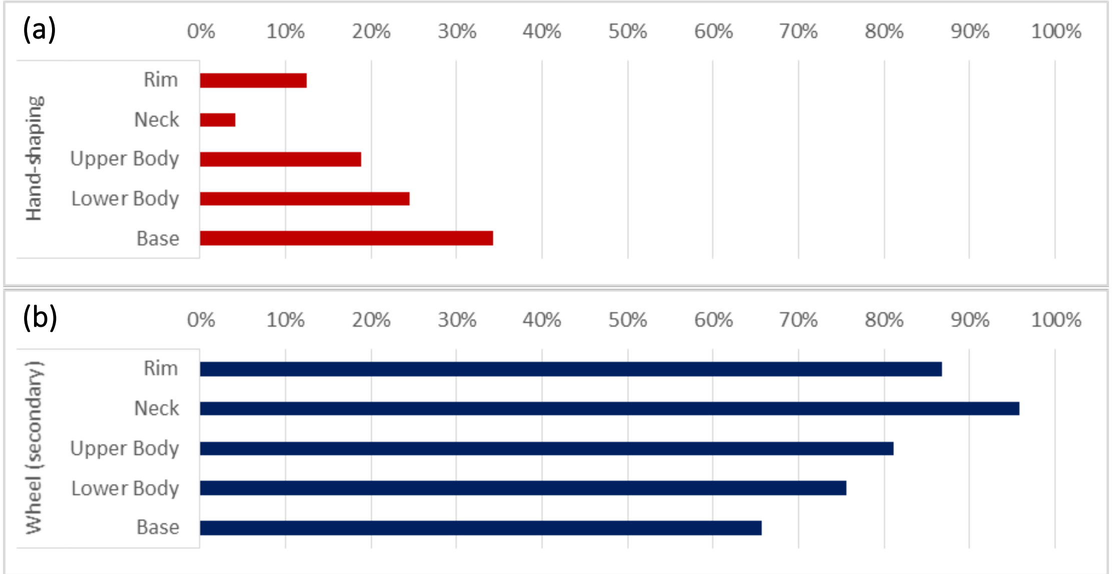


Figure 5.35. Region 2, Grog Group. Occurrence of hand-shaping (a) and secondary wheel-use (b) according to vessel body-part. Totals: Rims n=129; Necks n=97; Upper Bodies n=127; Lower Bodies n=49; Bases n=35.

ID	Type	Vessel Class	Rim Diam. (mm)
2/BAL-004	C3	Saucepan	100
2/BAL-013	C5-2	BeadRimJB	90
2/BAL-009	C6-1	StorageJar	
2/BAL-011	C8-1	EvertedRimJB	160
2/BAL-015	C3	Saucepan	160
2/BAL-016	C6-1	StorageJar	
2/BAL-017	C3	Saucepan	210
2/BAL-023	B5-1	EvertedRimJB	100
2/BAL-026	C8-1	EvertedRimJB	270
2/BAL-027	C3	Saucepan	180
2/BAL-030	F1-2	PedestalledJB	140
2/BAL-031	C3	Saucepan	160
2/BAL-032	C2-2	EvertedRimJB	120
2/BNT-016	B3-2	NeckedJB	
2/BNT-022	???	UnkJB	
2/LVA-002	C6-1	StorageJar	
2/LVA-010	???	UnkJB	
2/BAL-006	C5-2	BeadRimJB	190
2/LVA-015	???	UnkJB	100
2/LVA-020	C1-3	BeadRimJB	210
2/LVA-035	???	UnkJB	
2/PWD-030	???	UnkJB	
2/LVA-007	C1-3	BeadRimJB	310
2/WBP-011	C7-1	EvertedRimJB	
2/WHS-004	???	UnkJB	
2/WHS-005	???	UnkJB	
2/WHS-006	C6-1	StorageJar	380

Table 5.1 (above). Region 2, Grog Group. Vessels with no evidence of wheel-use.

fast wheel-throwing, then this technique is a clear element of continuity with the pinched-rimmed vessels of MIA potting, strongly suggestive of the persistence of some techniques going into the LIA.

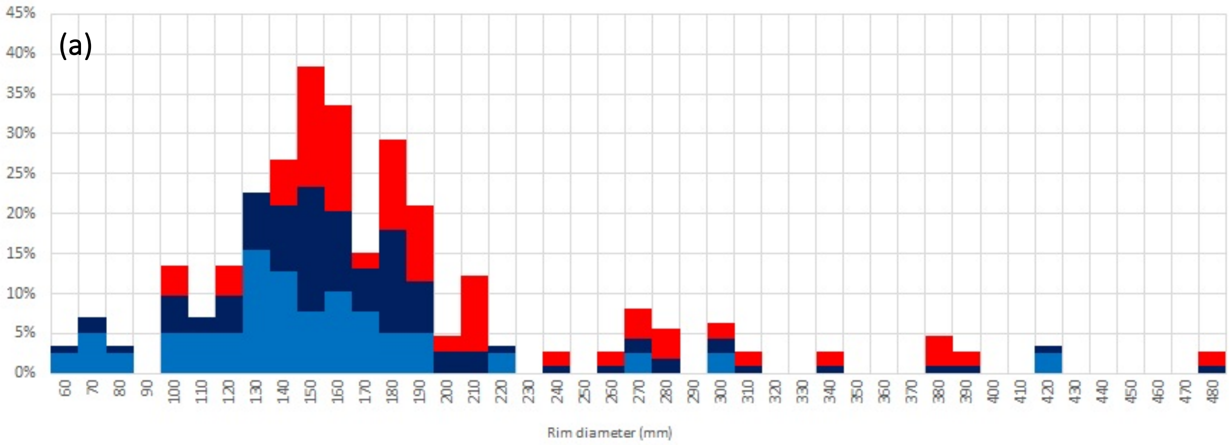
Secondary forming was dominated by wheel-fashioning (84.6% (148) of vessels). The overwhelming dominance of wheel-potting, like in the Region 1 Grog Group, is the most prominent technological shift for which there is evidence in the Later Iron Age. When not associated with throwing, outward signs of wheel-use were most often accompanied by evidence for coiling, signifying a similar 'wheel coiling' technique to that identified commonly in Region 1. Those vessels found not to have any evidence for wheel-use in their manufacture are predominantly of Thompson's 'C' types, i.e. the coarser jar forms such as bead-rim forms (C1) and lid-seated vessels (C5). Such vessels appear to have only been crafted on the wheel part of the time, the differential perhaps coming down to the preferences of different groups of craftspeople, rather than to the significance of vessel size (these vessels having a wide range of rim-diameter measurements: see table 5.1).

Fig.5.35 shows the use of secondary forming techniques, broken down by vessel body-part. This excludes data derived from platters, the forms of which are sufficiently different to all others to warrant separate analysis. While secondary wheel-use is most common at the neck (95.9%) and rim (86.8%), wheel-shaping becomes less common the further down the vessel the body-part is. This exactly mimics the use-pattern for this technique found in the Region 1 Grog Group. This may initially suggest that the primary function of wheel-use was in crafting the cordoned decoration found on these body-parts, although analysis of the necked jar/bowl types (the most commonly-cordoned vessel type) warns against this (see below).

Analysis of the Roux & Courty methods observed in the subsample of wheel-coiled vessels shows that, like in Region 1, the vast majority of wheel-coiling was conducted using one of the simpler variants of the method, i.e. those involving relatively sparing use of rotary motion and more reliance on manual manipulation of the preform (table 5.2). Methods 1 and 2 were most popular, with only one vessel being found to have signs of a forming technique with more reliance on the use of rotary motion in manipulating a coiled preform (2/BAL-010).

Method	No.	% (n=51)
1/2	47	92.2%
3	0	0.0%
4	1	2.0%

Table 5.2. Region 2, Grog Group. Roux & Courty methods found amongst the 51 wheel-coiled vessels.



(b)

	Wheel (Primary)	Wheel (Secondary)	Coiling
n=	39	109	53
Mean (mm)	153.1	175.9	204
Mode (mm)	130	150	150
St.Dev. (mm)	64.8	69.8	79.3

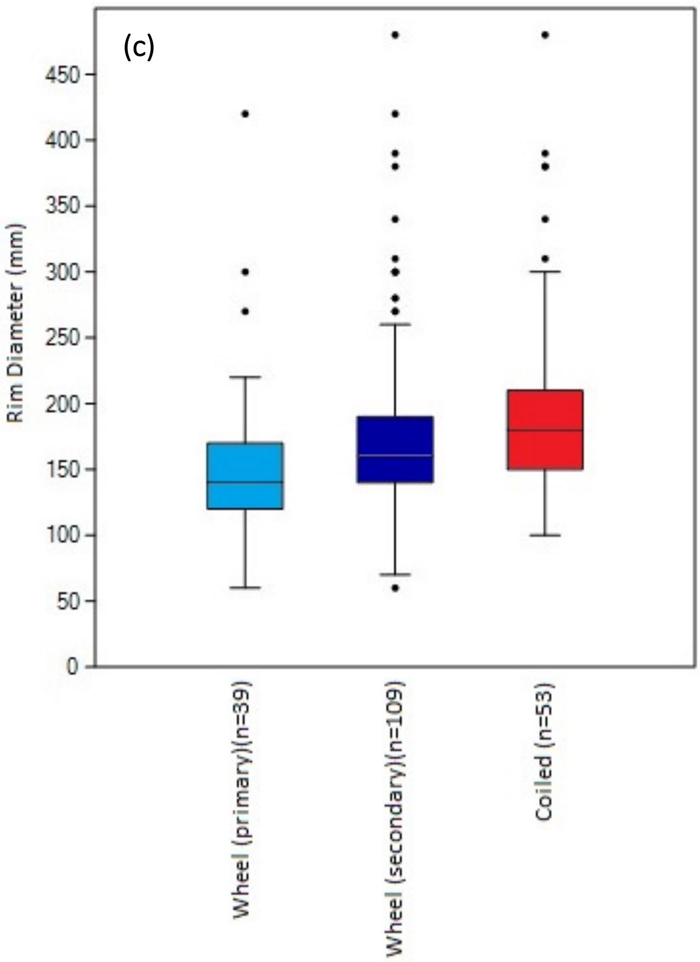
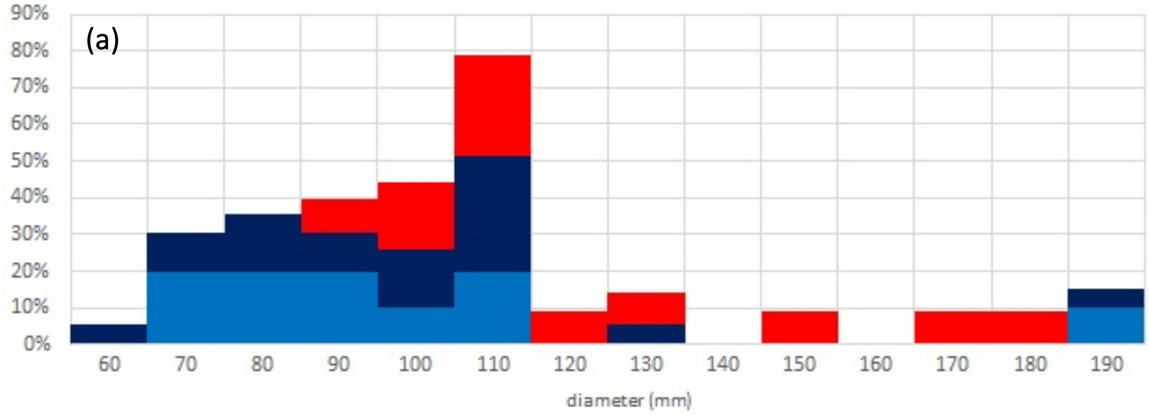


Figure 5.36. Region 2, Grog Group. Occurrence of primary and secondary wheel-use, and coiling, according to vessel rim diameter. (a) histogram; (b) descriptive statistics; (c) box-and-whisker plot.



(b)

	Wheel (primary)	Wheel (secondary)	Coiling
n=	10	19	11
Mean (mm)	99	100	124.6
Mode (mm)	70	110	110
St.Dev. (mm)	35.1	28.3	29.8

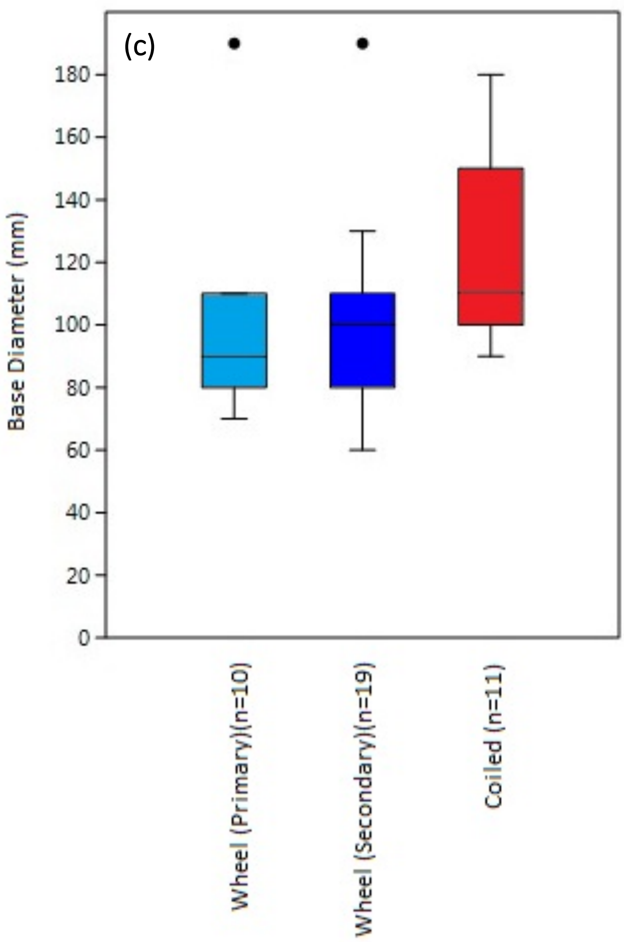


Figure 5.37. Region 2, Grog Group. Occurrence of primary and secondary wheel-use, and coiling, according to vessel base diameter. (a) histogram; (b) descriptive statistics; (c) box-and-whisker plot.

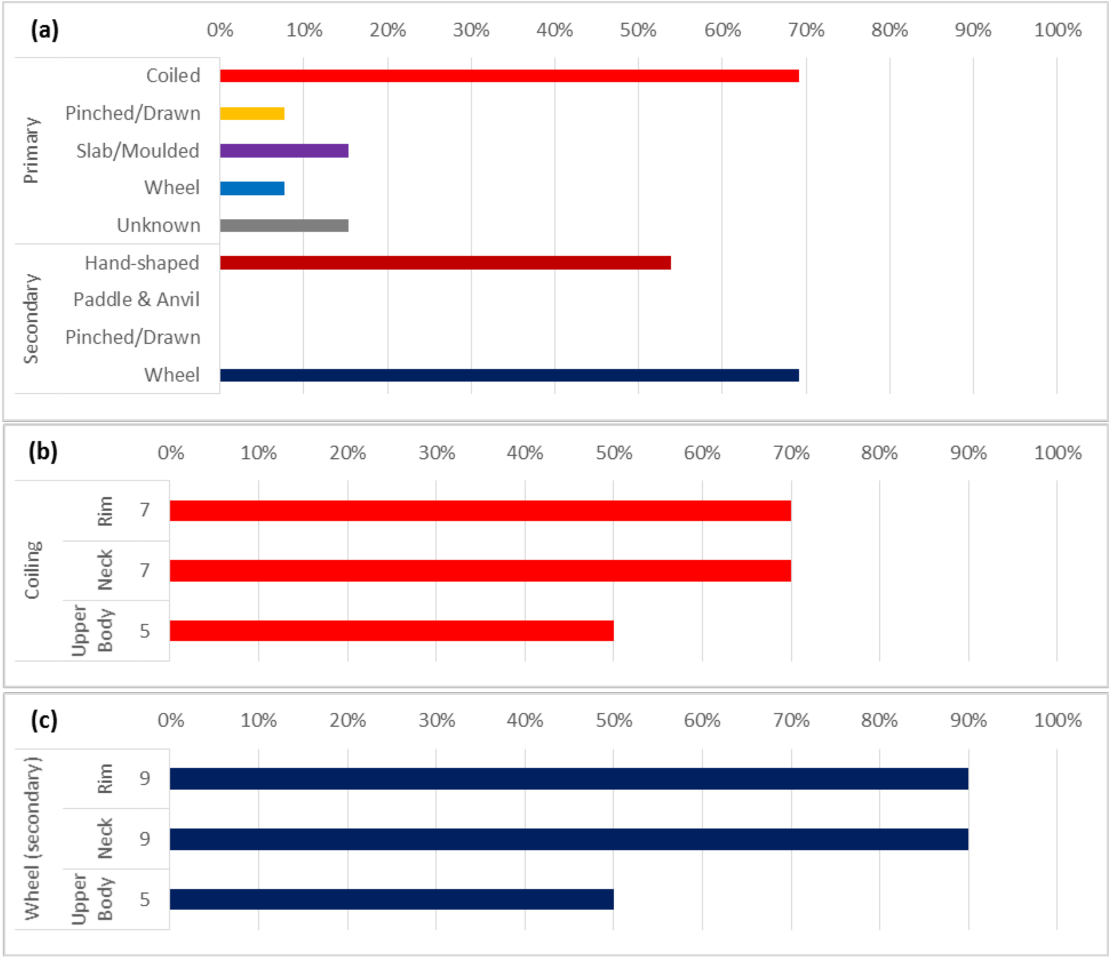


Figure 5.38. Region 2, Grog Group, storage jars. Forming techniques as proportions of vessels (a); Occurrence of coiling (b) and secondary wheel-use (c) as proportions of vessel body-parts. Body-part totals: Rims n=10; Necks n=10; Upper Bodies n=10. Lower bodies and bases omitted due to poor representation.

Size appears to have been an important factor in the use of different forming techniques. Fig.5.36a shows the rim-diameter distributions for vessels found to have evidence of wheel-throwing, wheel-shaping, and coiling in their upper body parts (i.e.upper body, neck, and/or rim). While all three techniques are represented over a wide range of rim-sizes, and the modal peaks in each dataset are fairly similar, the means differ markedly for each technique. Wheel-throwing was found to have the lowest mean rim-diameter at 153.1mm, while coiling was found to have the highest at 204mm. This suggests that vessel size was important in potters' technological choices. Analysis of the smaller sample of bases (fig.5.37) similarly shows that coiled bases were generally larger than wheel-crafted ones, demonstrating that the size of the vessel being formed was an operative factor in potters' technological choices regardless of the specific body-part being dealt with. This size differential maps on to particular types in some cases: for example, the Thompson C6-1 storage jar, which was found to be coiled nine times and thrown only once among a sample of 13 vessels. Secondary wheel-use had its primary function in crafting the rims and necks of

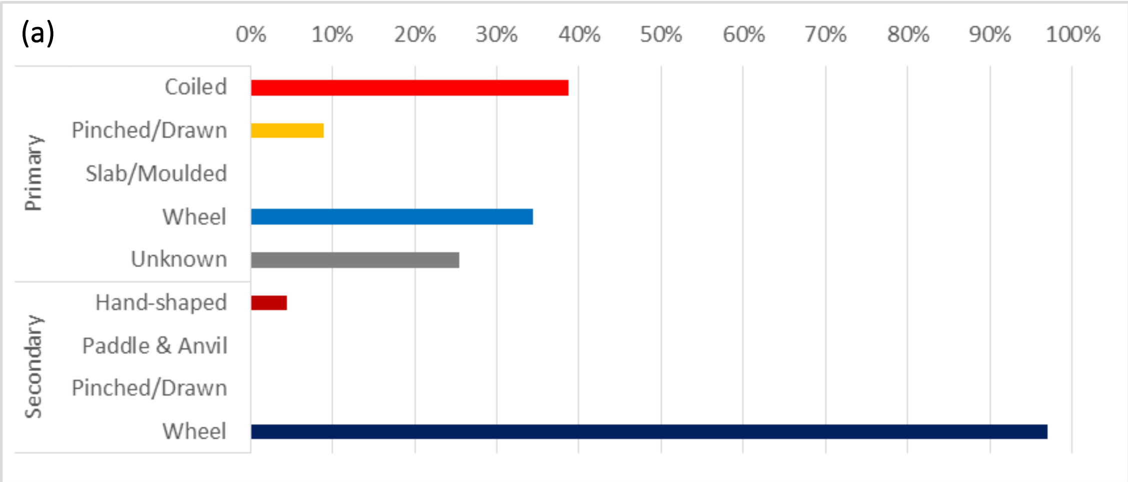
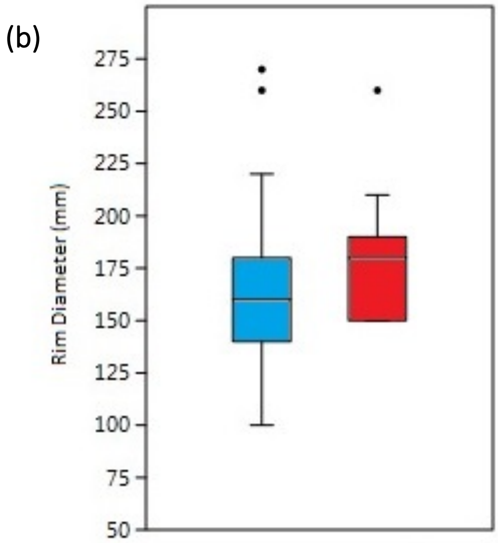


Figure 5.39. Analysis of Region 2 Grog Group 'necked jar/bowl' and 'cookpot' categories. (a) Forming techniques as proportions of vessels. (b) Box-and-whisker plot of rim-diameters for wheel-thrown and coiled vessels



	Wheel	Coiled
n=	22	23
Mean (mm)	165	178.6957
Mode (mm)	150	150
St.Dev. (mm)	40.98226	26.75238

these vessels, being present in 90% (9) of each of these body-parts but in only 50% (5) of the extant upper bodies (fig.5.38c). This preference for wheel-fashioning the upper parts of larger vessels may go partway to explaining the more common use of this technique in crafting rims, necks, and upper bodies.

By comparison, fig.5.39a shows that the most common jar/bowl types – the B1, B3, D1 and D2 necked forms, and C7-1 'cookpots' – have forming characteristics that are far more in line with what is expected for the group as a whole. The 67 vessels analysed are of modest sizes (mean rim-diameter 171.6mm). Primary forming is broadly split between coiling (38.8%: 26 vessels) and wheel-throwing (34.3%: 23 vessels), with a minority of vessels exhibiting pinched/drawn rims (8.96%: 6 vessels). A size differential is again in evidence (Fig.5.39b), coiled vessels generally having larger rim-diameters than smaller vessels, which are more likely to have been thrown. Interestingly, analysis of the occurrence of secondary wheel-use by body-part suggests that there is little ground to say that the wheel was preferentially used to craft necks and rims, all identifiable body-parts being wheel-shaped more than 95% of the time (fig.5.40). This suggests that general effort was being made to craft smooth, even vessel walls regardless of whether

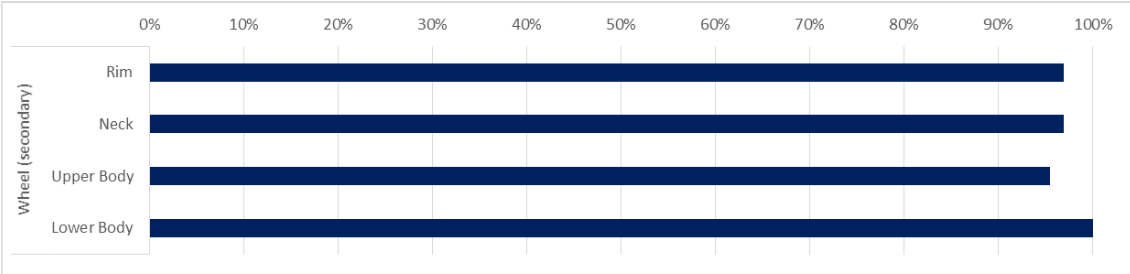


Figure 5.40. Region 2, Grog Group, 'Necked jar/bowl' and 'cookpot' types. Occurrence of secondary wheel-use by body-part.

cordoned decoration was being applied to the particular area being worked. This nevertheless emphasises the outward appearance of a vessel rather than any other variable.

The few ‘saucepans’ (Thompson form C3) that were analysed are an interesting exception to the rule that size dictated primary forming. Saucepan forms are generally small: the five analysed having a mean rim diameter of 162mm. The near-straight sides of this type also means that the overall volume of the vessels will have been substantially lower than other vessels with comparable rim diameters and heights. However, these vessels were all found to have been coil-built and hand-shaped. It is significant that the C3 is one of the typologically earliest forms from Region 2, four of the five examples analysed coming from the earliest contexts at Baldock (dated first half of the first century BC). It is also worth pointing out that the two analysed examples of the C8-1 – Thompson’s other typologically early form – were both found in the early Baldock contexts, analysis showing that they too were entirely handmade by coiling, as were the other three vessels analysed from the early Baldock levels (forms F1-2, C2-2 and C5-2). It seems that this early phase at Baldock was represented wholly by vessels that are technologically MIA in all but their fabrics, but which were a mixture of vessels derived from local MIA vessels and imported late La Tène types (cf. the F1-2).

The early Baldock group makes clear the importance of considering both the chronological and stylistic natures of vessels. The ‘specialist’ wares are a range of functionally- and stylistically-varied vessel types, many of which were new introductions to LIA Britain. As such, consideration of the ways in which these types were made by indigenous craftspeople is bound to be highly informative regarding processes of innovation in LIA potting. 32 specialist vessels were among the Grog Group sample, including 13 beakers (forms G4 and G5), 11 platters (form G1), 6 cups (form E1), two flagons (form G6), two flasks (forms E3-5 and E3-6), eight pedestalled forms (A and F forms), and two lids (L forms).

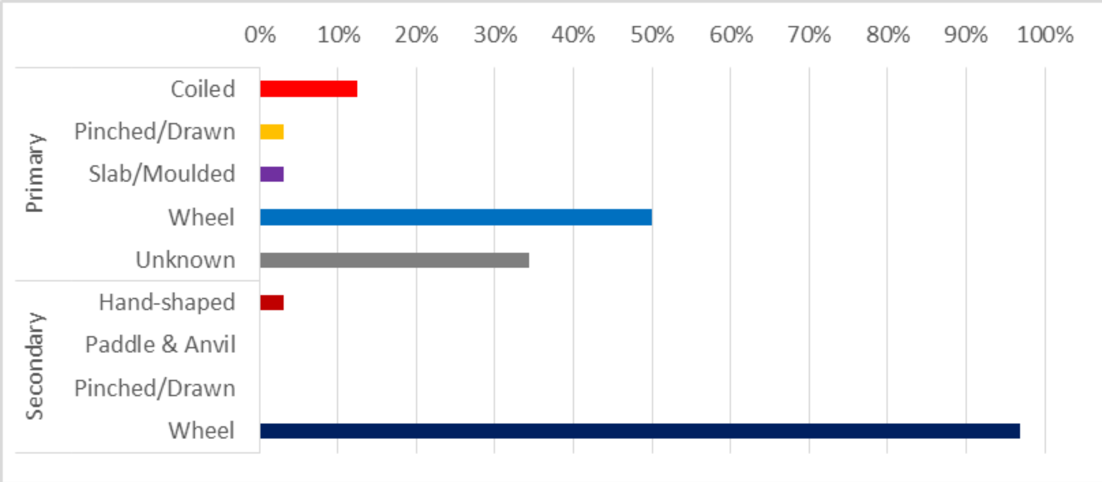


Figure 5.41. Region 2, Grog Group, 'Specialist' types. Forming techniques as proportions of vessels.

Fig.5.41 shows that wheel-throwing was found to be very common amongst the specialist types, being found in 50% (16) of the vessels. Coiling was found in only 4 (12.5%) of the vessels, and 11 (34.4%) were unable to be provided with a determination of primary forming technique. Secondary wheel-use was found in all but one of the vessels, the exception being the F1-2 from the early Baldock group.

Size appears to have been a clear factor in explaining some of the preference for wheel-throwing in the specialist wares. Cups and flasks are essentially the smallest variants of the necked jar/bowl vessel category, the difference between the two being the degree of constriction (cups being open, flasks being constricted) and overall volume. Primary forming was determined to have been conducted by wheel-throwing, at least in part, in four (50%) of the eight cups and flasks. The other four were of either entirely indeterminate primary forming technique (three vessels), or were possibly pinched/drawn into shape (cf. 2/WBP-003). The fact that none of these vessels could be shown to have been coil-built corroborates with the apparent preference for the use of this technique in the construction of vessels of average and above-average sizes.

Beakers may or may not fit into the general pattern of size dictating the choice of primary forming technique. Beaker rim-diameters are generally small (mean 138mm). Of the 13 beakers analysed, 6 (46.2%) showed signs of having been at least partially wheel-thrown, and 3 (23.1%) were coil-made. In all cases secondary use of the wheel had served to craft the fine surfaces, often thin walls, and cordoned decoration. It may be that beakers fit the general pattern of smaller vessels, crafted on the wheel on the basis of their small size. However, despite their rim-diameter metrics, beakers are considerably larger and more voluminous than cups or flasks, and so there may be another component influencing the decision to commonly craft these vessels using wheel-throwing. It may be that, as specialised serving vessels, more effort was being put into the aesthetic qualities of these wares, the decision to throw them being related to the required fineness of the finished product. Alternatively, wheel-throwing may not have been deemed appropriate for larger vessels with a less specialised or utilitarian role, handmade techniques being considered to produce more robust vessels that were less fragile and more capable of resisting stresses such as the repeated thermal shock associated with cooking.

Figure 5.42. Interior surface of 2/BNT-003, showing concentric features possibly representing coil-seams.

Finally, platters are a very interesting case-study, being a completely novel vessel shape in the LIA. All 11 of the platters analysed showed external signs of wheel-use, having been at least secondarily shaped with the aid of rotary motion. The actual process of forming is, however, obscure in all cases: none of the 'plate' body-parts yielded conclusive results when analysed in radiograph. However, over half (6) of the platters showed signs of having been subjected to rotary kinetic forces at the point at which the wall was formed (fig.5.43). G. Taylor has suggested (pers. comm.) that the platters were completely wheel-thrown in one stage, the lack of indicative void-orientations within the plates being attributable to the relatively small amount of time and energy required to throw such a shallow shape. This is plausible and seems likely, although the external evidence for coil-building in 2/BNT-003 (fig.5.42) raises the possibility that there was variation within this, as has

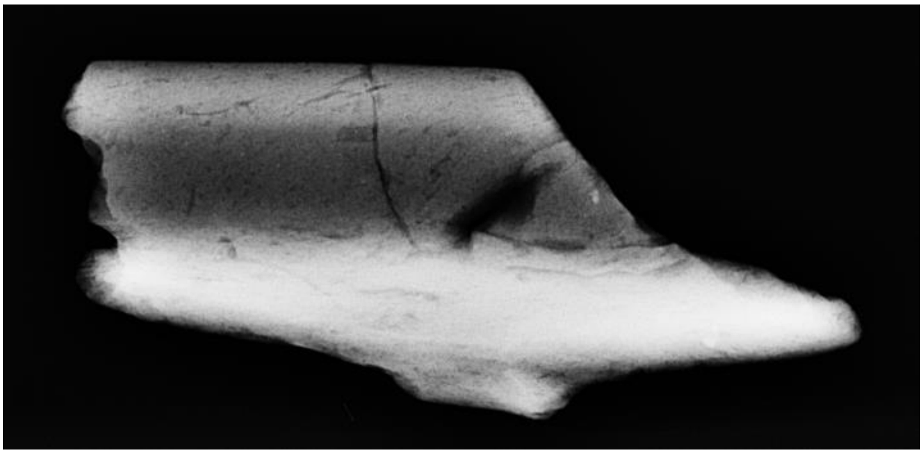


Figure 5.43. Radiograph of platter 2/PWD-053, showing diagonal void-orientations at the wall.

also been suggested for the platters from Region 1. Similar variation is evident in the crafting of the foot-rings applied to these platters, which in seven (of eight) cases seems to have been applied as a clay coil that was subsequently turned, but in one example (2/PWD-052) appears to have been moulded.

Surface treatment

A far higher proportion of the Grog Group – 49% (85 vessels) – exhibited signs of surface treatments of various kinds than any of the other groups. Here, as in the other groups, 'surface treatment' includes all deliberate surface modifications that do not follow an obvious decorative motif, and that could be argued to serve a practical function of some sort. Clearly, there is always an argument to say that there is some degree of overlap between surface treatments and decoration, but for the purpose of this study a distinction is drawn between those applications that appear to have an overall decorative theme, and those that do not but would have imparted a quality to the vessel that could have been used for primarily utilitarian purposes (the difference between a motif crafted using a comb applied to plastic clay, versus the use of a comb to create a roughened surface that would have improved the handling qualities of a vessel by increasing grip, for example).

The higher proportion of vessels with surface treatments is indicative of a greater investment in the finished qualities of Grog Group pottery. The most common treatments are all-over burnishing (39 vessels: 22.3%) and combing of the body (41 vessels: 23.4%). Much of the combing was done so as to create a horizontally-rilled exterior surface on coarse jars such as the C6-1, C7, and C8-1, and this may be hypothesised to have had a practical function in increasing the handling qualities of

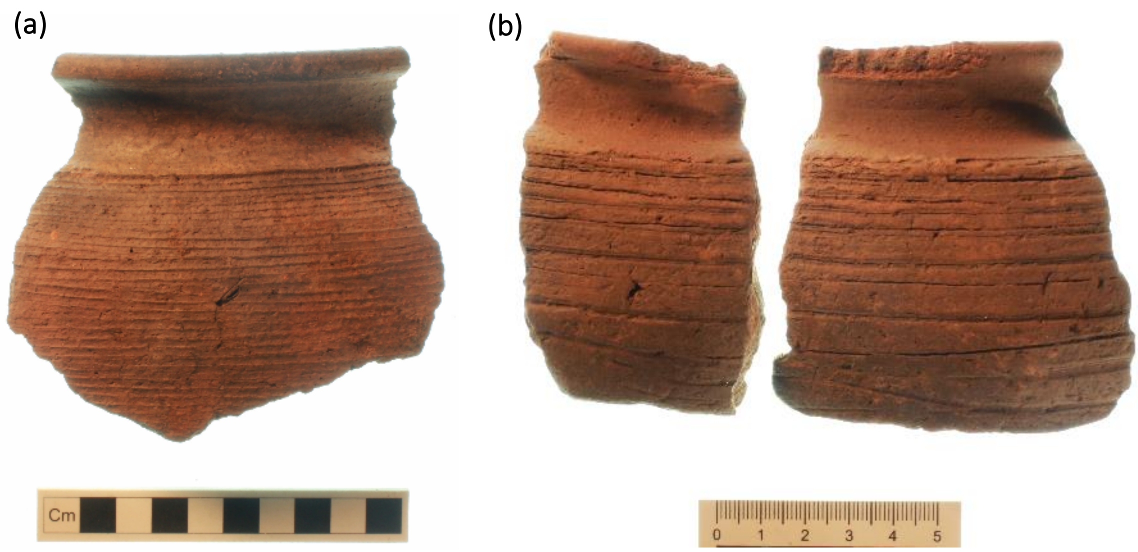


Figure 5.44. Sherds of two C7-1 'cookpots'. 2/PWD-061 (a), showing combed surfaces; 2/WBP-001 (b), showing horizontally-incised surfaces.

these types of vessels, which will have been used in such utilitarian functions as cooking (e.g. C7-1), or which will have been unwieldy and difficult to handle, and heavy when full (e.g. C6-1). Similar patterns were applied to an additional 5 vessels that have been classified as having been horizontally incised due to the wider spacing of the tooled lines, and the unevenness of the tooled lines relative to one-another. This form of surface augmentation will have been achieved with a single-pronged tool repeatedly applied to the surfaces rather than with a comb, but the resulting appearance and handling qualities are likely to have been very similar.

The difference between the two broad categories of surface treatment – burnishing and combing – may be between primarily coarse, utilitarian vessels such as cookpots and storage jars (which tended to be combed), and somewhat more ornamental vessels that had roles in service or small-scale storage (e.g. necked jars, which tended to be burnished). This suggests that at least two major categories of jar/bowl may have existed in the Grog Group repertoire, with these being functionally and stylistically distinct from one-another. This approximately parallels the situation in relation to MIA vessels, which Hill and Braddock (2006, p.175) have suggested involved the use of one category of vessel for food preparation, and another category of similar-sized vessel for service. Admittedly, this is not totally supported by Hill's data on the sizes of LIA vessel types (2002, pp.144–145), which he rightly asserts indicate increased morphological and functional diversity in the latter period; however it may be the case that within the morphologically-limited category of jars and bowls the traditional MIA pattern of food preparation and consumption continued in some form. At the very least, the use of burnishing to distinguish a finer product appears to have carried on throughout the Later Iron Age, perhaps with combed surfaces taking over from those that had been scored in the case of the coarser household vessels.

Decoration

A high proportion of Grog Group vessels was also found to have been decorated (57.1%: 100 vessels). The majority (70 vessels) were cordoned, some with a single cordon (37 vessels), others with multiple (32). One vessel was corrugated (2/LVA-014). The techniques used to achieve these kinds of decoration varied widely. Half (35) appeared to have been produced by the use of a template or tool being held against the pot as it rotated on a wheel, while another 14 examples showed evidence that the decoration had been crafted either with a sharp implement (incised), or a broader, blunt, smooth instrument (burnishing). These operations may or may not have been conducted as the vessel rotated. 12 examples seemed to have been formed

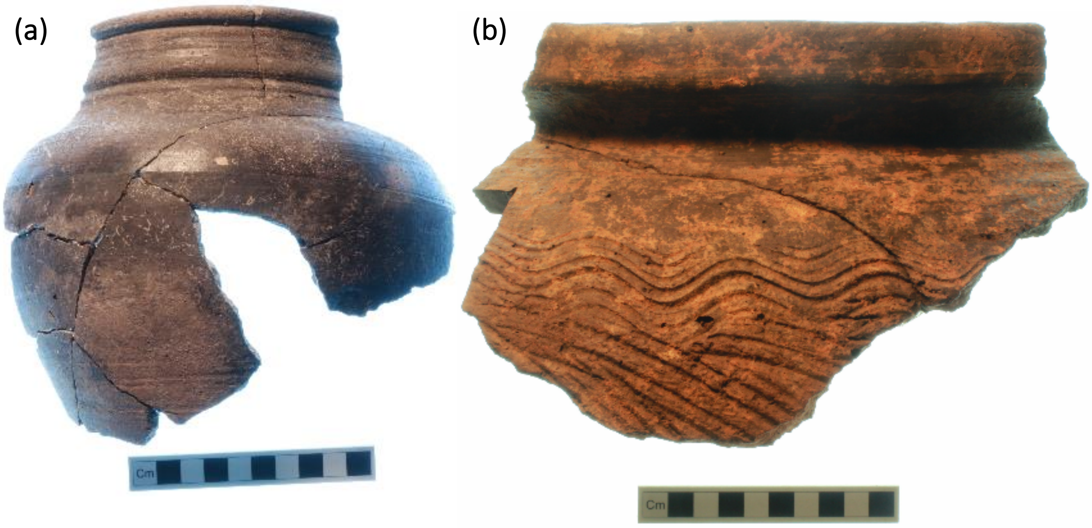


Figure 5.45. (a) 2/BAL-029, showing cordoned decoration at the neck, and zone-burnishing (permission to use image kindly provided by North Hertfordshire Museums Service); (b) 2/PWD-058, showing a combed motif on the shoulder.

solely by hand as the vessel rotated, producing broad troughs in the vessel wall that correspond to finger-impressions. Finally, 15 examples amongst these appeared to have involved the application of counter-force by the potter's second hand; this being placed so as to push into the interior of the wall, supporting the wall as the decoration was applied to the exterior (fig.5.46). This is known here as the 'pushing' technique, and based upon the distortion it creates in the line of the vessel wall it is likely that in these cases the decoration was applied while the clay was still plastic, i.e. immediately or only shortly after the secondary formation of the pot.

Burnished patterns were found on 30 occasions (18.29%). These included a combination of linear and curvilinear patterns, applied primarily to the shoulders and necks of storage jars, and horizontal zones applied to a range of vessel types. In addition, there was one example of vertical linear decoration applied to a girth beaker (2/WBP-007). Combed decoration was found on ten occasions, mostly taking the form of wavy lines applied to the shoulders of storage jars. Shallow incised decoration was applied to four G5-2 butt-beakers, in imitation of rouletted decoration on the imported originals; and fingertip-impressed decoration was found to have been applied in lines to the shoulders of three

Figure 5.46. Beaker 2/PWD-060. The interior surface shows where the potter's fingers have 'pushed' against the wall of the pot, aiding the crafting of the exterior cordon and leaving a broad groove.

C8-1 jars. Another three examples of slashed rims were found, two of which were on the same type (C5-2) as this decoration was found to occur on in the Shelly Group. Finally, one example of rouletting was present: a unique pattern created with a square-toothed wheel and applied to the 'shoulder' of a C3 variant form from Baldock (fig.5.47).

Figure 5.47. (a) 2/BAL-017, with square-toothed rouletting around the upper body; (b) 2/BAL-011, a C8-1 with impressed decoration around the shoulder.Permission to use images kindly provided by North Hertfordshire Museums Service.

Overall, the Grog Group, while admittedly far larger than the other groups, contains a far greater variety of decorative motifs, styles, and techniques, and has a far higher proportion of decorated vessels, than the other three groups. This is suggestive of a far greater degree of investment in the aesthetic qualities of these vessels in terms of technical competence, labour and time input, than is evident in the other varieties of pottery. In addition, there is a significant argument for the functional and stylistic specialisation of decorative forms in these vessels: this specialisation, its emergence from a variety of different stylistic schools, and the relationships between different motifs and the vessels on which they are found, is likely to be of great significance in considering the precise nature of how and why the production and use of pottery vessels changed as it did in the Later Iron Age.

Firing

As in the other three groups, predominantly reduced firings again predominate, accounting for 88.6% of the total. 33.7% was of the well-executed R1 firing pattern, and 11.4% of the similarly well-executed R7 firing pattern: the latter - with a reduced core and two consistently-oxidised surfaces with sharp boundaries – being the firing pattern most often associated with the 'red-surfaced' vessels known

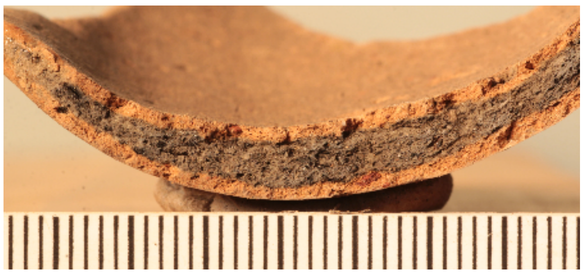


Figure 5.48. Sherd of 2/WHS-001, freshly broken and showing the distinctive 'R7' firing pattern. A reduced core is overlain by consistently-oxidised, reddened surfaces. Sharp firing horizons form the boundaries between the zones of reduction and oxidation.

throughout the southeastern counties (fig.5.48). Both of these patterns represent a degree of control over firing atmospheres, R7 in particular representing what appears to be the ability to consistently and quickly control the flow of oxygen over vessels in the final stages of firing. This degree of control is not present in chronologically earlier groups of pottery.

However, 36.6% of the Grog Group vessels were of the UR firing pattern, exhibiting considerably less control than the other firing patterns. A further 6.3% exhibited the similarly-uncontrolled UO pattern. Overall, 43% of the group appears to have been fired in poorly-controlled conditions.

Importantly, these relatively uncontrolled patterns are found in association with both coarser wares (e.g. C6-1 and C7 jars) and those evidently meant to serve in the presentation of food (e.g. in the case of nine G1 platters). Similar variety is evident in the occurrence of well-executed red-surfaced firing patterns. Among these no C6 forms and only one C7 is present, but the rest of the range includes necked, everted-rim and bead-rim jars and bowls; pedestalled forms; beakers; and one flagon. It may be that certain firings were selected for specific instances of deliberately-controlled surface oxidation, and that the loads fired in these cases were of mixed character but included certain vessel types intended to be ‘red’. However, if this is the case then this is not detectable in the sample, no vessel class exhibiting a convincing association with surface oxidation. Both flagons analysed had oxidised surfaces, but these vessels alone are insufficient to make a conclusion by themselves. Beakers were found to be of variable firing patterns, sometimes red-surfaced; sometimes fully reduced; other times poorly-fired. While the specific role of this kind of firing therefore remains ambiguous, some vessel types appear to have been deemed inappropriate for this new procedure (i.e. coarser forms such as cookpots and storage jars).

<u>Summary</u>

Like the Sandy-Organic Group that predominated in the MIA, the Grog Group likely represents a dispersed tradition of pottery production. The finer details, locations, and modes of production remain ambiguous as a result of our inability – at present – to distinguish and map the products of different producers. It has, however, been shown that the fabrics of the Region 2 Grog Group are distinct from those of its Region 1 equivalent, demonstrating that these wares were not produced centrally, but probably more locally. The chronology of the group is restricted to the LIA, although the Region 2 group appears to start significantly earlier than its Region 1 equivalent: perhaps fifty or more years so, closer to the start of the first or end of the second century BC.

Technological novelty is found in abundance in the Region 2 Grog Group. Grog temper characterises the fabrics; the repertoire becomes far more varied, incorporating novel stylistic and functional elements; and the potter's wheel finds widespread use in several distinguishable methods of primary and secondary forming. Not all is novel, though. Petrographic analysis suggests that a similar range of silty clays was used in making the Grog Group wares to that used in the Sandy-Organic fabrics that preceded them. Similarly, the ways in which clay was tempered was ad-hoc and subjectively judged, thereby being analogous to the ways in which Sandy-Organic Group clays were modified (albeit with novel materials). And hand-building techniques such as coiling and pinching/drawing saw persistent use in the Grog Group, often in vessels that would go on to be shaped under rotary motion. The conclusion may therefore be offered that, as the Region 1 Grog Group emerged from a pre-existing local potting tradition, its Region 2 equivalent appears to have emerged from the preceding local Sandy-Organic tradition.

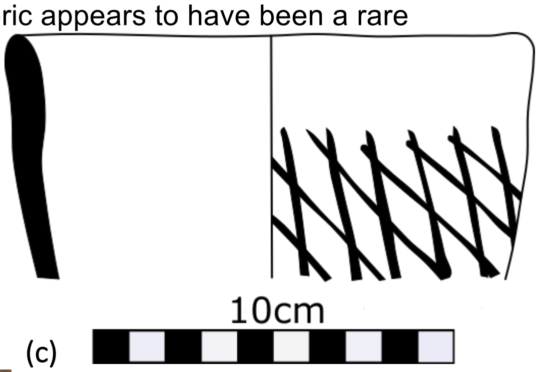
Additional interrogation was able to be done on the Region 2 Grog Group due to the larger sample size available, and this permitted a depth of analysis that could not be achieved in the Region 1 group. In addition to the identification of at least two different forms of wheel-use, it was found that each of these two techniques (wheel-coiling and throwing) could be associated with vessels of different size-ranges. Throwing was more common in smaller vessels; wheel-coiling in larger vessels. This size-differential mapped onto different types in some cases: storage jars, for example, tended to be wheel-coiled (presumably owing to their large sizes). Analysis of vessels with more novel morphologies (such as platters and perhaps beakers) may also corroborate with this notion, although there is a suggestion that potters were negotiating the production of such new types on a slightly more experimental basis. As in Region 1, the factor uniting all instances of wheel-use was the apparent intention to create vessels with specific outward appearances: smooth surfaces; even rims; finely-tooled cordoned or combed decoration; etc. Finally, important chronological variation was identified. Forming technology remained of a MIA character for a time after the introduction of grog tempering to the technological repertoire, as is evidenced by the earliest analysed groups from Baldock. As such, the Region 2 Grog Group serves to build upon the notion of variable interactions between potters and prospects of technological change.

5.2.5 Other fabrics

Two fabrics could not be easily allocated to any of the larger fabric groups. Both of these appear to be rare, with one sample of each being encountered in Region 2. Fabric BG1 was encountered at LIA Baldock and may be of non-local origin. Fabric C1 was encountered at Prae Wood and was not the subject of detailed fabric analysis (being observed in hand-specimen only). There is no reason to believe that the latter is derived from geological deposits outside Region 2, but it nevertheless appears to have been rare and therefore the subject of only limited production.

<u>Fabric BG1</u>

A hard fabric. The clay matrix is reduced to dark brown/black in all cases, and has a soapy feel. Breaks are irregular and show common inclusions of a rounded-to-angular off-white substance up to 3mm, confirmed in thin-section to be bone. This is alongside sparse-to-common angular dark grey grog up to 2mm, and common silt-sized quartz, mostly monocrystalline but some polycrystalline also being present. Iron oxide pellets may also be present. Some very fine elongated voids may suggest the presence of a certain amount of organic matter, but this could not be confirmed petrographically due to the darkness of the matrix (fig.5.49a & b). This fabric is unprovenanced due to a lack of diagnostic mineralogy. Only one sample (BAL-08: fig.5.49c) is known from Region 2, and the fabric appears to have been a rare occurrence in Region 1 also, with a similar bone-tempered fabric being reported at Little London Road near Silchester (Timby 2011: fabric BO1) and analysed in the fabric samples from Marnel Park, Basingstoke (MPP-10). It is worth noting that at Little



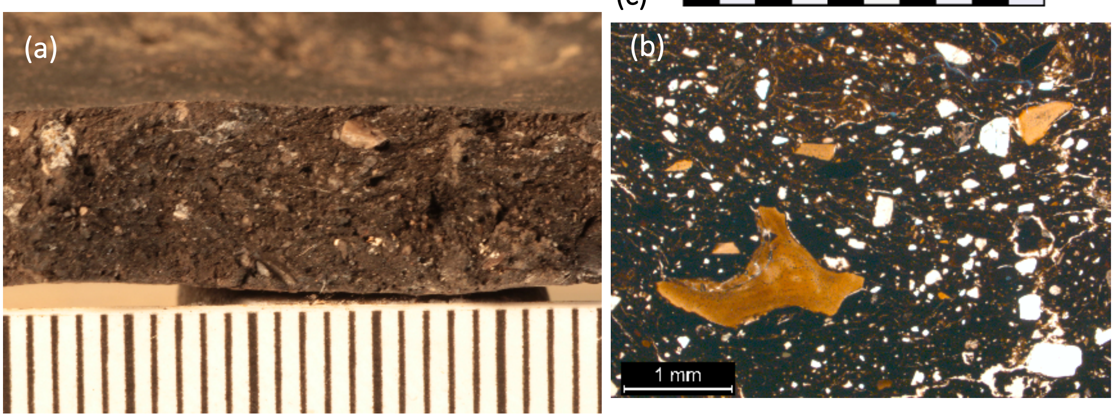


*Figure 5.49. **Fabric BG1**. (a) photograph of fresh break; (b) photomicrograph, x40, PPL. Yellowish inclusions are bone fragments; (c) Illustration of 2/BAL-022, the only vessel known in this fabric from Region 2 (image: the author).*

London Road the apparently-similar fabric BO1 was proposed to have been of a date transitional between the M-LIA, while the sample from Baldock was found in a similarly early context, dated by the excavators to the early-to-mid first century BC (B230, layer 1: Stead & Rigby 1986, p.277). While this link should be treated cautiously due to the small amount of evidence upon which it is based, there may be a connection between the occurrences of this fabric in the two regions, with some chronological implications. The single vessel was found to be of coiled construction, finished by hand, as were the rest of the vessels analysed from this context.

<u>Fabric C1</u>

One sample only (a hand-specimen not analysed petrographically: 2/PWD-007). The vessel is a Thompson C7-1 'cookpot', LIA in date and which appears to have been of wheel-coiled construction. A soft-to-hard fabric with sandy feel, predominantly fired to reduction colours in the range of dark greys and blacks. Where patchy oxidation occurs this presents as thin layers of buff colours. Irregular breaks show abundant large angular calcite (chalk/limestone) pieces up to 4mm, in a moderately silty matrix. Few other inclusions can be seen aside from these (fig.5.50a).

On solely geological grounds, there is little reason to suggest that C1 is of non-local provenance. Calcareous geology capable of producing fabrics with abundant chalk inclusions is plentiful in Region 2. The single vessel is a form known primarily in Grog Group fabrics (Thompson C7-1: fig.5.50b), and as such it may be that this is a rare example of a vessel made in the same tradition as the Grog Group, but using a raw clay that was found to include sufficient natural aplastics that the potters saw no reason to temper it artificially.

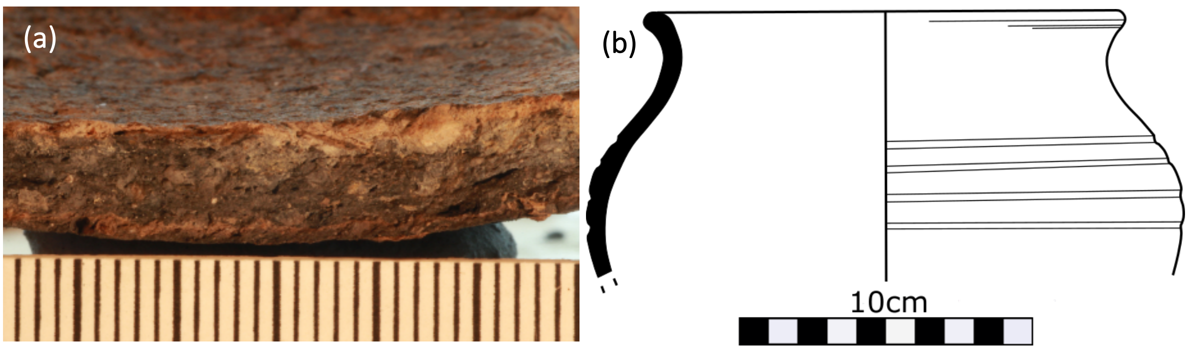


*Figure 5.50. **Fabric C1**. (a) Photograph of fresh break. (b) Illustration of 2/PWD-007, the only vessel identified in this fabric.*

5.3 SUMMARY

At first glance, Region 2 presents somewhat more of a linear impression of technological change than does Region 1. Pottery traditions appear to have changed in sequence, with one predominant ceramic group characterising each identifiable phase. In the MIA, following the currency of Flint Group pottery the wares of the Sandy-Organic Group took predominance, with some pottery moving into Hertfordshire from the groups occupying the areas to the north and/or west of the Chiltern Hills (the Shelly Group). Interrogating the techniques implicated in creating Sandy-Organic Group pottery, however, has revealed some similarities and differences relative to the other MIA groups analysed (i.e. from Region 1, as well as the Shelly Group). In particular, Sandy-Organic pottery production and design fed extensively off the larger-scale 'scored ware' and 'east midlands plain ware' styles, and in some ways perhaps also from the Sandy Group wares known from the eastern parts of Region 1, in particular. Forming was based upon the ubiquitous coiling technique, the specific details of the forming procedures being tailored to the production of a localised suite of material culture. In sum, the know-how utilised in creating Sandy-Organic pottery stemmed from multiple sources, these disparate elements of technical knowledge being combined in such a way as to define a distinctive localised variant of ceramic production. The situation is analogous to that found in Region 1, and has the same implications for different groups' interactions with material culture, and for the definition of distinctive communities of practice.

Although there is no equivalent of the Region 1 Flint Group in Region 2 – i.e. no situation in which a tradition of potting is defined on the basis of the outright rejection of technological change – variable interaction with technological novelty has again been found. The LIA saw innovation with the introduction of the potter's wheel, grog temper, new vessel forms, and experimentation with firings. However, certain of these were variably employed, demonstrating different producers' decisions of how and when to utilise the different technological novelties. Good examples are provided by the potter's wheel (utilised extensively in the forms of wheel-coiling and throwing) and oxidised firings, both of which appear to represent the choices of individuals and/or groups within the Grog Group. This evidences multiple different dispositions towards technological change even within this outwardly homogeneous group.

Additionally, although the Grog Groups from both regions are outwardly similar and seem to represent a continuous body of shared knowledge, the processes by which the localised versions of these groups came into being appear to have been different. For example, there appears to be a significant chronological differential between the introduction of grog temper in Region 2 (around the start of the first century BC) and in Region 1 (probably in the third quarter of the first century BC). In Region 2, grog-tempered wares are known from a phase that appears to have been previous to the commencement of use of the potter's wheel; in Region 1 the two appear at the same time. In Region 2, an early ('incipient') phase is characterised by purely handmade grog-tempered vessels derived in part from MIA design precedents, alongside wheel-made Late La Tène-style vessels; in Region 1 there is no evidence of such an 'incipient' phase, and no precedent for certain components of the repertoire to maintain an exclusively handmade *chaîne opèratoire*.

The introduction of novel technologies therefore prompted variable responses, this variation serving to characterise the behaviours of different groups of craftspeople within overarching ceramic traditions. This may have been related to numerous variables: for example, the nature of the settlement pattern, localised forms of social interaction, or economics; or the social values held by different groups in each identifiable chronological context. These variables will be the focus of discussion in the following two chapters, which seek to better understand the socially-embedded nature of technology in the two study-regions: firstly from the point-of-view of interactions around the techniques themselves; and secondly by interrogating what ceramic technology may tell us about – and how it may have been affected by – larger-scale processes of change.

CHAPTER 6: TECHNIQUES IN CONTEXT

6.1 INTRODUCTION

Chapters 4 and 5 have presented data pertaining to the techniques used in the production of a variety of different types of Middle and Late Iron Age pottery from the two study-regions. The pottery from each region has been grouped according to certain concurrent technical characteristics, these groups being interpreted as technological ‘traditions’ in the broadest sense. Interpretation that has been offered within these two chapters is limited to the direct consideration of the data, what this represents in terms of technical practice, and basic notions of how practice varied through time and between traditions.

This chapter expands analysis with an explicitly theoretical consideration of the techniques identified and how these relate to their surrounding socioeconomic contexts. Select examples of forming, tempering, and firing operations have been chosen for detailed analysis, although other techniques are necessarily implicated in the discussion and are referred to where appropriate. Techniques are discussed individually, with analysis centring, in most cases, on three principles: ‘affordances and constraints’; ‘historical aspects’; and ‘construction of meaning’. Analysis of affordances and constraints involves consideration of: (a) the possibilities for action presented by a technique; and (b) how the technique may limit action of certain types, or require certain actions for successful operation. Affordances and constraints are fundamental aspects of modern post-Cartesian notions of material culture (e.g. Knappett 2005; Swift 2017). Ditto design and its historical aspects (e.g. Gosden 2005; Robb 2015; Van Oyen 2016a; 2016b). These refer to thinking around how the affordances and conceptual associations held by objects (and, in this context, techniques) are constructed in a particular temporal context, as well as within a specific spatial and cultural milieu. This imbues objects/techniques with influential properties of a different kind, whereby their particular temporal situations and perceived historical associations form an important part of how techniques are interacted with. Finally, the construction of meaning has been a concern of archaeologists for decades now, and in terms of technology studies has its origins in the Social Construction of Technology (SCOT) movement (e.g. Hughes 1986; Bijker et al. 1987; 1995; 2010). Meaning is implicated both in purely socially-constructive studies of technology in the past (see Killick 2004), as well as in more recent post-Cartesian approaches (e.g. Knappett 2005). Analysis is broadly structured around consideration of those aspects of technical practice for which associations or ‘relations’ (cf. Van Oyen 2016b) can be demonstrated. Such associations may take the form of firmly demonstrable technical associations (e.g. regular concurrence of a particular forming technique with a given vessel type), affordances/potential uses, provenances (i.e. association with a given location or population group), or time-periods, for example. Consideration of these associations can sometimes yield information on how techniques or objects were rendered cognitively or conceptually, leading to abstract notions of ‘meaning’ which set a precedent for how they may have been/were interacted with.

6.2 COILING

6.2.1 Affordances and Constraints

Blandino offers three statements regarding the characteristics of the coiling technique which, in modern archaeological terms, equate to the physical affordances of the technique (1984, p.11). Firstly, coiling is a “practical way of building large forms”. Unlike methods that work from a single clay lump (which are constrained by the mass of the lump), coiling is an additive technique which affords the construction of larger vessels than does, for example, pinching. However, although Blandino specifies the affordance of *large* forms, it is possible to modify this statement to include forms of all sizes, as Waller (1990, p.30) identifies. Secondly, coiling is a controlled way of building forms – the progressive and incremental nature of the work affords periodic appreciation of the shape, allowing adjustments to easily be made when necessary. Finally, coiling “can accommodate the peculiarities of almost any clay mix” – the technique makes few demands of clay composition or inclusions. In terms of the pure act of making pottery, then, coiling is a very versatile technique that is capable of creating vessel types of wide varieties of shapes and sizes with relative ease and involving few requirements from other steps in the *chaîne opèratoire*. Additionally, Rigby & Freestone (1997, p.60) have recognised that the incremental and progressive nature of coiling affords discontinuous episodes of potting, partially-formed vessels easily being able to be left and returned to later. Meanwhile, Roux and Corbetta (1989, p.69) have studied the apprenticeship process of coiling and found that the relatively simple nature of the technique afforded a relatively easy, non-intensive learning process, and mastery of the technique in as little as a year.

The main constraint of the coiling technique is the requirement that coils be joined to one-another adequately so as not to compromise the function, integrity, or desired appearance of a vessel. Modern pottery manuals emphasise the need to adequately bond coils as the potter’s main concern. Joined surfaces must be moist, being pressed together to a sufficient extent that they will not crack apart during drying, firing, or use (Cosentino 1990, p.23; Waller 1990). An additional concern is that of maintaining the desired shape of the vessel. Waller recommends keeping coils slanting slightly inwards, slapping any bulges down with a paddle and periodically trimming away any excess clay in order to avoid the vessel sagging under excess weight (Waller 1990). In the context of the designs of M-LIA pots from both study-regions, there appears to have been a requirement for the coiled structure of vessels to not be overtly visible in the completed pot. This may have had both practical (maximising the structural integrity and minimising the permeability of pot walls) and aesthetic relevance, both being a feature of the anticipated forms of pots. This necessitated, in all cases, the use of one or more secondary techniques to thin, smooth, and shape vessels.

6.2.2 Historical Aspects

It is likely that coiling was a popular pottery forming technique for much of British prehistory. Stevenson's early paper 'Prehistoric Pot-building in Europe' (1953) identifies numerous examples of British vessels built from variants of the coiling technique, among which are pots of widely varying dates. Subsequently, Woods (1989) discusses still more examples, mainly from northern Britain, wherein coiling had been identified on the grounds of particular fracture-patterns or easy visibility without detailed analysis. Although not systematically studied since Stevenson's paper, coiling has now been identified sufficiently regularly that Gibson & Woods (1997, pp.37–44) were comfortable stating that coil-building techniques were probably the dominant methods of pottery manufacture during British prehistory. Coiling has therefore had a long history of use in the British Isles which, by the MIA, had shown the method able to produce a wide variety of shapes and sizes of pottery. This situation is crystallised in the results from the two study-regions, which confirm that by this time coiling was in widespread and predominant use.

Coiling will therefore have been an ancient technique even by the time that it was used to create MIA forms. This long ancestry (well outside living memory for contemporary potters) may well have played an important part in the social construction of the technique, the process of receiving knowledge and experience in its use being of significance in constituting pots and potters as parts of long-lived, traditional methods of craftsmanship that may not have been challenged for centuries. In turn, this may well have played a part in the construction of personhood for potters, the use of gestures and behaviours associated with coiling being part of a body of collective knowledge that bound together master and apprentice, as well as craftspeople across broad swathes of the landscape.

6.2.3 Construction of Meaning

At the outset, it would appear that coiling is a fairly ideal solution to the construction of pottery vessels. The technique affords the easy construction of a huge range of vessel types and is thus flexible enough to act as a basis for the production of a wide variety of functional and stylistic types. In this context, it may seem somewhat redundant to consider why the technique saw such widespread use in the MIA – from a purely functionalist perspective, it is fair to say that coiling admirably achieved the aim of affording the creation of all of the required forms of pottery.

However, the principle of technological choice (see Chapter 2.2.2) establishes that it is important to consider each technique as a 'decision' made from multiple available options. In particular, Hill (2002, p.152) reminds us that the use of the wheel seems to have been established among continental potters somewhat earlier than it was in Britain, and that it is likely that some British craftspeople were at least aware of the technique during the third and second centuries BC. There is therefore a question to be asked in terms of why British communities did not adopt the wheel at the same time as their continental counterparts. Two variables are likely to be of particular relevance in this regard: the pre-existing status of coiling technology; and the surrounding social and economic circumstances of production.

Firstly, it may be said that on economic grounds coiling remained entirely appropriate for the nature and intensity of production. Increasing specialisation and centralisation is often noted as being a feature of MIA potting in some regions (e.g. Morris 1996, pp.43–46; though see Henderson 1991, pp.106–107). In any case, coiling has been shown in a number of archaeological and ethnographic contexts to be appropriate for use in some specialised and centralised industries, as pointed out by Roux and Corbetta in their consideration of the relationship between different techniques and degrees of specialisation (1989, p.89). Therefore, while the introduction of the wheel may have been part of a process of accelerating craft specialisation, coiling was also capable of forming the basis of an industry that may be defined archaeologically as 'specialised'.

Hill rightly invokes the principle of socially embedded techniques (2002, p.152), and in this context the continued use of coiling in MIA eastern England represents a continued compatibility between the coiling technique and the socioeconomic conditions of production: a compatibility which the potter's wheel did not mimic. It may have been, for example, that a subset of the community derived a portion of their subsistence from the production of ceramics, but did not do so on the full-time basis that was required in order to undertake the long and arduous apprenticeship associated with wheel-potting: for such individuals, the wheel did not ‘work’ in the surrounding technological context. In particular, however, Hill refers to the ‘regionality’ of Iron Age material culture and social practice (*ibid.*), and how this structuring framework eventually came to incorporate the use of the wheel. This example in itself implies the existence of certain social values and their reconfiguration throughout the later Iron Age; this is a subject which will be returned to below. However, the principle may also be seen in the context of MIA potting, wherein there is evidence for overt differences between the different identifiable ‘traditions’ in terms of both craft practice and material outputs. The clearest examples of this are the differences between the *chaînes opèratoires* of the Region 1 Flint and Sandy groups – the former incorporating the exclusive use of flint temper, and the extensive use of hand-shaping in secondary formation; the latter the use of various tempers and silty clays, and the extensive use of pinching in shaping the upper parts of vessels. Distributions suggest that these ‘traditions’ may have been geographically distinct; at any rate the different producers, even if living side-by-side, were distinguishing themselves both by the use of distinctive practices, and by the production of identifiably different pots.

It may not seem as though coiling is overtly implicated in this, both traditions utilising the coiling technique on an apparently equivalent basis. However, the nature of the coiling technique – affording, as it does, the production of a wide variety of different kinds of vessel – can be seen as very much bound up in the social milieu by virtue of its facilitation of a kind of variety capable of acting as the basis for the expression of difference. Essentially, coiling presented the opportunity to create a wide range of different types with an equally wide range of *secondary* forming techniques; its use was therefore fundamental to the expression of identity. It is worthwhile noting that such a reading is endorsed ethnographically by Gosselain’s study of the relationships between techniques and identity in sub-Saharan Africa (2000), which found that primary forming techniques were most resistant to change due to their high degree of embeddedness within the learning processes of making pottery.

Importantly, Gosselain’s study highlights the differential natures of the kinds of identities that are expressed by different categories of manufacturing practice. ‘Fashioning’ (i.e. forming) is said to be reflective of heavily rooted facets of identity, being more intimately bound into the structure of learning the craft of potting than more superficial elements such as decoration, which are more open to imitation or expression. As such, forming techniques speak of the social networks of which a potter was part when they were an apprentice; these being more closely linked to kinship or ethnicity than to more superficial aspects of culture. Embeddedness therefore goes partway to a possible explanation of why coiling remained so popular despite the appearance of new options; but it is nevertheless worth considering the specific contexts of this embeddedness. A possible analogy from the context of Iron Age Europe is provided by recent analysis of Celtic Art (Garrow & Gosden 2012). Decorated metalwork of 'Celtic Art' types are known from across Europe, and according to Garrow and Gosden the media provided by these kinds of objects permitted geographically-dispersed communities to mediate transformative, transitional processes through acts such as burials, hoards, and other 'structured' deposits. Importantly, while 'Celtic Art' must have been acknowledged as significant by widely dispersed groups, the significance of the practices associated with the 'use' of these objects remained bound up in the relations between individual objects/groups of objects and the people/groups/objects/landscapes that were also involved directly in practice. As such, the use of Celtic Art in mediating change was multi-scalar, serving to bind together dispersed groups while also differentiating them on the basis of distinctive localised practices that were understood on a far more particular and nuanced level.

A similar model may be applied to the practices of MIA pottery-making. Coiling was a fundamental medium, understood as being appropriate and capable in making a huge range of containers. The particulars of the use of coiling, however, will have been understood as part of far more localised worldviews. The implications of both Garrow and Gosden's reading of Celtic Art, and of Gosselain's analysis of African potting, however, imply that coiling was not simply a 'blank canvas' for the negotiation of regionalised identities and worldviews: the technique demonstrates a connectedness of another kind, visible as a network of technical knowledge that must have been understood between groups throughout much of southern England (perhaps also further afield); and also the existence of a possible overarching form of identity that served to bind together British communities at a different scale, potentially gaining further significance in the face of continental groups who had by this point adopted the wheel. Coiling was therefore instrumental in both embodying overarching connections between geographically dispersed communities, as well as affording the expression of aspects of localised practice that will have been important in the continual reconstitution of more localised groupings.

6.3 WHEEL POTTING

6.3.1 Affordances and Constraints

Throwing

Perhaps the key affordance of wheel-potting referred to by archaeologists is the advantage offered in the speed of production. Although empirical study has not been conducted to evaluate the relative production speeds of coiled and thrown vessels, experimental studies have shown that techniques requiring more reliance upon the use of rotative kinetic energy (RKE: i.e. the force applied by the rotation of the wheel) tend to be faster than those which rely more upon manual motions (Roux & Courty 1998, p.150)[4]. The speed of production assignable to this technique is related to two variables – the production of the vessel from a single clay mass as opposed to multiple, independently-formed clay masses; and the potential redundancy of secondary formation. In the particular context of the southern British LIA, we may also say that the wheel afforded the production of a range of particular shapes, many of which were based on curves and flowing lines, decorated primarily with horizontally-oriented features such as cordons and carination, which will have been facilitated by the rotation of the vessel in conjunction with the use of a template.

The constraints of the technique are numerous, however. The clearest example of a constraint is the requirement for more equipment – the potter's wheel itself, in whatever form that took (cf. Lobert 1984; fig. 6.2), as well as any tools or templates (ribs, knives, combs, polishers, etc.) required for the particulars of forming. In sum, these are certain to have required more initial investment and subsequent maintenance than the assemblage of tools used in coiling or other hand-making methods. Accompanying this is the requirement for a vastly more developed skillset in the use of the wheel and its associated tools. Roux & Corbetta (1989) have conducted a detailed empirical study of the learning processes involved in coiling and wheel-throwing techniques, finding that coiling could be mastered in as little as a year while an apprenticeship in throwing could take ten years or more to complete. This was attributed to the relative complexity of the gestures and motor skills required in throwing, and their relative unfamiliarity when compared to other common tasks; this was not the case in relation to coiling (*ibid*. pp.28-29). Throwing is also more

[4] It is worth noting that these time-estimates take into account the time taken to make coils, but do not incorporate consideration of time taken to process clay for throwing, which is likely to have been more demanding in many cases.

	Forming coils	Joining coils	Thinning coils	Shaping	Total time
Method 1	Manual	Manual	Manual	**RKE**	50 mins
Method 2	Manual	Manual	**RKE**	**RKE**	40 mins
Method 3	Manual	**RKE**	**RKE**	**RKE**	20 mins
Method 4	**RKE**	**RKE**	**RKE**	**RKE**	30 mins

Table 6.1. Summary of Roux & Courty wheel-fashioning methods and times taken in crafting the same kind of simple, small pot. Data reproducedin edited form, with permission of Academic Press/Elsevier,from data presented in Roux & Courty 1998, tables 1 and 2.

demanding of the characteristics of clay than is coiling – while almost any clay can be used in coiling, Cosentino (1990, p.85) specifies that clay to be thrown should be “soft, pliable and sensitive enough to be shaped quickly but firm enough to retain its shape when wet”. It may also be said that inclusions/tempers are similarly constrained by this technique, as has been highlighted by Hill (2002, p.152) in pointing out the benefits of the use of grog for temper in wheel-made pottery. Some tempers – flint, for instance – would be too hard or sharp to act as an opening material in a clay used for throwing, easily being dragged through the surface of the clay or, at worst, cutting the potter’s hands under the speed of rotation.

<u>Wheel-coiling</u>

The affordances offered by wheel-coiling are somewhat different to those of throwing. Roux & Courty’s analysis of the production speeds of wheel-coiled vessels (1998, p.150) showed that a range of different production speeds were attainable by each of their four methods. These offered a ‘sliding scale’ between coiling and throwing, with the more manual methods (1 & 2) offering only a slight time-advantage over coiling; while the methods that relied more on RKE (3 & 4) offered a more substantial time-advantage, approaching that of throwing (table 6.1). Specifically in relation to the vessels from regions 1 and 2, it may be said that where wheel-coiling was found the Roux and Courty methods identified tended to be the simpler kinds more reliant on manual pressures (methods 1 & 2), which in the experimental study offered little time-advantage over coiling. Specifically, this is attributable to the requirement to manually build up the preformed vessel and bond the coils, only following which would the wheel have become involved (in shaping and/or thinning the preform). In relation to these latter processes, however, we may still say that the wheel will have afforded the production of particular, curving shapes, these potentially being more difficult to achieve using the coiling method alone.

Wheel-coiling is also somewhat demanding in terms of its constraints. Preparation of the clay is required in terms of both the production of coils *and* the use of particular clay types. While the qualities of the clay may not have been quite as strict in their requirements as for throwing (Cosentino’s statement above appears to relate primarily to the ability of the clay to be shaped from a single mass), the requirements to do with inclusions and temper may also be carried over to the wheel-coiling technique. As referred to above, wheel-throwing also involves the continued use of a two-stage forming sequence. Most significantly, however, the method also requires similar material and labour investments to those required in throwing. Investment in a wheel is clearly a prerequisite, although wheel-coilers may potentially have been able to use one of the simpler varieties of wheel, perhaps even a simple turntable or *tournette* (Lobert 1984). Wheel-coiling requires lower rotational speeds than throwing: the 80 rpm reported for wheel-coiling Roux's (2003, p.17) conical cups being said to be roughly equivalent to the rotational speed required to throw a far larger vessel (the throwing of smaller vessels requiring substantially higher rotational speeds than larger vessels: up to 150rpm: *ibid*.; also see Rye 1981, p.74). Wheel-coiling may therefore have required investment in a simpler apparatus than throwing, but nevertheless involved substantially more investment than the simple tools required (but not necessarily relied upon) in hand-making methods. Maintenance will have also involved the long-term investment of labour, or expense incurred in consulting a specialist. Crucially, though, it is generally accepted (Gelbert 1997; Roux & Courty 1998, p.147) that the actions and motor skills associated with secondary forming in wheel-coiling are comparable in nature, complexity and difficulty to those used in throwing; as such, wheel-coiling implies the undertaking of a far longer apprenticeship than coiling – one more comparable to that undertaken for throwing.

6.3.2 Historical Aspects

It has been shown in chapters 4 and 5 that wheel-use is associated with a range of new vessel types. This is an association present both in terms of the contemporaneity of introduction, and the technical use of the wheel. Specifically, the popularity of wheel-coiling demonstrates that the wheel can be associated primarily with the secondary shaping of Late La Tène-type vessels, and later with the production of Gallo-Roman types also of continental derivation. This shows that one of the key attributes of the potter's wheel was the facilitation of production of these novel types; this in turn demonstrates that the wheel – in terms both of itself as a technical artefact, and of its associations with novel, continental forms of material culture – was entangled in a vastly different web of relations than was, for example, the coiling technique.

Looking at the nature of these relations in detail poses some problems – the nature of the technical practices associated with the potter's wheel in making the continental Late La Tène wares, in particular, is yet to be the object of explicit analysis (though see Rigby et al. 1989 for a study focused on a particular example of La Tène fineware production). There is therefore currently no basis for a comparison of technical practice on one side of the channel compared to the other. However, it seems fair to say – as a number of studies previously have – that the technology of the potter's wheel derived, at least in part, from knowledge of practices used on the continent. There is debate as to how exactly this knowledge circulated. For Rigby & Freestone (1997, p.57), close parallels between LIA vessel types in circulation in southern Britain and northern France imply that the first wheel-made pottery found in Britain must have been produced by "immigrant or itinerant potters from Gaul". For Hill (2002, p.152), however, the evidence for handmade wares in the earliest of LIA settlement assemblages is suggestive of British potters producing new forms, rather than the activities of immigrants. Both viewpoints have pros and cons, and of course there is no reason why the question of immigrants needs to have a black-and-white answer. The results presented in chapters 4 and 5 support the notion of LIA production derived from traditions known in the MIA of the same areas. Nevertheless, it is totally possible that immigrant potters were present in Britain in the earliest decades of the LIA and contributed certain elements of technical practice to the repertoire of techniques we find in this period; individuals may also have travelled the other way. This need not solely have been a result of an abstract process of 'increased connectivity', but may also be reflective of new social attitudes prevalent in the LIA that led groups to be more open to the prospect of novelty or movement (cf. Hill 2002, pp.151–152). The multifaceted nature of this notion of knowledge circulation may well be reflected in the plurality of approaches to the use of the potter's wheel that has been shown by radiography.

It should be said, however, that the long apprenticeships undertaken in order to gain proficiency in wheel techniques implies significant constraints upon the fluidity of how knowledge moved. Knowledge transfer will have needed to be formalised in some way – a British apprentice could not have simply 'picked up' how to throw a pot during a short trip to visit his or her relatives in Gaul, just as an itinerant Gaulish potter could not have taught an apprentice how to use the wheel during a visit of a few weeks to a community in Hertfordshire. Potters must have either been relatively static for substantial periods (perhaps setting up to cater to a single community), or people in general must have been willing to move away (to, e.g., Gaul) in order to acquire their skills with the wheel. This need only have been the situation for a generation or two – by this point there was probably (based upon the apparently rapid uptake of new forms and wheel-potting in the south-eastern counties) a sufficient number of wheel-using potters operating in Britain to facilitate the perpetuation of skill. It may also have been at this, relatively early, point in the LIA that the wheel lost its association as a purely ‘novel’ or ‘foreign’ artefact. By this point familiarity may well have developed to the extent that the social construction of wheel technology had reached Bijker’s point of ‘closure’ (2010, p.69), wherein the object’s associations and the nature of its use are regarded as being integrated into the surrounding socioeconomic structure.

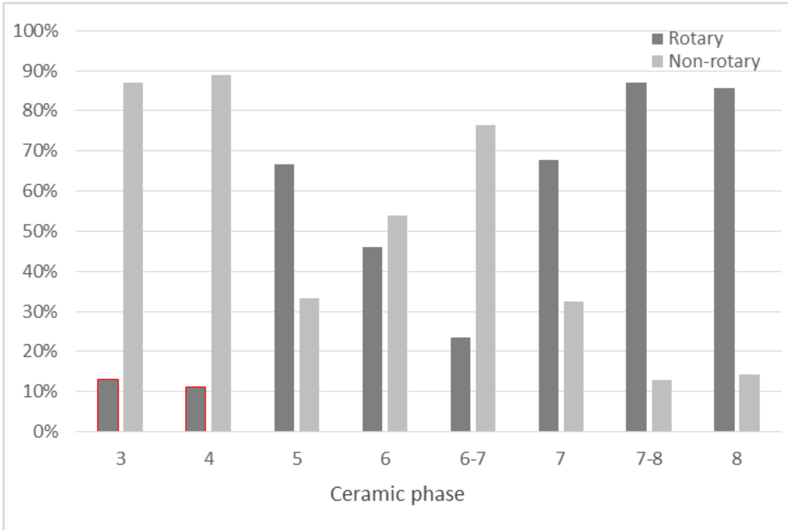


Figure 6.1. Percentage by ceramic phase of rotary versus non-rotary querns found in the 1979-1988 excavations at Danebury, Hants. Rotary querns in CP3 and 4 are highlighted red, as their attribution to these absolutely-dated phases is uncertain (Laws et al 1991, p.396). Original data reproduced in Appendix L.

This evidence being acknowledged, it is nevertheless worthwhile considering the wheel’s associations at a more abstract level. Rotary technologies had been seeing progressively greater use throughout the Later Iron Age, and several had been known at far earlier dates than those associated with the potter’s wheel. For example, rotary querns were known at least as far back as the fifth century BC in parts of Hampshire and Dorset (Peacock & Cutler 2011), though it does not appear to be until the third century BC that their use became firmly established and standard over that of traditional saddle querns (fig.6.1: see Laws et al. 1991, pp.390–397), and it was perhaps as late as the first century BC or even early first century AD that the technology was introduced to some regions (e.g. Essex/Hertfordshire: Major 2004; also see Green 2016, p.157). In the case of Hertfordshire puddingstone querns, parallels with the potter’s wheel may be drawn not only in the fact that the device being made was rotary in nature, but that the object type itself seems to have been based upon an earlier, continental precedent (Green 2011, pp.123–125), and that the production of the querns may have involved the use of an innovative rotary setup of its own kind: specifically, a kind of drill used to bore into the (unusually hard) rock in order to create the hopper (*ibid*. pp.127-128: see fig.6.3).

A similar situation is presented in the use of lathes for turning various materials: most prominently wood and shale objects. Though the evidence has not previously been synthesised, lathe-use is attested in the working of Kimmeridge shale possibly as early as the EIA (and certainly by the MIA) at Rope Lake Hole, Dorset, in the form of disc-blanks and lathe-mountings on waste cores (Cox & Woodward 1987, fig.87). However, finds associated with lathe-use increase dramatically in the LIA phase at this site, suggesting that a similar expansion in popularity may have occurred in the final century BC to that seen in rotary quern use at Danebury in ceramic phases 7-8. Again, however, there is a suggestion that there is regional variability in lathe-use: shale vessels in Late La Tène types became popular in burial contexts in Bedfordshire, Hertfordshire, Essex, and Cambridgeshire during the LIA (Kennett 1977), and it is rightly proposed that their production – which involved the lathe – probably took place within these counties using shale either derived from local deposits, or imported from Kimmeridge (*ibid*. p.20). This may have also involved the introduction of lathe technology to these regions, as no certain evidence of lathe-use has been recovered from these areas at dates prior to the LIA.

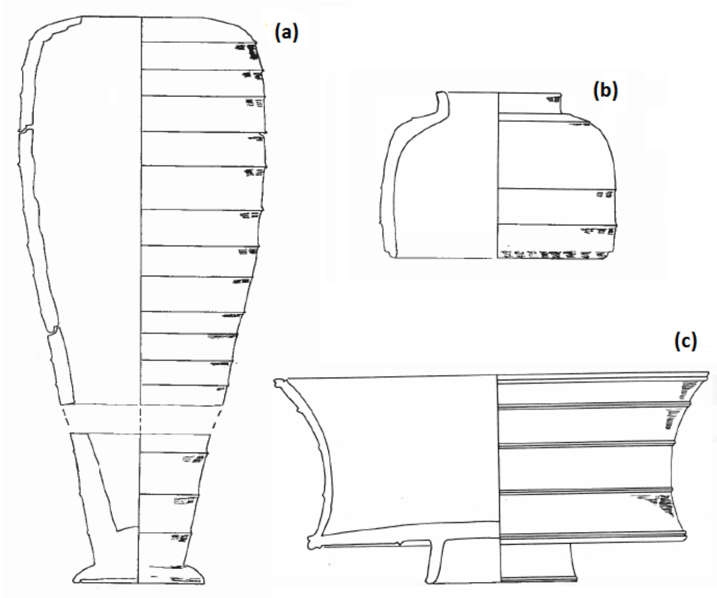


Figure 6.2. Shale vessels from Region 2 and surrounding counties. (a) and (b): pedestal urns from Harpenden, Herts.; (c): tazza from Barnwell, Cambs. From Kennett 1977, fig.1 (a & b) & fig.4 (c). Images reproduced with kind permission of Bedfordshire Archaeological Journal.

The potter's wheel therefore existed within a complex body of technologies – developing throughout the Later Iron Age – that involved the application of the rotary phenomenon for the amplification of manual effort. The case seems fairly strong to say that at least some of these developments have their origins in the south-central counties, and that elements of the technologies may have spread east from there during the first century BC. However, the case of puddingstone querns also highlights the possibility of direct continental interactions, as may the forms in which turned shale vessels are found. Nevertheless, the evidence provided by these other rotary technologies may warn against a simple reading of potter's wheel technology as 'imported' wholesale from the continent. While elements of the technology almost certainly derived directly from continental Europe, the wheel takes its place amongst a long line of rotary technologies developing incrementally throughout the final centuries

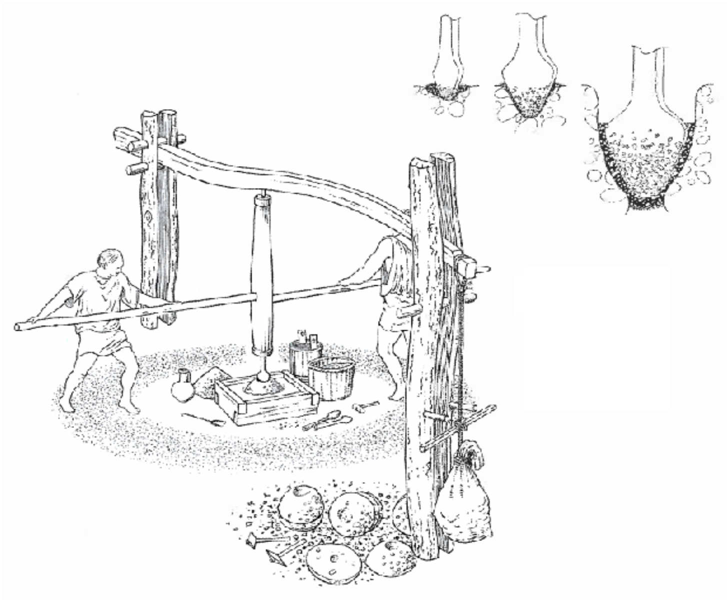


Figure 6.3. Green's hypothetical reconstruction of a drill setup used to perforate Hertfordshire Puddingstone querns. From Green 2011, fig.8.

BC; these developments in understanding the base phenomenon of rotary motion should not be underestimated as a feature of wheel technology.

The situation is equally complex in the case of the potential associations held by wheel technology: again, continental connections are clear, but those from within M-LIA southern Britain should not be ignored. The new technology may have been conceived as much as a pure 'novelty' (or perhaps associated with a different form of specialised craftsmanship) as it was an object of certainly 'continental' derivation. In Region 1, where clear links existed with adjacent areas that had the use of lathes and rotary querns from an early date, the basic principles of the potter's wheel may not have been as alarming or divisive as may initially be assumed; a certain level of awareness and familiarity with complex rotary tools already having been attained. This may have contributed to the relatively fast uptake of wheel technology in Region 1 relative to Region 2; while the date of introduction seems to have been later in Region 1, there is no 'incipient' phase here, wheel-made wares becoming predominant very quickly following their introduction to the area.

In Region 2, where complex rotary technology appears to have been little used before the first century BC, evidence for the familiarisation of the potter's wheel may be found in elements of the form repertoire, particularly from the earliest LIA contexts here. These contexts are defined by the presence of Thompson's C3 saucepan pot, and her C8-1 jar (Thompson 1982, pp.234-237-295). These vessels are of types that can predominantly be shown to claim inspiration from established MIA types – the C3, for example, can be easily related to the Hill & Braddock K, L, or P types, which similarly have straight or slightly curved walls, relatively simple rims, and (sometimes) decorated bodies (fig.6.4). Similarly, the archetypal combed or scored decoration of MIA 'scored ware' may be linked to the combed or rilled bodies of the C8 types (fig.6.5). Finger-impressed bands around the shoulders of C8 types, however, may be a link with Gaul: *La Tène finale* vessels from sites such as Hornaing (Nord) are characterised by such shoulder decoration even when the predominant vessel types are distinctly different to the C8-1 (fig.6.6). The first evidence of continental late La Tène types therefore occurs in this phase, most prominently with the occurrence of some necked and cordoned forms that are unlike anything in the mainstream MIA repertoire. The vessels comprising assemblages from this phase are therefore composed of a blend of design precedents – common C3 and C8 forms with their historical link to established indigenous designs, albeit modified; and Late La Tène forms with their clear and well-known links to continental types.

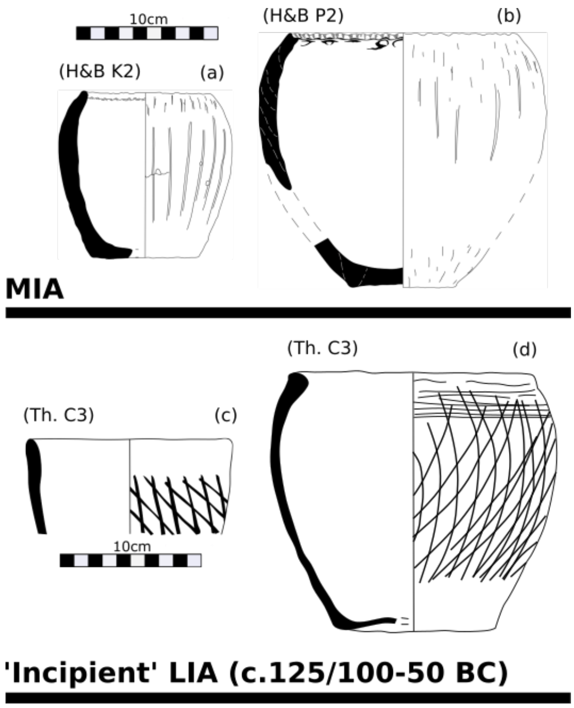


Figure 6.4. Evolution of saucepan pottery in Region 2. (a) and (b) from Mayne Avenue, St Albans (images: the author); (c) from Baldock (image: the author); (d) from St Albans (reproduced with kind permission of Isobel Thompson: after Thompson 1982 p.237 no.11).

Importantly, this mixture of new and old design elements also seems to be echoed in the intended functions of vessels. Hill (2002; Hill & Braddock 2006) established that, compared to MIA vessels, LIA pottery is of far more diverse morphological characteristics, assemblages from this period seeing the breakdown of the relationship between vessel height and rim diameter that had been a feature of vessels throughout prehistory (Woodward 1995; Woodward 1997; Woodward & Blinkhorn 1997). This morphological variety is interpreted as being coincident with typological and functional variety, new vessel types such as pedestal urns, pedestalled bowls/*tazzae*, and later beakers, flagons, platters, etc., demonstrating a new concern with the serving of potentially different kinds of foods and drinks to those consumed in the MIA. Hill's original plots (fig.6.7a) were split only along the lines of the MIA/LIA chronological divide, but plotting a sample of vessels from the 'incipient LIA' of

Hertfordshire (i.e. that period during which the C3 and C8 were in peak circulation) shows that a similar pattern emerges to that seen for the LIA generally – morphological diversity is evident, and this is suggestive of a wide variety of different vessel types, each affording a different set of functions in the context of use (fig.6.7b). This contrasts with the metrics from Hertfordshire MIA vessels (also fig.6.7b), which demonstrate a similarly linear pattern to that found by Hill – this shows that a limited range of forms were made in a range of different sizes with comparable relative dimensions: pots did not occupy strict 'categories' but were intended for a variety of uses as utilitarian containers, with size being the main variable with overt relevance in affording different kinds of action. Crucially, when the C3 and C8 types are isolated from amongst the 'incipient LIA' repertoire, they can be seen to create a pattern similar to that known for the MIA vessels. This is again strongly suggestive of continuity of design of these vessels with their MIA predecessors, and also of the functional affordances of the vessel types. It is therefore likely that these more 'traditional' types would have existed as a discrete category of vessel in LIA assemblages, with their users understanding their appropriate functions as an equally discrete category of action, just as different categories of Late La Tène vessels would have been understood by their potentially more specialised roles (cf. Hill's suggestion that, for example, pedestal urns were

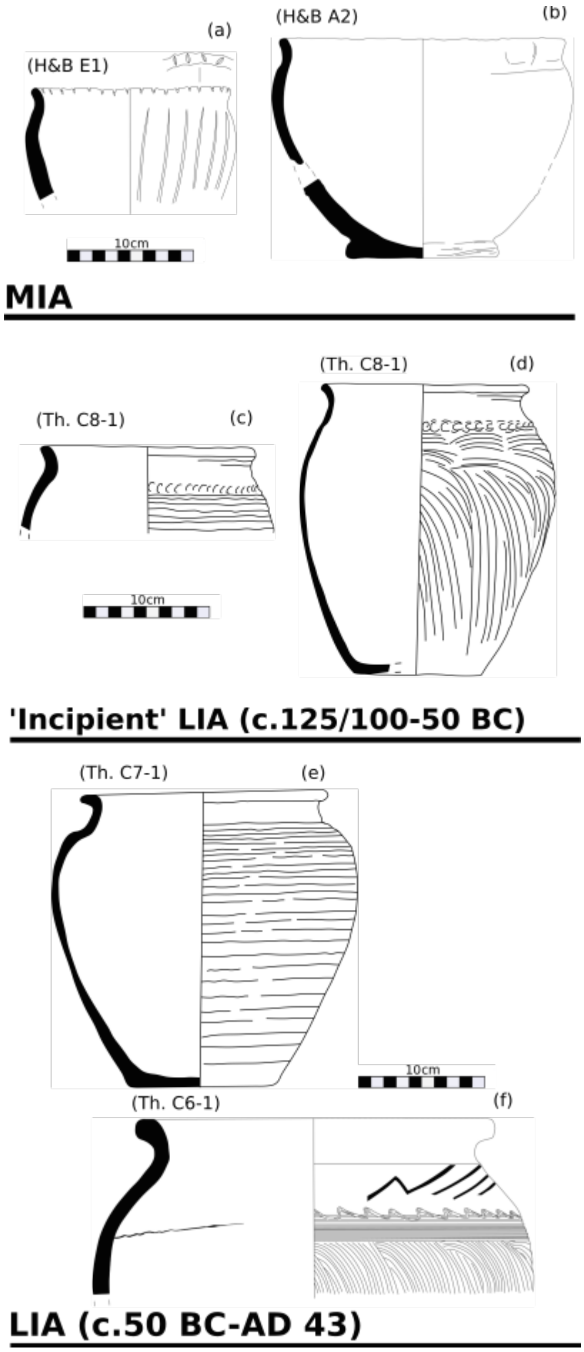


Figure 6.5. Evolution of basic jar types in Region 2. (a) and (b) from Hare St. Rd., Buntingford (images: the author); (c) and (d) from Wheathampstead (Thompson 1982, p.291 no.16(18) and 16(17) respectively); (e) from Crookhams, Welwyn Garden City (ibid. p.277 no.12(2)); (f) from Prae Wood, St Albans (image: the author).(c), (d), and (e) reproduced with kind permission of Isobel Thompson.

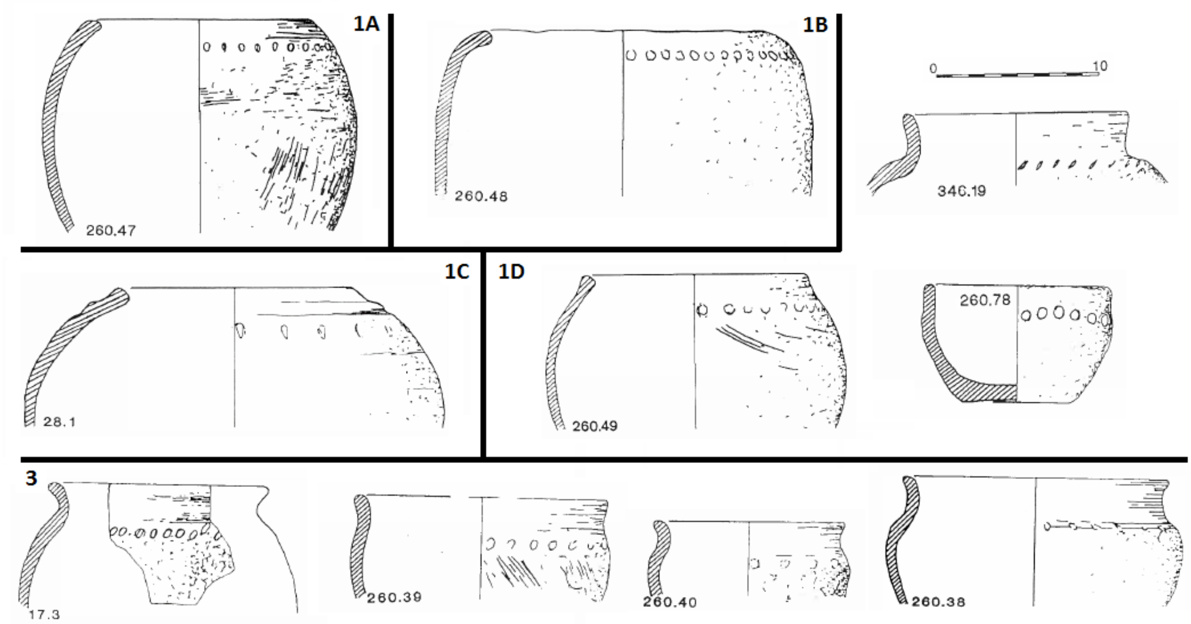
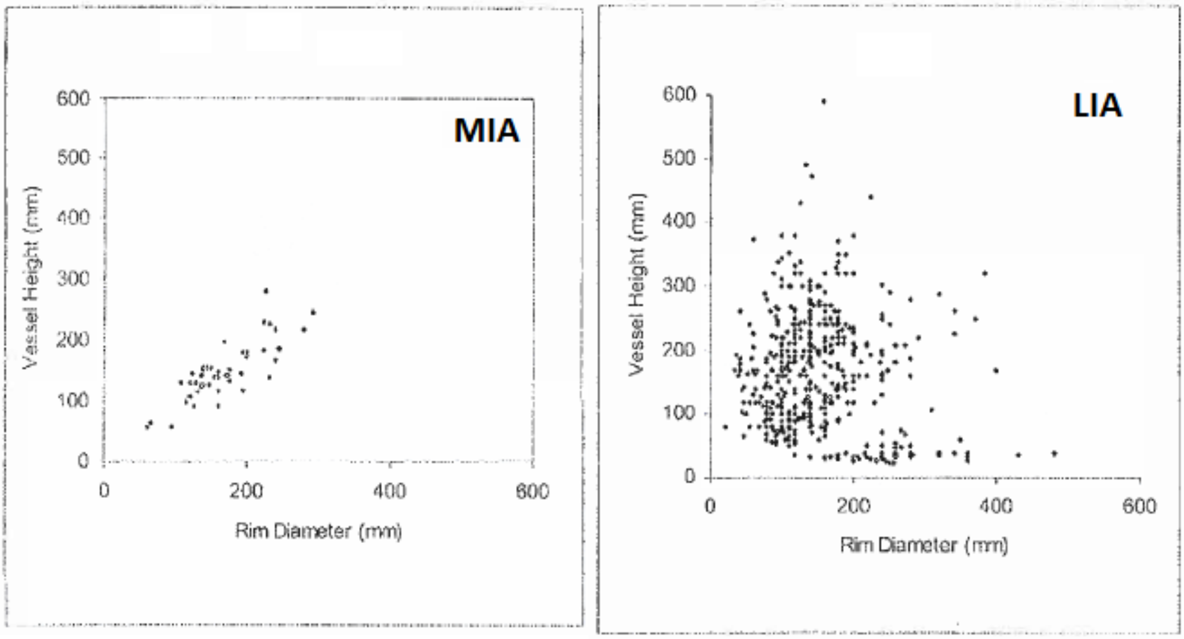


Figure 6.6. Types 1 and 3 from Hornaing (Nord, France) commonly have a row of impressed decoration on the upper body, like that characterising the Thompson C8-1. Type 3 shares the upright or everted rim of the C8-1, but the more common Type 1 variants commonly have no distinct rim, and are of more globular shapes. After Dilly 1992, figs.27, 28, and 30.

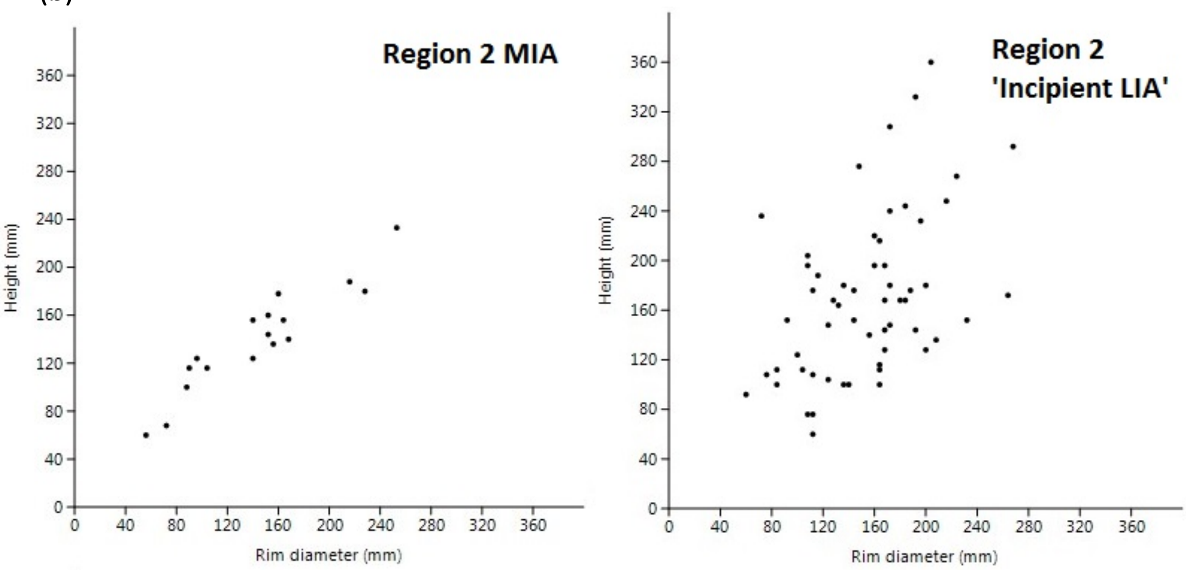
connected with drinking: 2002, p.148). Functional specialisation was evidently developing, but amongst this was an important element of continuity.

By the later phase of the LIA, the increased popularity of the C7-1 jar as the dominant component of assemblages is suggestive of the evolution of the C8-1 type. The combing of the C8 is perpetuated in the C7 form, as are the commonly-everted rims and ovoid bodies. The 'stabbing' or impressing beneath the rim has, however, disappeared. There are therefore clear signs of design evolution, with the C7-1 able to claim a direct lineage with MIA everted-rim types (fig.6.5). Importantly, the C7-1 is also commonly wheel-made: mostly by wheel-coiling, but sometimes being thrown. As discussed in Chapter 5, the chronology of this early phase is difficult but the fact that these distinctive early types with their MIA associations appear to have been some of the last to receive the use of the wheel is potentially significant of their conception as categorically 'older' types. A generation or more seems to have elapsed before the new technology was sufficiently embedded within society for potters to be comfortable using it in the production of all vessel types. This may have had to do with the social construction of the wheel as an object, initially being regarded as something only to be associated with 'unfamiliar' material culture but at some point familiarity having developed to the extent that it was permissible to be used for the production of any kind of pot.

(a)



(b)



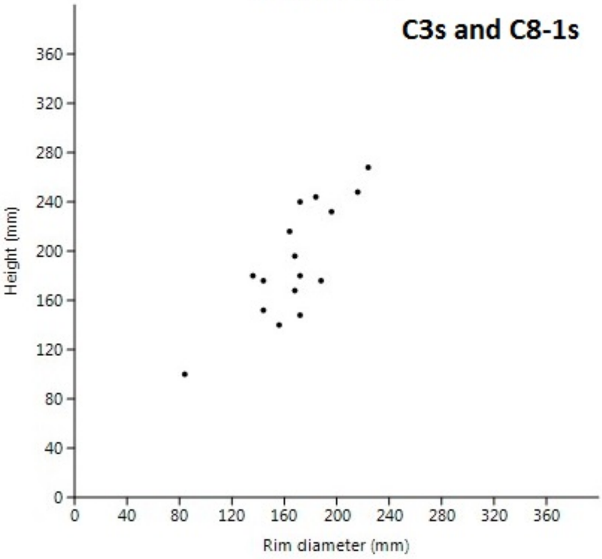


Figure 6.7. (a) Hill's original plots of rim diameter vs. vessel height for MIA and LIA vessels from 'Anglia'. After Hill 2002, fig.13.2. (b) Rim diameter vs. vessel height for categories of Region 2 vessels (measurements can be found in Appendix J).

6.3.3 Construction of Meaning

The previous section has served to highlight some of the value structures and tensions surrounding the introduction of wheel technology. This section will expand consideration to include a number of other concepts proposed to have been important in how the wheel was socially constructed, and how the fundamental and socially-constructed properties of the wheel influenced action and social structure. The ideas discussed relate to three categories: ‘apprenticeship’, ‘performance’, and ‘worldviews’.

<u>Apprenticeship</u>

As discussed above, skilled wheel-use of any kind requires the undertaking of a significantly longer apprenticeship than do methods of hand-making pottery. These apprenticeships are part of a larger ‘package’ of increased investment in skill and equipment – and, by extension, time, effort, and productivity – associated with the uptake of the wheel. In the case of apprenticeship, this increased investment led Roux and Corbetta (1989, pp.88–90) to conclude that the potter’s wheel was a certain sign of specialised industry; although the degree to which pottery production was specialised during the MIA is itself a source of debate (e.g. Morris 1996, pp.43–46; Henderson 1991, pp.105–107). It appears to be the case that the potter’s wheel is entangled in processes of craft specialisation, but that its role within this was not, in the strictest sense, ‘causal’ (Hill 2002, pp.151–154).

The development of longer apprenticeships, dealing with the transferral of more complex skills than previously, probably implies the increasing formalisation of the social structures associated with learning the potter’s craft. Whereas apprenticeships within potting traditions based upon coiling may have lasted less than a year and may therefore have been undertaken on a less formalised basis, for example with skills being passed from one generation to another within the context of the home and on a relatively low-intensity basis, the longer apprenticeships required for wheel-use – perhaps taking up to ten years or more – would have required far more concerted effort and commitment on the part of both teacher and learner. This longer-term arrangement would have provided an environment which will have facilitated the easy emergence of more formalised versions of the ‘master’ and ‘apprentice’ roles. The impact of the emergence of these roles may have been a key part of the experience of being a potter in this reconfigured learning setup; a fundamental part of the identities of both learner and teacher. There may also have been different elements of craft practice that were deemed appropriate for one role or the other – for example, an apprentice serving to turn a pole-driven wheel while the master crafts the pot on the wheel-head – and these will have served to performatively reinforce the nature of a given role and its relationship(s) to others. The wheel is strongly implicated in any formulation of this new dynamic, being the key technical artefact within production, and an object relied upon to a great extent for both economic subsistence and the construction of professional personhood. No such comparable relationship with a material culture object can be said to be implied by the *chaîne opèratoire* able to be reconstructed for MIA vessels.

Performance

Production is not socially isolated. The performance of gestures and movements associated with technical action is an important medium within which elements of socially-held values, identities, and political relations can find physical expression, deliberate or otherwise (Dobres 2000). Appreciation of practice therefore can offer key insights into how craftspeople constructed their own personhood and wished this to be displayed to others. Materials, objects, and techniques are all intimately bound up in this process, all having active roles in how personal and social agency unfold in the context of technological practice.

Wheel-potting presents a complex set of technical interactions, not least due to the existence of a hybrid technique (wheel-coiling) within this category. Wheel-coiling can be conceived of as something of a technological composite, the actions, gestures, movements, and skills associated with the coiling technique demonstrating very different conceptual links to those shown by the use of the potter's wheel. Specifically – as has been discussed above – coiling can be associated with traditional methods, the technique having a long history of use, serving as the basis for the production of a wide variety of different ceramics in widely variable traditions of potting; and being socially embedded in this role. The significance of the conceptual associations held by coiling may well have been exaggerated in the situation of the LIA, in which the relevance of the technique within the craft was evidently being challenged by the throwing technique, which many potters were apparently demonstrating could be used to make pottery without the need for coiling. Meanwhile, wheel-fashioning will have had – to some groups, at least – associations with the 'other', and perhaps specifically with the geographically or culturally 'foreign'. This association may have dulled with time, as familiarity increased and the technique became better integrated into the craft. However, the association with 'novelty', and perhaps also 'foreignness', may have persisted in some way, as is suggested by the innovative crafting of new, continentally-inspired forms such as platters and beakers using the wheel during the later decades of the LIA. Additionally, as discussed in the previous section on apprenticeship, potters invested massive amounts of time, effort, and economic capital into their skills and equipment for using wheel-making techniques. Their profession is likely to have been intimately bound to the wheel as an object, the affordances of the artefact permitting the technical actions for them to make the kinds of vessels their profession required of them. In some cases, a political element may have been implied, with 'masters' or those potters proficient at a higher level being reliant on the wheel for a degree of their social and professional standing. There may have been an association between the skills, gestures and tools used in wheel-potting and the social networks through which they will have been acquired: such networks would have been more formalised, potentially more politicised, and perhaps also associated with individuals who were known to originate elsewhere. Finally, there may have been a 'mystical' element to practice, particularly as regards wheel-throwing, in which a mass of clay is transformed through the skilled manipulation of complex phenomena into something resembling an established item of material culture. As such, the exhibition of skill in the use of the wheel will have evoked very different associations to those demonstrated by coiling: on the one hand, wheel-use spoke of developed social connections that perhaps transcended traditional boundaries; on the other, it reflected the reconfigured, more formalised (and specialised?) structure of LIA society; and reinforced associations between the craftsperson and the range of often novel products that they created.

All this will have served to help construct and continually recreate the professional identities of potters through the exhibition of skilled practice. Crucially, we may infer different formulations of the social construction of pottery and potters through the existence of at least two distinct forms of wheel-potting. Potters who learned a version of wheel-use that incorporated the coiling technique will have embodied the mediation of the new alongside continued adherence to the values associated with older techniques: this is likely to have been fundamental to how these potters perceived their craft, their role(s) within it, and how they were displayed to others. Meanwhile, those potters who learned to throw were making a somewhat bolder statement, receiving from the wheel the means not only for faster production of novel aspects of material culture, but also creating a vastly reconfigured social milieu within which their more novel techniques were central. This is emphasised when it is considered that there is evidence to say that throwing and wheel-coiling were not chronologically successive techniques, but that they coexisted in space and time: in both regions, the earliest pottery groups with evidence for wheel-use contain examples of both wheel-coiled and thrown pots. For some, throwing in particular may have been a performative statement by which the past was broken with.

Worldviews

In the section above on coiling, the case has been made for perceiving coiling as a technique implicated in the construction of identity by virtue of the inherent flexibility of the method. Coiling was sufficiently versatile to afford the creation of numerous different kinds of vessels of all sizes, using widely varying techniques of secondary formation. In this regard, coiling mediated the expression of division while maintaining the spatial and temporal continuity of practice and *savoir-faire*, perhaps at the broadest level of the pottery craft as it was practiced in southern Britain. This multi-scalar relationship between techniques and groups appears to have been fundamental to the understanding of the world for people living in the Iron Age, a similar theme also being represented in recent studies of Celtic Art (Garrow & Gosden 2012).

As already discussed in relation to wheel-coiling, the practices and knowledge associated with coiling continued to be of relevance in the LIA. Importantly, while the physical characteristics of coiling remained constant – the technique was used to do similar jobs in the LIA to those it was used for in the MIA, i.e. constructing preforms that would be subsequently modified by secondary techniques - the ways coiling was regarded by those who used and encountered it is likely to have changed as a result of the introduction of an alternative primary forming technique associated with vastly different values and social structures. As coiling was bound up with older, more 'traditional' ways of making pottery (and its role in structuring action seems to have been similar to that held in the MIA in terms of being a versatile technique affording the use of various secondary techniques in making a range of vessel types), it seems likely that at least part of its role may have been to facilitate the incorporation of newer techniques into the pre-existing structure of pottery making. This may have worked on a cognitive level, allowing the maintenance of the traditional two-part division between coiling and various secondary forming techniques, thus providing the basic structure of potting knowledge into which wheel-techniques were integrated. Coiling may have also played a part in the familiarisation of wheel-techniques by virtue of its association with traditional forms of potting. This will have made the integration of the unfamiliar practices and structures surrounding wheel-potting far easier, allowing the development of an association between wheel-techniques, coiling, and – by extension – the traditional bipartite structure of forming practices, thereby creating a unique set of meanings by which wheel-coiling was understood and interacted with. However, such concern with integration does not appear to have been the case universally, evidence for the throwing technique seeming to shun these efforts.

In many cases, then, the social construction of wheel technology seems to have initially been bound up with very traditional forms of potting: the association between elements of the novel with elements of the 'established' and 'familiar' serving to redefine both in the reconfigured context of the LIA potting craft. This process can be seen as being akin to the SCOT conception of social construction (e.g. Bijker 1995; 2010), with the incorporation of new technologies into a pre-existing 'sociotechnical ensemble' (i.e. the collective social and technological interactions surrounding a technological system) being reliant upon the specifics of the ensemble as well as how well the new technology can be seen to 'work' within it. For many, wheel technology evidently worked not only as a technical artefact (i.e. in the production of specific vessel types) but also as a social object: affording new kinds of performance; the physical manifestation of increased connectivity; and the exhibition of hard-won, novel skills. The evidence for coexistence with the throwing technique, meanwhile, demonstrates the 'interpretive flexibility' of the technology, the new artefact (if indeed all variants of it were regarded as of one category) interacting with different social constructions of itself in different subsections of Iron Age communities.

Implicit in all this is a necessary consideration of the 'worldviews' held by individuals and groups in the Iron Age. Again, it is useful to consider Garrow & Gosden's reading of Celtic Art here. It has already been discussed how the situation in ceramic technology echoes interaction with Celtic Art in terms of the mediation of community and identity at multiple scales; this also applies to the use of the potter's wheel, which initially served to constitute and define a new community/set of communities in the south-eastern counties, with an identity/identities based partially upon the integration of new – potentially 'foreign' – practices into the ceramic *chaîne opèratoire*. These reconfigured identities clearly worked at multiple scales. This is attested both by the variability in use of the wheel, as well as by variability in pottery repertoires, which tend to differ in character somewhat from region-to-region (cf. Thompson's "zones": 1982, pp.8–17). A significant portion of this regional variability – in the case of Regions 1 and 2, at least – is attributable to the pre-existing pottery repertoires of the regions, and therefore implies tight historical relationships between the designs used in the LIA and those from the MIA of the same region. In Region 2, the case for the evolution of the basic MIA jar/bowl and saucepan pot types into the C3, C8-1, and then C7-1 types of the LIA has already been made. In Region 1, meanwhile, the bead-rim jar persists as the predominant coarseware type in the LIA, being heavily based upon a MIA precedent (fig.6.8). Bead-rim C1 types are relatively uncommon in Region 2, being subordinate to the C7; the reverse is true in Region 1.

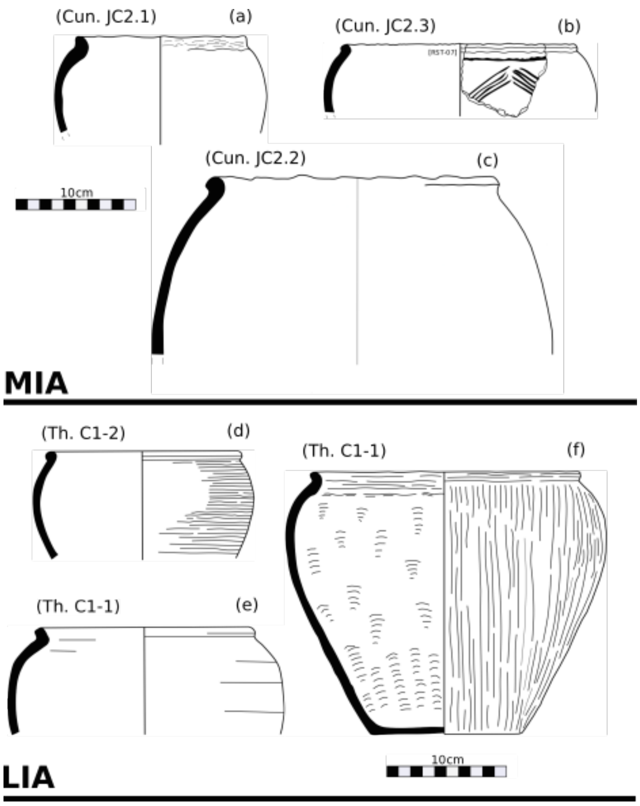


Figure 6.8. Evolution of bead-rim jar types in Region 1. (a) from Brighton Hill South, Basingstoke (image: the author). (b) and (c) from Ructstall's Hill, Basingstoke (images: the author). (d), (e) and (f) from Silchester forum-basilica (Timby 2000 nos.246, 273, & 478, respectively).

Additionally, Garrow and Gosden's thesis on Celtic Art makes the case for the use of material culture in the mediation of transformative processes. They connect Celtic Art objects with a variety of different contexts such as hoards and burials, which may be regarded as 'transitional' in some way. Perhaps more crucially, the material and decorative properties of Celtic Art objects are argued as themselves mediating transformation – motifs are combined in novel ways, being integrated amongst a decorative scheme which appears to 'unfold' as the eye is led through it; an apparent concern with innovation and individuality alongside integration resulted in the 'cumulative' nature of the Celtic Art style (also see Garrow et al. 2009, pp.110–112; Garrow & Gosden 2012). Similarly, much LIA pottery served to provide a historically-grounded 'structure' into which novel elements could be integrated. In this context the continual performance of the *chaîne opèratoire* may be regarded as akin to the 'unfolding' of art motifs: the familiar and the unfamiliar are blended in such a way as to integrate new and old to produce the truly innovative. Throughout the first centuries BC and AD, then, ceramic technology unfolded through time; repeated and tweaked performances of the operational sequence serving to maintain the familiar whilst also making important statements about the continual reconfiguration of technology and society. It may also be of significance that the period from c.50 BC-50 AD seems to have been a period during which there was little deposition of Celtic Art: it may be that in this period, increased amounts of material culture provided other, more novel, media for the mediation of the rapid change being experienced during this period – based on the above reading of ceramic technology, pottery and the artefacts associated in its manufacture may well have been implicated in this.

6.4 GROG TEMPERING

6.4.1 Affordances and Constraints

Rye (1976, p.109) lists four properties of clays that are of importance to the potter and which can be modified by the addition of tempers:-

- Workability – clay plasticity needs to be great enough that it is sufficiently malleable to be worked into the desired shapes, but not so great that the shapes are unable to maintain their integrity;
- Shrinkage – clays lose mass and shrink when undergoing dehydration during firing. Excessive or uneven shrinkage can result in cracking due to stresses on the clay body. Shrinkage can be reduced by the addition of tempers, which are often already dehydrated, provide pore-space for the escape of moisture, and present obstacles to the propagation of cracks within the clay body (also see Rice 1987, pp.66–67).
- Firing behaviour – i.e. the ability of a pot to survive rapid heating and cooling, most prominent in the case of open firings. Firing involves a number of complex chemical interactions, including the driving off of superficial and chemically-combined water from the clay, and structural changes resulting from progressive stages of bonding between clay mineral grains as temperature increases (Rye 1976, pp.110–113). Thermal shock resistance is therefore an important attribute of a ceramic fabric, as is the nature of inclusions as 'opening materials' (as described by Rice *ibid.*). The relevance of inclusions in thermal shock resistance is discussed by Rye alongside vessel shape and porosity (*ibid*. pp.114-120). Rye states that particularly crucial criteria for a choice of inclusion type are thermal expansion rates (which should be as close to that of the clay matrix as possible, so as to avoid disrupting the structure of the clay body), and the absence of structural changes to the mineral crystals ('inversions') within the temperature-range associated with firing and use. These are essentially constraints to be considered in temper choice.
- Post-firing properties – the characteristics of a temper/inclusion may afford certain possibilities for action in the sphere of use. For example, an organic temper will burn out during firing and leave behind pores that are of benefit to thermal conductivity, thus affording the use of a vessel for cooking (*ibid*. p.114).

Grog has been stated on several occasions as being a fairly ideal tempering agent. According to Rye (*ibid*. p.116), grog, like organic tempers, improves both the workability of clays as well as producing thermal shock resistance useful in firing and cooking. Cleal (1995, pp.191–192) expands upon this, referring to grog as being:-

- easily crushed;
- easy to use (presenting few sharp edges);
- a stable non-plastic (i.e. not possessing a crystalline inversion) with properties near-identical to the clay matrix.

Additionally, in the case of wheel-using potters, the softness and bluntness of grog affords its use in conjunction with rotary forming methods, posing no danger to the potter's hands when being turned at speed, or presenting much risk of dragging or leaving holes (cf. Thompson 1982, pp.20–21). Therefore, from a purely functional perspective, the adoption of grog temper in the LIA appears to make complete sense, and this appears to have contributed to the relatively uncritical analyses of this particular development presented in the previous literature (Thompson *ibid*.; Rigby & Freestone 1997; Hill 2002, p.152).

An additional factor to which attention has been drawn is the possibility to interpret grog as a form of material/object 'rebirth'. This is mostly contained within literature on Bronze Age pottery (Morris 1994b, p.38; Brown 1995, p.127; Cleal 1995), but is also known in commentary on LIA wares (Hill 2002, p.152). The notion is essentially that grog – as the effective recycling of pottery (or other ceramic matter) as temper – could be interpreted as representing a historical connection between 'generations' of pottery – the reconstitution of one pot within another. This may have implications for perceptions of transformation, and the legitimation of changing or novel objects; alternatively, where it does not occur it may have been taboo for various reasons. This aspect of the conceptualisation of the technology will be considered further below; suffice to say at this point that the nature of grog as a recycled material appears to afford these interpretations: possibly in the past; and certainly in archaeological readings of it.

6.4.2 Historical Aspects

Grog is little-known in either study-region before the first century BC. The exceptions to this are two sites near Basingstoke, wherein fabrics tempered with grog are known in very small amounts at MIA dates – these are Winklebury Camp (Smith 1977: fabric 1) and Ructstall's Hill (Richardson 1978: fabric S5). While this does not necessarily imply an 'origin' for the idea of grog tempering that was popularised during the LIA, the fact that some potters in Region 1 saw fit to use grog suggests that there was no negative association to grog which might have prohibited its use wholesale; but, equally, grog held sufficiently little value to be ascribed any particular significance by potters *en masse*, most of whom chose not to use it despite its apparent functional benefits. Of course, it is possible that this kind of pottery was ascribed some particularly significant function, but based upon the small corpus of known vessels this is difficult to substantiate.

Grog tempering exhibits certain links between southern Britain and the near continent. Following analysis conducted in the 1970s, Tyers (1981, pp.144–157) made note of numerous sites in the Nord-Pas-de-Calais region of France and the adjacent Hainaut region of Belgium that were defined by the dominant presence of grog-tempered pottery dating to the first centuries BC and AD. Tyers' sites were poorly dated in the 1970s, but subsequent work on the ceramics of this region has begun to establish a clearer chronological sequence (Tuffreau-Libre 1996). Overall, the area appears to have been relatively lightly settled during the final La Tène and *gallo-romain précoce* periods (*ibid*. p.71), and the ceramic sequence appears to be similar to that known in south-eastern Britain from the beginning of the first century BC onwards. In particular, Tyers (1981, pp.142–151, figs.37-39) highlighted several assemblages from Picardy, Flanders, Artois and Hainaut that commonly contained vessels with upright or slightly everted rims, and impressed decoration on the shoulder – i.e. akin to Thompson's C8-1 type. Although it is generally difficult to assign a date on the basis of a lack of typologically Roman wares in this region due to a general paucity of finewares even in definitely post-conquest contexts (*ibid*. p.148), it would appear that the assemblages containing C8-1 jars characterise the very end of the Iron Age, forming the basis of the assemblages to which Gallo-Roman pottery was subsequently added. A good example of a significant assemblage from this region which is characterised by this sequence was found at Hornaing near Douai (Nord), which includes the C8-1 as well as a related type with an in-turned rim (Dilly 1992). Gallo-Roman forms are attributed to the Augustan period and later, with the early micaceous Gallo-Belgic fabrics represented at the site of Beaudimont near Arras and dated to the Augustan-Tiberian period (see Rigby & Freestone 1986 for discussion of the British finds; Tuffreau-Libre 1996).

The French and Belgian groups characterised by the C8-1 and allied types are almost universally reported as being in grog-tempered fabrics. Additionally, certain assemblages – such as that from Le Bois de l'Homme Mort, Saint-Pathus, Seine-et-

Marne, (Desrayaud 2011) – have yielded vessel types dating to the middle-final La Tène period that are also characterised by grog tempering (e.g. *ibid*. fig.7 a & b), suggesting that the use of grog may have been continuous further back into the second or third centuries BC in some areas. It therefore appears that, like several other of the innovations known from LIA Britain, grog tempering had a clear historical association with traditional forms of potting known from certain areas of the near continent. This will have undoubtedly had an effect upon how this material was regarded, at least in its initial phases of use by British craftspeople. Crucially, this evidence weakens the potential link between grog temper and wheel-use, only a small component of the French and Belgian material from the sites referred to above being reported as being wheel-made. Grog may have been part of a separate axis of technological change, the affordances of the material only later being found to be coincidentally appropriate for the production of wheel-made pots. As will be expanded upon below, grog was not simply a fully-functioning method of facilitating the crafting and survival of pottery through firing; it was also socially constructed by its associations with Gaulish practices, perhaps even coming loaded with notions of the superstitious or mythological significance of its nature or effectiveness.

6.4.3 Construction of Meaning

Previous work has alluded to the highly beneficial qualities of grog temper in facilitating the changes to paste preparation deemed necessary to best use the potter's wheel (Thompson 1982, pp.20–21; Hill 2002, p.152). Specifically: grog is soft and blunt, and therefore offers no impediment to wheel-using potters or to those wishing to provide a burnish to the elegantly-rounded surfaces of a La Tène-style vessel. These features are clear and difficult to challenge. However, what is unclear is why grog temper became so popular so quickly in many areas, and eventually over such a broad swathe of southern Britain. As well as in the south-eastern counties, grog-tempered fabrics are well-known all of the way up the Thames Valley into Oxfordshire (e.g. at Gravelly Guy: Green 2004), and into the counties of the East Midlands studied by Hill (*ibid*.). As such, the phenomenon of grog-tempering expanded throughout much of southern Britain during the first century BC, cross-cutting numerous pre-existing and clearly discernible potting traditions, and in some cases supplanting these completely.

Functional factors were not the only influences in the large-scale uptake of such similar techniques. While of clear benefits for many reasons, grog was not *required* in order to make wheel-made pottery, as is shown by the presence of wheel-made vessels in sandy fabrics in Region 1 from the earliest LIA, as well as by the return to sandy fabrics in the first century AD in industries such as the Alice Holt potteries (Lyne & Jeffries 1979; Timby 2013b, p.161). Sandy fabrics preceded grog tempering in both study-regions, and as such – when considered from a *longue durée* perspective – grog tempering appears as something of an anomaly, its use on a widespread and common basis only known in the first centuries BC and AD before a resurgence throughout south-eastern Britain during the late Roman period (Lyne 2015). We should therefore cease to regard the choice of grog for temper in the first wheel-made pots as a simple reflection of functionality: it is likely that the sandy fabrics used commonly in the MIA would have performed adequately on the wheel, possibly with only slight modification. What is more, the analysis presented in Chapters 4 and 5 suggests that these wares may have been naturally sandy and only tempered very lightly or occasionally – from an economic standpoint this would be of benefit, as processes of breaking down ceramic matter into appropriate grades for tempering would have been time-consuming and no doubt slowed down production somewhat.

At this point it serves to reiterate that technology and technical knowledge is subjective and socially constructed. As such, even technological choices that make sense from a functional perspective are bound up with socially-constructed perceptions, values, worldviews, and structures. As referred to above, fabric parallels are known from the Picardy, Flanders, Artois, Hainaut, and Seine-et-Marne regions. Grog temper was established as an element of technical practice here some time before it was known in Britain, and indeed even before the potter's wheel was adopted in these areas. This area is therefore likely to have provided the geographical origin-point for the notion of grog tempering in Britain, with this technique being introduced to Britain at around the same time (or perhaps slightly before, cf. groups from the earliest Baldock contexts) the potter's wheel was adopted. While perhaps initially considered as a novelty or as a feature of new and reconfigured forms of identity related to a continental precedent, being adopted in the production of all variants of the earliest typologically LIA pottery in certain regions (e.g. Region 2), association with wheel-potting is likely to have come quickly following the introduction of the new forming technique. This can be seen in the apparent close association between wheel-potting and grog tempering evident in areas into which wheel-made wares expanded at later dates (though see Hill's comment regarding the use of sandy fabrics in some areas as a reflection of culture expressed via fabric recipes: 2002, p.152). It is conceivable that the close association between grog tempering and wheel-potting found expression as a reconfigured metaphor used in understanding processes by which failure was avoided at various points in the *chaîne opèratoire* – there may have been a perceived relationship between grog and the new, wheel-made, types (based on their co-occurrence in the Gaulish communities from which the technologies were derived) that had British potters believe that grog was the appropriate material for these types, and that others were less appropriate or even untrustworthy. This may have related to the kinds of concerns with 'rebirth' or recycling that have been proposed by Bronze Age specialists based on the materiality of grog; however, if such superstitions did exist then the specifics of these conceptualisations are likely to have been far more nuanced than we are capable of recovering.

6.5 FLINT TEMPERING IN REGION 1

6.5.1 Affordances and Constraints

Quartz – of which flint is entirely composed – has a very high thermal expansion rate relative to clay (Rye 1976, fig.3) and experiences crystalline inversion at 573˚C (*ibid*. p.118): quartz is, therefore – from a purely materials-science viewpoint – a poor choice of opening material. Thermal expansion of rocks is said (*ibid*. p.116) to be lower than that of individual mineral crystals, and as such flint may have had a lower rate of thermal expansion than its monocrystalline counterpart (flint/chert is not included in Rye's fig.3). Additionally, the effect of the calcination of flint on its thermal expansion properties is uncertain as this also does not appear to have been experimentally tested. Calcination is commonly cited as being a method for inducing fractures in flint pebbles, thus making them easier to crush into grades appropriate for temper (Hamer & Hamer 2004, p.144), however its role in reducing the water content of flint (*ibid*.) may have also served to lower the fragments' thermal expansion rate relative to the other most popular opening material of the MIA (quartz). This may have afforded the more common survival of ceramics through firing and thus played a role in making flint such a popular temper.

However, flint presents certain limitations as an opening material, one of which – the requirement to calcine the material – has already been mentioned. In addition, the use of flint in a ceramic fabric limits the actions that can be taken to manipulate clays. Flint retains a sharp edge even when calcined, and as such care must be taken in manipulating flint-tempered clays as there will be a danger to the potter's hands. In particular, the use of a fast-turning wheel in conjunction with flint tempering will have presented significant difficulties, sharp shards of flint easily cutting the potter's hands when incorporated into a clay mass revolving at speed.

6.5.2 Historical Aspects

The use of flint for temper, or at least of flint-rich clays, was common throughout southern British prehistory. In Region 1 specifically, flint-tempered fabrics are characteristic of the MIA, normally being found to supplement the sandy wares of EIA type. Flint-tempered fabrics are common from ceramic phase 6 (c.400-300 BC) at Danebury, meaning that potters will have been working with flint-tempered clays for numerous generations by the time typologically LIA pottery began to be produced. As such, the use of flint temper – as well as the practices and technological processes associated with it – will have already been ancient by the first century BC, and may have been regarded as such by the craftspeople adhering to its use. As will be discussed in the following section, this perception of antiquity appears to have been a crucial component in the technological choices made by potters producing these wares.

6.5.3 Construction of Meaning

Flint-tempered ceramics seem to have been the archetypal domestic ware used in MIA homes in significant parts of Region 1. Such fabrics encompass almost the entire range of principal types used in storing, cooking, and presenting MIA foodstuffs. It is likely that this range of vessels was relied upon for everyday food and drink storage and preparation – Pugsley (2003, p.120) is pessimistic regarding the possible centrality of wooden vessels in Romano-British households, discussing the woodworking industry as of everyday importance only in the medieval and later periods. Similarly, containers in other materials such as shale and metal are sufficiently rare as to be regarded as potentially peripheral to everyday activities: they were possibly reserved for occasions of significance above and beyond that of the casual meal. This is certainly not to say that pottery was socially insignificant – on the contrary, the central role of ceramic containers in the domestic sphere signifies crucial interaction with these objects on an everyday basis. Pots were relied upon as tools facilitating the fulfilment of some very basic human needs – those of hunger and thirst. Additionally, the decoration of pots – common amongst the MIA flint-tempered vessels of Region 1 – is a much-neglected aspect of the phenomenon of 'Celtic Art' that arguably deserves especial attention precisely *because* it is found so commonly on objects that must have been used fairly regularly, if not every day.

As such, the tradition of flint-tempered saucepan pot, jar and bowl production will have been of key importance in the societies of MIA Region 1. This will have been so regardless of the precise relationships between producer and consumer: if pots were produced within the household in which they were used then there is no conceptual divorce between the significance of production in relation to consumption; if they were made in one place and then exchanged/gifted into the context of use then this signifies a different form of social relationship that is nevertheless significant in terms of individuals' reliance on the supply of material culture. Potters, in essence, indirectly facilitated the everyday activities that the whole community will have engaged in, and the technical processes that they used to create objects will have been fundamental in the establishment and maintenance of this role within society.

Going into the LIA the centrality of flint-tempered pottery was evidently challenged. By the late first-century BC such containers had seemingly disappeared from large areas wherein they had once dominated. Only at a handful of sites around modern Basingstoke is there suggestion that flint-tempered pottery remained central to daily life. The implications of this in terms of consumption are of clear significance, but so is the role of producers, who will have no doubt found their position within their communities challenged by changes in pottery supply and by new technologies. Coincident with this is social and – probably – political change. The hillfort at Winklebury seems to have gone out of use during the first century BC (Smith 1977), and by the end of the century the *oppidum* at Silchester had been established, signifying changes both in the ways in which communities constituted themselves and interacted, as well as in the geographical focus of communal activity. It is easy to perceive the communities living in the south-west of Region 1 at this time as being marginalised. In terms of the roles of potters, this may have seen a key focus of activity move from within the local community to a newly-established site elsewhere, the inhabitants of which were not – initially, at least – interested in the kinds of pottery that they had been producing for generations.

Local ceramic sequences show that flint-tempered pottery nevertheless remained popular in the area around Basingstoke. Fabric 'recipes' appear to have been almost completely uninterrupted by the historical processes unfolding around potters, while vessel types being produced became somewhat more utilitarian and were often larger than their forerunners. Crucially, potters made no effort to integrate new ideas of production into their repertoires – the LIA vessels of 'Silchester Ware' type make no effort to integrate La Tène or Gallo-Belgic styles that were becoming increasingly popular among potters working in other traditions, or to even approximate the functions of the new types. Flint Group types better echo the vessels known from the preceding period, particularly in the case of the bead-rim jars that are a central part of the LIA repertoire generally. Nor did Flint Group potters show any concerted desire to incorporate new technologies into their techniques – the use of rotary techniques of any kind is known from only a small number of vessels. Any effort to fully incorporate the use of the potter's wheel into production would have involved the requirement to substantially change the setup of the craft. New fabric recipes would have had to be devised or adhered to; and new, more formalised relationships around apprenticeship would have been necessary in order to acquire the requisite skills.

Therefore, broadly speaking, aside from the very limited evidence for rotary crafting, the techniques used in crafting LIA Flint Group vessels were heavily based upon those used in the MIA. Change that did occur seems to have been based on the designs and (possibly) functions of vessels. Production therefore incorporated a very limited degree of novelty, with this seemingly being geared towards insular desires for particular vessel types, the designs of which were based upon historically familiar objects and the production of which enabled the continuation of historically familiar practices. This evidence for limited change in pottery production is in stark contrast to the evidence for widespread change in the nature and extent of connectivity, social and political structures, and economic interactions going on during this time. The continuation of production of flint-tempered pottery should not, therefore, be regarded as an abstractly 'low energy' situation in which potters of this subgroup did not interact with wider processes. Instead, the contrary seems to be true – active effort will have been made to avoid/reject change and maintain traditional methods and object types. Production of pottery was one way in which people could situate themselves in a fast – potentially negatively – changing world. The exchange of distinctively anachronistic kinds of object (affording different possibilities for action than their counterparts made in other traditions) will have helped to create and maintain a community in the face of challenging historical processes: the potter will have been a fundamental part of this dynamic. In this context the maintenance of practices such as the calcination and grinding of flint and its use as temper, as well as the collection of clay from certain deposits; use of the paddle-and-anvil technique; and construction of vessels that very visibly and tangibly hearkened back to older objects, will have gained new significance as methods for maintaining a particular identity, preserving connections with other members of the community (perhaps also with notions of ancestors), and possibly also as statements of political resistance against nearby communities with different values and who were perceived as a threat to a particular way-of-life.

In the mid-first century AD flint-tempered 'Silchester ware' became far more popular than it had been in the late-first century BC, supplanting the grog-tempered wares (produced in a far wider form repertoire) in their place of predominance at the

Silchester *oppidum* and several nearby settlements. The reasons for this resurgence in the popularity of these wares are likely to have been complex and will not be discussed in detail here. At this point, suffice to say that the agency of the producer – in enacting their deeply-valued techniques persistently over such a long period (and in the face of apparent economic collapse, socio-political change, and the opportunities of new designs and technologies) – is clearly implied by the continuity presented by Flint Group ceramics. Alongside this, the effects of the material world are clearly evident as a factor in channelling human actions. Older vessel types such as saucepans and bead-rim jars and bowls, are not imitated in the LIA but are 'echoed' in some elements of outward appearance (beaded rims, high shoulders, blackened surfaces with visible white flecks of flint) and, perhaps most prominently, in the tactile qualities of the fabric when held in the hands or touched to the mouth when eating/drinking. In all of this it is hard to deny the 'agency', for want of a better term, of the techniques themselves: technological practices here are not simply the nexus of interaction between materials, objects and people, but take on a life of their own, being of value and therefore influence in their own rights. Most importantly, the LIA Flint Group of Region 1 is an excellent case study in how techniques are implicated alongside form and function in the definition – through flexible interpretations of meanings and values – in the definitive practices by which craftspeople defined themselves within their communities, and their communities within wider historical situations.

6.6 PYROTECHNOLOGY

6.6.1 Affordances and Constraints

While the many and varied kinds of firings that can be undertaken imply the existence of different particular aims for the process, the essential aims of firing pottery can be boiled down to two factors:

- the successful production of hardened ceramic through exposure to high temperatures;
- the minimising of loss as a result of heat exposure.

The first aim is achieved by exposure to temperatures above (at least) c.550°C. Far higher temperatures are often reached, and these can vary greatly in the case of open firings (Rice 1987, pp.156–157). Woods (1974, p.269) estimates an average firing temperature of 750-800°C for much LIA pottery, and the analysis of a small sample of vessels under the SEM suggests that, with some variation, this may be substantially accurate. A wide range of different structures, fuels, and arrangements could have been used to achieve these results: in the case of Later Iron Age pottery we have little data on precisely what the parameters of these may have been, as evidence does not often survive in the archaeological record. Some simple ‘pit kilns’ have been identified dating to the early-mid first century AD (it is debatable but essentially unknown if any of these date strictly to the LIA, rather than to the period immediately after the Roman conquest). Among these are the examples from Thames Valley Park, Reading (Mepham 1997, p.55: Region 1), M25 Junction 21A (I. Thompson, pers. comm.), and possibly the Wheelers’ excavations at Pond Field, St Albans (Wheeler & Wheeler 1936, p.44: both Region 2). Comparable features are not known from earlier dates: this, combined with the relatively ephemeral natures of these probable early kilns, suggests that earlier firings were of open types, consisting of bonfire or ‘clamp’-like construction and being surface-built, involving the production of no negative features or surface-made superstructures (cf. Woods 1974, pp.268–270). As such, these would be near-impossible to detect archaeologically, although in some ways (as highlighted), their very absence from the archaeological record is informative as to their nature.

The second aim – that of minimising loss – can be addressed through a variety of processes. These can involve both practical and ‘superstitious’ elements, with these often being intertwined as features of how techniques were understood in the past and in contemporary traditional contexts. Rice (1987) refers to drying as the most obvious of these, the practice of leaving pots in the sun for hours, days, or weeks serving to reduce the amount of superficial water contained in a clay and therefore minimise the amount of potentially-destructive steam that will boil off during firing. Related to this is preheating, which may be used in colder or wetter climates for reasons similar to drying (*ibid*. pp.152-3). In this context, the demands of firing result in the creation of a whole new step in the *chaîne opèratoire*. The nature of these measures as affording the avoidance of failure means that they have commonly attracted attention as elements of the *chaîne opèratoire* regarded as being of particular significance. This has been expressed through ritual or superstitious elements of practice, in some cases: for example, Reina (1966, p.272) reports that Chinautla individuals do not look at pots as they are being fired, for fear that this will induce failure.

While much discussion has focused on technologies specifically used to avoid or minimise failure during firing, it is important to acknowledge the affordances that pyrotechnology – as arguably *the* crucial element of the ceramic technological system – can bring to the craft. The obvious affordance – applicable in all cases – is the transformative quality inherent in inducing the ceramic change, rendering a once soft, malleable material irreversibly hard, fragile, and fixed as a given shape. Decorative qualities can also be imparted by manipulating pyrotechnologies. 'Smudging' or 'smoking', for example, are methods by which vessels are impregnated with carbon residues during or just after firing, in order to give vessels a blackened appearance (Rice 1987, p.158; Cosentino 1990). Glazing (Cosentino 1990) or raku firing (*ibid*. pp.65-67) are also afforded by manipulation of the basic pyrotechnological sequence. Firing – of whatever kind and perceived technological complexity – may also have socially-constructed significance beyond solely material or functional characteristics: these should be regarded as situationally specific and informative of the technological context, as well as of the technology itself.

6.6.2 Technological Development

The relative dearth of evidence available for firing technologies and their variation through prehistory means that little can be said of the historical development of techniques until the first significant[5] set of features associated with pottery firing appear in the archaeological record in the first century AD. However, based on the vessels themselves, by the LIA of both study-regions some variation in the firing methods being used can be proposed. Based on the evidence discussed in Chapters 4 and 5, during the MIA much pottery was fired in predominantly reducing conditions, but in such a way as to produce surface colourations that were patchy, i.e. with localised fire-clouding or oxidation. This is conventionally said to be the result of firing in relatively simple bonfire-like kilns (Rice 1987, pp.153–158) wherein pots were typically covered by fuel, but oxygen flow was occasional (resulting from gusts of wind or the falling away of portions of the external fuel, for example). This holds true for much LIA pottery also. However, the LIA 'red-surfaced' wares (e.g. Silchester Forum-Basilica fabric G4: Timby 2000, pp.235–236; Hawkes & Hull's "TR4": 1947, p.204; i.e. firing patterns R5, R6 and R7 referred to in chs.4 and 5) may be said to demonstrate a different procedure whereby oxygen was permitted to flow far more freely at the end of the firing, thus oxidising the vessel surfaces more consistently. The precise nature of this procedure must remain a matter for some speculation, although it is probable that – in its earliest iterations, at least – the technique was based heavily on the surface-built bonfires which must have characterised the majority of prehistoric firings. It may be hypothesised that the technique involved the modification of the usual bonfire

[5] Possible examples of features that may be associated with pottery firing are known from earlier periods of British prehistory: for example, at Tinney's Lane, Sherborne, Dorset, where occupation was dated to the 12th-11th centuries cal BC (Best & Woodward 2011). However, these do not yet provide a large or coherent body of evidence with which to consider prehistoric pottery production *en masse*.

structure with an outer layer capable of excluding drafts from the firing atmosphere. Thér (2004, p.68) has experimentally demonstrated that a closed structure of any kind – surface-built or not – is capable of providing the level of control over firing to produce homogenously reduced or oxidised surfaces as desired: in the case of oxidising firings, this can be achieved without the division of the fuel from the pottery load, but simply by providing an insulating external layer/structure and maintaining airflow internally. The former could be provided by a layer of turves or similar, as is traditionally suggested for clamp kilns. The latter could be done by making sure that pots were spaced appropriately apart and providing one or more 'stokeholes', and a 'smoke hole' at the top of the structure. Consistent reduction firings, meanwhile, required the division of the fuel and the load, thus necessitating a somewhat more elaborate kiln structure (Thér *ibid*.). Notably, Woods (1974, pp.268–270) experimentally verified the ability of a surface-built kiln – of a kind proposed to have been operating at the very end of the LIA (based on finds from Rushden and Hardingstone, both Northants.) – to produce

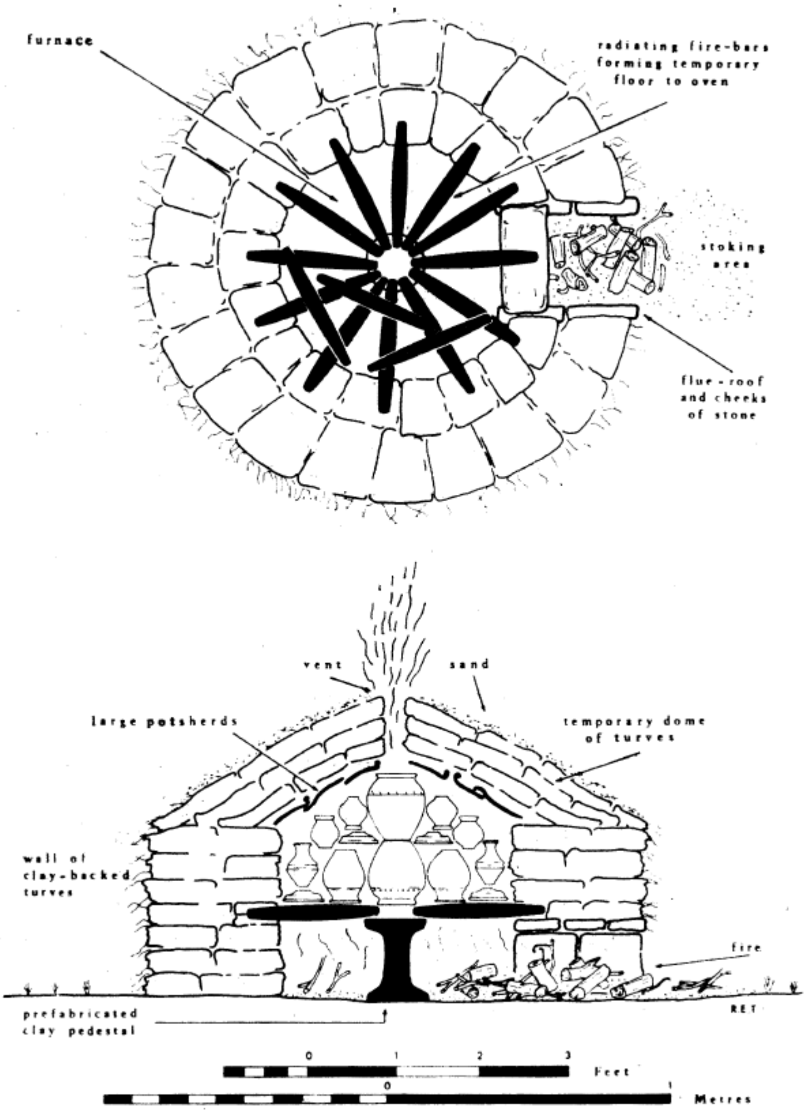


Figure 6.9. Woods' experimental Iron Age surface-built kiln. Note the use of firebars and a pedestal to create an impermanent floor separating the fuel from the pottery load. From Woods 1974, fig.3.

consistent oxidising conditions. However, Woods' kiln utilised internal supports to separate the load from the fuel (see fig.6.9), and as such qualifies as one of Thér's 'two-space' types. Alternatively, consistent oxidation can be achieved by removing the load from a bonfire once maximum temperature had been reached (*ibid.*). The reduced cores of many red-surfaced pots may suggest that this latter possibility was in fact the case: traditional bonfire firings served to bring the pots up to temperature, with the vessels being removed and allowed to cool in an open area that helped develop oxidation.

There is therefore much ambiguity regarding the precise nature of the technology used to produce the 'red-surfaced' wares. However, the archaeology is unequivocal that the technique used would have remained a variety of surface-built firing, possibly either modified with an external covering, or remaining an open bonfire (around which developed the technique of removing the pottery at the height of temperature). Based on these ambiguities caution should be exercised in analysing the development excessively. However, one clear aspect of technology which is secure in the evidence is an increase in the understanding and skilful harnessing of the phenomenon of oxidation. It goes without saying that in the LIA understanding of such a phenomenon will have been based on experience and interpretation of a non-scientific kind. MIA potters will have been aware that their products occasionally turned different colours to the blacks and dark browns which they will usually have expected or required, and will probably have connected this with the characteristics of the environment in which they were fired (the presence of wind or smoke, for example). Innovation came in the form of the acknowledgement that certain conditions (specifically, the absence of smoke and space around the pots) promoted the even development of one particular colour – in this case: reds, pinks, or oranges.

It is worth considering the associations that control over this phenomenon may demonstrate. Red-surfaced vessels appear at a date roughly coincident with the first Gallo-Belgic imports to southern Britain (Thompson 1982, pp.22–23). However, there is no convincing association between red-surfaced firings and any particular vessel type or category, the exception being that certain coarse forms such as cookpots and storage jars were only very rarely oxidised. Many Gallo-Belgic 'copies' are fired with red surfaces, but so are numerous necked jars and bowls: types which had been in circulation for decades by this point. It is conceivable that this was the result of an intention to fire certain vessels (e.g. Gallo-Belgic copies) red, but that other vessels were included in order to make up the loads. However, the fact that only a proportion of Gallo-Belgic copies were fired red potentially warns against this association, as does the fact that certain vessels such as platters (which in their fineware originals were typically coloured the black of *terra nigra*) were included in at least some oxidised loads (e.g. in the kilns at Thames Valley Park).

More likely is that oxidised firings were not intended to be applied strictly to one component of the pottery repertoire, but that some potters were experimenting with new firing procedures, potentially having been inspired by the realisation that such consistently reddened finishes were attainable. This goes against Thompson's assertion that the red-surfaced fabrics mainly imitated Gallo-Belgic forms, and particularly those originally known in *terra rubra* (1982, pp.22–23), but corroborates with the observation that at Silchester the most common red-surfaced types are jars and bowls, only then followed by beakers (Timby 2000, pp.235–236). Nevertheless, the fact that the commencement of red-surfaced firings appears to have been roughly coincident with the import of the first Gallo-Belgic finewares (including *terra rubra*) may be telling regarding the details of knowledge circulation. Thompson notes that the earliest contexts at Braughing contained small amounts of red-surfaced wares alongside Gallo-Belgic imports (Thompson *ibid*.; Partridge 1981, pp.54–61). Similar can be said of all but the very earliest contexts at the Silchester forum-basilica, where red-surfaced fabrics were similarly dated to the final quarter of the first century BC prior to their floruit in the early-mid first century AD (Silchester forum-basilica periods 2 and 3: Timby *ibid*.). Specifically, the

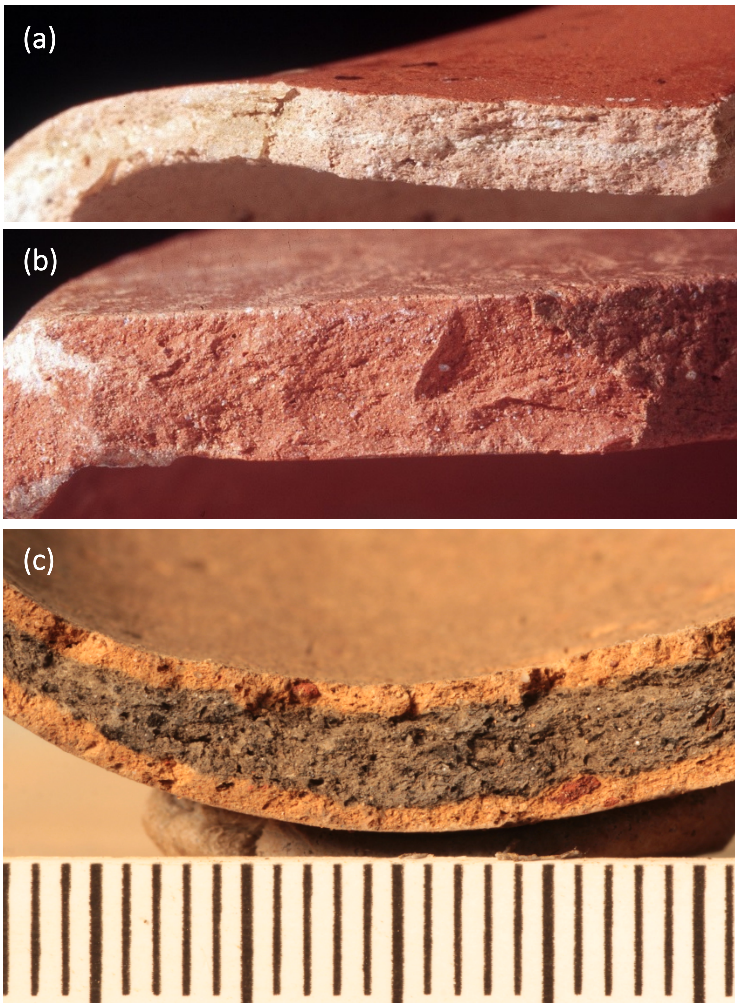


Figure 6.10. Oxidised firing patterns of LIA ceramics. (a) terra rubra TR1A; (b) terra rubra TR1C; (c) 'red-surfaced' grog-tempered ware. All images to scale. (a) and (b) detail of images from Tomber & Dore 1998, reproduced in modified form (cropped for scale) under the terms of a Creative Commons CC-BY 4.0 license (https://creativecommons.org/licenses/by/4.0/legalcode); (c) image: the author.

uptake of surface oxidation seems to be unlike the uptake of the potter's wheel, which probably took place a generation or more beforehand in both regions. The uptake of the potter's wheel demonstrates massively increased investment in time, effort, and equipment to that known previously. While the exact nature of the wheel-techniques used on the continent at this time are currently unknown, the evidence for throwing alongside wheel-coiling demonstrates that at least some potters were developing their skills to the maximum level of sophistication. Not so with pyrotechnology, wherein the slipped and kiln-fired finishes of Gallo-Belgic fabrics were not sought, but were approximated with a level of innovation and investment easily achievable without substantially altering the nature of production. This is strongly suggestive of a different process of technological change to that seen with the wheel. Whereas it has been proposed that the process of learning skills with a potter's wheel implies the movement of at least a small number of people one way or another across the channel, the development of pyrotechnology does not necessitate this. By comparison, there is no reason to believe that British potters will have been aware of the kinds of kilns that were used by Gallo-Belgic potters. While Fitzpatrick and Timby (2002, p.171) note the probability (based on the evidence of Latin graffiti at Braughing) that Gauls were known in Britain from – at least – the late first century BC onwards, the presence of Gallo-Belgic-style fineware producers in Britain – whose activities would be archaeologically conspicuous through the existence of semi-permanent kilns – are not evidenced until the conquest period (Timby 2013b, pp.162–164). There may therefore have been no direct connection between Gallo-Belgic-style potteries and British potters, by which detailed knowledge could have been transferred. Nevertheless, once the innovation surrounding surface oxidation had occurred it seems to have spread rapidly, being known at Braughing and Silchester apparently within a few years of one-another. This may be testament to the relative simplicity of the technique, its compatibility with pre-existing technology, and the favourable environment provided by groups of potters in each region who appear to have conspicuously valued novelty.

Some modification to the current theory that red-surfaced wares were a way of familiarising 'alien' vessel types may therefore be necessary: there is little evidence to suggest that we can associate oxidised firings with vessel types that would have been novel at the point in time at which these firings were introduced. Innovation in this case may have been a combination of a will to experiment in an effort to attain a specific material outcome, and a response to a lack of knowledge circulation or to the existence of opportunities for apprenticeship. The example of the potter's wheel demonstrates that potters were willing to go to extreme lengths in the use of novel techniques during the LIA. While it is possible that, in the time between the first appearance of the wheel and that of the new firing technique, social values may have changed to the extent that such lengths were no longer deemed appropriate in the imitation of new vessel types, a prerequisite of this is that the necessary technical knowledge and experience was also in circulation. Without prior understanding of practices of slipping and kiln-firing, it may not be readily apparent how the finish of a *terra rubra* beaker – for example – was achieved. Craft knowledge would also need to have been in circulation: in the case of fineware production this is not in evidence in Britain. This presented certain British potters with the opportunity to innovate their existing firing techniques into a form more capable of providing the evenly oxidised finishes that they sought to experiment with. The fact that only some producers appear to have been undertaking such experimentation may be another example of the kinds of internalised variation within the potting craft that we see with, for example, the potter's wheel.

Regardless of the precise social dynamics surrounding the circulation of new knowledge, the point stands that a novel technique was developed by which the new surface appearances could be consistently achieved. This poses another issue related to knowledge circulation. Other spheres of practice had experienced development relating to the harnessing of atmospheric conditions during the LIA. Oxidation was crucial to funerary procedures in the LIA and Romano-British periods, facilitating the proper cremation (as opposed to charring) of the body (McKinley 2008, pp.182–183). Pyres must therefore be constructed so as to maintain airflow, in order to provide sufficient oxygen for adequate combustion of the fuel as well as to avoid reducing conditions at the apex of the construction. This knowledge – however it may have been socially constructed as an element of the *savoir faire* associated with funerary pyrotechnology – will have been fundamental to cremation practice, as is demonstrated by the results of analysis of cremated remains from this period (McKinley *ibid.* pp.190-199.; E. Carroll pers. comm.). Cremation was common in the southeastern counties (including Hertforshire) in the LIA, e.g. at King Harry Lane (Stead & Rigby 1989) and Folly Lane (Niblett 1999), St Albans; and in the Welwyn Garden City burial (Stead 1967) ; less-so (but still known) in areas to the west such as Region 1: e.g. at Latchmere Green (Fulford & Creighton 1998), Burghfield (Boon & Wymer 1958), and the recently-discovered burial at Windabout Copse (Wheeler & Pankhurst 2017). Cremation is a very visible form of pyrotechnology: it is a spectacle almost by nature, and its popularity in certain areas means that many inhabitants of the southeastern counties in particular will probably have attended one or more cremations in their lifetimes; if, indeed, they did not intend upon being cremated themselves. There is debate as to the possibility of specialist cremators amongst LIA societies (Carroll pers. comm.), and it is likely that many individuals in cremating communities had knowledge of how to properly construct a pyre. If cremation was not a specialised activity it is likely that some potters may have personally known people skilled in making pyres, if indeed some potters did not possess this knowledge themselves. Therefore, it is potentially easier to relate developments in LIA pyrotechnology to indigenous practices taking place in other spheres of action, than to those going on in pottery industries operating elsewhere.

To sum up: all of these features of developing pyrotechnologies will have contributed to the social construction of meaning in relation to firing techniques. The situation is one of the more difficult to assess in this study due to the relative inaccessibility of the practices themselves; therefore, analysis has focused upon the firmer aspects of technological development (namely, the phenomenon of oxidation). The ideas presented are therefore partial and necessarily provisional. It has been suggested that the developmental processes associated with forming and firing techniques respectively were differential in nature, and that this suggests that knowledge circulation – as well as social agency – played a part in the development of the new technique in response to a demand for new kinds of pottery. It has also been suggested that the requisite understanding of the base phenomenon of oxidation existed and was probably in circulation closer to home, highlighting a potential link between two social arenas (pottery production and cremation) that are often conceptually divorced in archaeological studies, but which in fact may have been far closer to one-another in terms of social distance than hitherto assumed.

6.7 SUMMARY

The analysis conducted in this chapter has served to illustrate the many and varied ways techniques were implicated in the social processes that were ongoing in the LIA. It has been demonstrated that, even where functional or economic decision-making is implicated as a factor in change, the socially constructed nature of techniques and their associated knowledge-bodies means that simple techno-evolutionary conclusions cannot be regarded as providing the full picture. Instead, it has been demonstrated at numerous points that technologies were inextricably linked to the undertaking and mediation of social change. As such, the analysis conducted in this chapter has found that innovative techniques, technologies, and designs could be used to variously situate the novel amongst the familiar; facilitate and/or react to social change via the skilled use of the novel; or indeed shun certain forms of novelty by developing forms of practice conspicuously based upon the ‘familiar’, ‘traditional’, or ‘anachronistic’. Attention has been paid not just to the overtly ‘different’ elements of LIA technical practice and material culture compared to the MIA, but also to those elements that hearken back to previous times. Similarly, novelty has not been assumed to be purely the result of the importation of ideas, objects, or people from overseas: consideration has also been given to the potential dynamics between pre-existing technological precedents, novelty with associations in other areas of Britain, and techniques thought to have links with elsewhere. Fundamental to this is acknowledgement of the heterogeneous nature of British material culture, practices, and processes during this time-period, which represents, in part, highly variable responses to technological change by different groups of craftspeople.

CHAPTER 7: DISCUSSION: INNOVATION AND SOCIETY

7.1 INTRODUCTION

The previous three chapters have presented an evidence-base and several interpretive principles that allow a detailed discussion of the complexity of ceramic technological change in the two study-regions. The analysis presented in chapters 4 and 5 have served to establish variability in the uptake of new technologies. This has been interpreted in terms of different socially-mediated processes of interaction with and between new technologies and pre-existing aspects of material culture. Crucially, this variability existed both between and within individual archaeologically identifiable periods. Chapter 6 expanded these analyses, seeking to contextualise certain of the techniques identified within wider spheres of social action, including the affordance and constraint of action and the significance of temporal/spatial/cultural associations. This resulted in a primarily bottom-up approach, building conclusions from the basis provided by technical practice when considered in relation to other archaeological features.

By contrast, Chapter 7 attempts a more top-down approach, emphasising the processual nature of technological change and the significance of wider processes of socioeconomic change within Later Iron Age Britain. The consideration of historical factors that were at the forefront of Chapter 6 imply the continuous nature of change, and this fits with the Maussian notion of technologies continuously unfolding ('becoming') through the medium of practice. In this chapter, the details of how – and potentially why – this process unfolded as it did will be considered. An initial section will provide some preliminary thoughts on the processual nature of modern understandings of innovation and integrate these with recent archaeological theory. Following this, the various forms of technological change for which there is evidence in the LIA will be considered in the light of wider changes to the nature of economics, social networks, value structures, and identities.

7.2 INNOVATION AND PROCESS

This section addresses the role of innovation in the developments in Iron Age ceramic technology that have been discussed thus far. Archaeologists have typically been poor at addressing past innovation, being hampered by methodological difficulties and an evidence-base that seems to conceal direct signifiers of the innovative process (van der Leeuw 1990). However, recent decades have seen increasing attention given both directly and indirectly to the concept of innovation in archaeology, with the proponents of evolutionary and, later, materiality theories being particularly influential (see e.g. van der Leeuw & Torrence 1989; Knappett 2005; Gosden 2005; O'Brien & Shennan 2010; Robb 2015). This section will discuss these theoretical developments, establishing the current state-of-thought before considering the analyses presented in chapters 4, 5 and 6 as part of multifaceted innovative processes. This will then set the scene for a consideration of how these innovative processes were bound up with both localised and broader socioeconomic factors, being part of the wider processes of change we see in the Later Iron Age.

7.2.1 Innovation as process

Innovation is generally considered to consist of at least two distinct phases. Torrence and van der Leeuw (1989, pp.1–5) conceive of 'invention' – the initial conception of a new technical idea or practice – and 'adoption' – the interactions surrounding the acceptance and eventual use of the new idea. Basalla (1988), meanwhile, called his stages 'invention' and 'selection': the latter in accordance with the Darwinian understanding of the term. As a basic, initial point, therefore, it suffices to say that the study of innovation is not simply concerned with the appearance of novel technologies, but that there is acknowledgement of the potential complexity of conception and application, and of subsequent adoption or rejection. In particular, much has been written on the selection/adoption/diffusion stages that follow invention/innovation. Examples include Bijker's *Of Bicycles, Bakelites and Bulbs* – the flagship of the SCOT paradigm – as well as Roux's 'dynamic systems framework' (2003). Meanwhile, Edgerton (e.g. 1999; 2008) has for many years emphasised that much of the significance of technologies lies in their use, rather than in the processes by which they come into being; the former being a barometer of arguably wider and more significant socioeconomic conditions.

This discussion nevertheless centres on invention and innovation, arguing that the innovative process is sensitive to different kinds of social forces to those evidenced in selection/diffusion/adoption/use. It is a fairly basic premise at this point to say that the nature of innovation is to take small, incremental steps in understanding or technological ability. Basalla (1988) envisages technological innovation as continuous, generally with very gradual development taking place by which a technological system is progressively reconfigured. Provided with favourable circumstances, individual instances of innovation mount up and technologies become increasingly complex (*ibid*. pp.26-63): Arthur (2009) refers to this as 'combinatorial'. The reading of technological innovation as a continuous process was explicitly acknowledged in archaeology relatively early-on: by, for example, Torrence and van der Leeuw (1989, p.4).

Importantly, Basalla gives a large amount of page-space to his ‘invention’ stage of the innovative process – the very first inception of a new idea. He discusses the roles of creativity, play, and fantasy in invention, claiming that necessity is not the ‘mother of invention’, but that creativity and inventiveness are parts of human nature that are fundamental to cognitive engagement with the material world. As evidence of this, Basalla cites the illustrations of Leonardo Da Vinci, in which the artist demonstrates significant creativity in devising machines that, at the time, will have had little practical necessity (e.g. a basic helicopter: i*bid*. pp.64-78). Creativity is therefore a crucial concept in relation to human agency in technological change, being subsequently utilised in the studies of, e.g., van der Leeuw (1990), and Dasgupta (1996).

These notions – that innovation is incremental and cumulative, and that the creativity by which innovation comes about is a fundamental part of human interaction with the material world – fits well with recent post-Cartesian approaches taken by archaeologists. The object-centred approaches of, e.g., Gosden (2005) and Robb (2015) are rooted in the idea of material culture as being embedded within pre-existing material and object landscapes, with any modification to the nature of a manmade object being necessarily rooted in an understanding of this pre-existing context. Knappett (2005), meanwhile, envisages creativity as being central to human cognition of the material and social world. For him, the ‘mind’ is not only the brain but also the objects, materials, and social forms with which individuals interact. These serve to shape how individuals think, thereby variously constraining, enabling, and informing action, including creativity. By this reading, creativity (and thus, innovation) is potentially accessible to everyone as a key part of their exploration of the material world: this runs counter to Roux’s notion of expert artisans who, through mastery of technical processes, are able to “transcend the cultural representations that have formed their way of seeing and doing” and are thus the sole preserve of innovation (2010, p.224).

The implication of this for archaeologists is that innovation need no longer be regarded as simply about continuity and change. There has previously been a temptation to equate archaeological change with novelty and thus with innovation: the argument implicit in the theory presented here is that innovation is part of human nature and thus forms an intrinsic part of individual agency. The difference between contexts in which innovation is evident versus those in which it is not, therefore, is that different social and/or material conditions will have been prevalent in order to provoke different, novel responses to the object environment. These may be quite separate to factors surrounding the eventual adoption of a given technique. Equally, where innovation is not evident this does not necessarily imply that social and material conditions will have been identical from one context to another. Rather, we must consider what technological continuity tells us about peoples' interactions with society and materiality, and not simply assume that production will remain continuous unless producers are given explicit reason to act differently.

7.2.2 Introduction versus innovation

Before proceeding it is worth referring to the concept of 'introduction'. This has been discussed in relation to LIA ceramic change by J.D. Hill (2002, p.144), and for the purpose of this discussion may be defined as the movement of a novel idea into a new sociotechnical system from a different geographical or cultural context. It has been argued in chapter 6.3.2 that, although likely to have been a complex process, at least a small number of continental potters were probably involved in providing British potters with knowledge and skill in the use of wheel technology. This would be an example of introduction: the inception of the idea of wheel-use occurred outside of the social group to which it was introduced.

It may at the outset be argued that such introductions are in fact not innovations at all when considered in the context of the social group to which they were introduced. The purpose of this brief section is to argue otherwise. In particular, the SCOT concept of 'interpretive flexibility', for example, demonstrates that novel/innovative ideas and objects need not necessarily be utilised in the same ways by all of the social groups adopting them. This point is evidenced extensively in the dataset for this study: e.g. in the employment of rotary technology in wheel-shaping and throwing; or in the variable responses to new tempering technologies and pyrotechnologies. Such variable responses in their own ways imply the enactment of individual and/or social agency in relation to novel objects and techniques; this in turn implies a level of creativity (and thus, innovation) in dealing with novelties that have already been introduced to a sociotechnical system.

As such, I argue that regardless of precisely when, where, or by whom an innovation was devised, the process of its continual (re)incorporation into a sociotechnical system implies further creative, innovative action. This principle may be seen as being at work in contributing to the diversity that we see in many examples of technical development.

7.2.3 Ceramic technology develops incrementally and cumulatively

The evidence from the two study-regions shows clear sign of the development of ceramic technology both incrementally and cumulatively during the LIA. Innovations can be seen to most often derive heavily from pre-existing practices. This was a strong, implicit influence upon Rigby & Freestone's description of ceramic technological change and their model, which incorporates the narrative, processual quality of innovation. This study has developed several aspects of this. For example, the identification of wheel-coiling as a very popular form of wheel-use in both study-regions during the first centuries BC and AD highlights how – to many potters, at least – the wheel was an incremental development in practice that did not involve a wholesale revolution in how potting was conducted. As argued in chapter 6, the technique of wheel-coiling involved the continuation of the traditional two-part structure of pottery production (primary production of the preform followed by secondary smoothing, thinning, shaping, etc.) and incorporated the coiling technique with all of its associated values and meanings, while also integrating (possibly legitimating) rotary technology. Similarly incremental change can be seen in the development of pyrotechnology, wherein traditional bonfire or clamp-firings were progressively augmented in order to produce new results. Development led from bonfires/clamps, to bonfires/clamps with the affordance of oxidising firing conditions, to simple pit-kilns such as those found at Thames Valley Park, Reading, and finally to the development of more formalised, semi-permanent kilns in the Roman period (Swan 1984). As has been discussed in chapter 6.6, these developments show potential associations with several spheres-of-influence from both within and outside the potter's craft, these novel aspects seeming to expand potters' experiences and knowledge-bases in such a way that new technical possibilities were made available via the process of creative innovation.

Therefore, the model of incremental and cumulative development fits within the context of the two study-regions. However, the examples cited so far deal with the 'high-tech' end of innovation – those technologies that were both successful in terms of their widespread adoption, and also can be seen to have built significantly upon pre-existing technological practice. In the context of the discussion of archaeological representations of continuity and change above, it is appropriate to seek innovation even where it may not be expected to be found. The Flint Group of Region 1 is an

Figure 7.1. 1/BHS-043. Exterior (left) and interior (right) views.

excellent example of material culture associated with a sociotechnical system that is conspicuously continuous throughout the period in question. Despite this, chapter 4.2.1 identifies several relatively small-scale examples of departure from this picture of continuity. Among these are the two vessels suggested to have been secondarily shaped by rotary techniques. One of these, 1/BHS-043, appears to have been extensively shaped on the wheel (fig.7.1), implying that its craftsperson had been tutored in wheel-use for an extended period. The other, 1/SIX-015, has only been superficially modified using rotary motion, its rim having coarse horizontal striations that suggest it was shaped and smoothed using a cloth as the vessel turned (fig.7.2). The two examples are widely divergent and are best treated as separate instances of (potentially individual) creativity. 1/SIX-015 is a relatively simple case – the crafting of

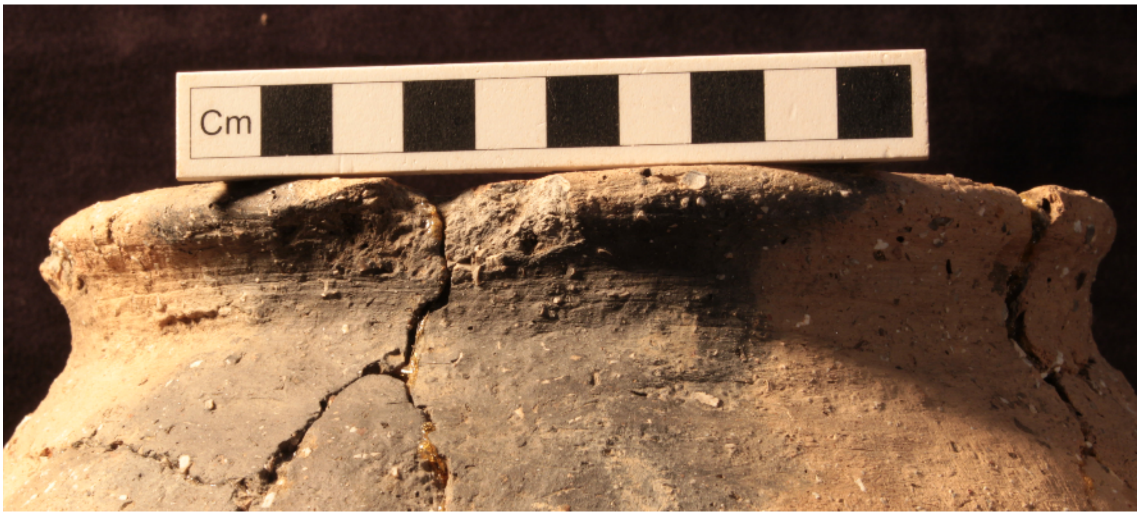


Figure 7.2. Rim of 1/SIX-015, showing coarse horizontal striations indicative of application of rotary motion.

its rim was probably inspired by the potter's awareness of wheel-techniques and the envisaged outcome of a flat, even shape to this part of the vessel. This is a very clear example of a potter exercising individual agency: their curiosity and creativity interacting with an awareness of the material constituents and practices going on in their environment. 1/BHS-043 is a somewhat more complex case; a 'hybrid' in many ways. The actual nature of the innovation evident in its crafting is difficult to identify. The potter used the wheel competently and in the manner of a wheel-coiler in the neighbouring grog-tempered tradition, and this implies that the potter participated in an apprenticeship in the use of the wheel. However, while the form of the vessel is the common bead-rim jar that was produced in all of the major Region 1 traditions, the fabric is very much that used by the Flint Group, and this has implications for the procurement of resources, practices associated with clay preparation, and knowledge of these things. It is therefore difficult to assess where the creativity lay in this instance. Perhaps this was an itinerant potter, skilled in wheel-use and who found themselves in the area inhabited by the Flint Group potters, creatively deciding to use the raw materials utilised by local potters and taking the decision to prepare these in the traditional way. Other possibilities are conceivable, but any option is speculation.

What is significant is that these examples show that creativity can be identified in instances where material culture shows evidence of violating the usual 'rules' that serve to define a tradition. 1/BHS-043 is something of a cautionary tale in the reconstruction of the different sequences of events, but 1/SIX-015 shows that the evidence can also sometimes be very revealing as to the cognitive processes that are implied by innovative behaviour. We have already seen how individual and material agencies are implicated in this particular instance of creativity; however, we must also consider other contextual factors. Specifically, while the creative process described above for this vessel implies knowledge of novel technologies (and therefore a connection to other craft traditions) and a desire, however limited, to engage with certain aspects of non-traditional objects (flat, even, smooth vessel openings), the fact that the evidence of action of this kind is so limited in this tradition implies the social agency of the kinds of value-structures that were used to characterise the Flint Group in chapter 6.5.3. All signs point to the Flint Group potters as being conservative: innovative in the sense of adapting the repertoire of forms that they made, but relatively uncompromising in their perpetuation of traditional techniques. The use of wheel technology or an approximation of it may have been distasteful to potters working under this value-system and was therefore discouraged. There will also have been difficulties of a purely practical nature that will have played a role in dissuading Flint

Group potters from adopting these practices: flint-tempered fabrics being dangerous to the potter's hands and, in the example of 1/SIX-015, apparently necessitating the use of a coarse cloth or similar to protect the fingers as the vessel turned. The fact that continued use of flint temper was chosen over the adoption of simplistic rotary techniques also implies the relative valuation of the two techniques, which was clearly in favour of the traditional flint temper.

7.3 ECONOMICS

7.3.1 Vessel forming techniques and their implications

The innovation of vessel forming methods during the LIA was in no way simplistic in either study-region. During the first centuries BC and AD at least two distinct variants of wheel-use – wheel-coiling and throwing – were in widespread use. As discussed in 6.3.1, these techniques are related in many ways, but are also different in their affordances and constraints on action. Crucially, both are united by the length of the apprenticeships required to learn the requisite skills; however, the economic outcomes, judged in terms of production speeds, are different. Specifically, the kinds of wheel-coiling most commonly identified in both study-regions (Roux & Courty methods 1 and 2) may have offered, on average, only a 25% decrease in the time required to make a given vessel-type compared to purely hand-done techniques. Throwing will have been able to achieve similar shapes in a far reduced time.

Rigby & Freestone's (1997) model of ceramic technological change in this period is predicated by two assumptions. Firstly, they establish economic influences as the drivers behind technological change (specifically: a desire to increase productivity). Secondly, they assume a directionality to the process of technological change: towards full specialisation and the eventual achievement of 'Roman-style' production. The evidence provided by this new data on the potter's wheel allows the first of these assumptions to be challenged. Rigby & Freestone explicitly base their interpretation on the notion that Late La Tène and Gallo-Roman types made in British coarseware fabrics were wheel-*thrown* (*ibid*. p.57). While they briefly acknowledge the potential significance of increased investment in learning that is implied by the wheel (*ibid*. p.60), their analysis is that this investment is representative of the transition to full-time specialism, and that the increase in production speed that can be attained with the throwing technique signifies this transition occurring at this point in time.

This interpretation requires some augmentation. As stated above, wheel-coiling requires the kind of lengthy apprenticeship associated with any wheel-using technique but does not offer the same returns in terms of production speed. Its popularity in both study-regions is therefore somewhat mystifying in the context of Rigby & Freestone's economically-driven model. In particular, it is unclear whether the kind of c.25% increase in efficiency offered by wheel-coiling over hand-making would have been sufficient to incentivise potters to undertake an apprenticeship of several years' length (during which their productivity and competence will have no doubt been sub-optimal) when an apprenticeship in coiling would have offered the chance to become proficient far more quickly. Under this model, the conditions motivating innovation are obscure: it therefore serves to consider the significance of the economic background in a wider sense.

Technological optimisation or production efficiency were not prerequisites to success in the Iron Age potting economy. It has already been established that in Region 1 an entire potting tradition persisted (becoming overwhelmingly successful during the first century AD) despite maintaining an entirely handmade *chaîne opèratoire*. The case of the Flint Group may however be somewhat exceptional, perhaps being related to the role of these wares as a specialised category of pottery. Nevertheless, the point is still very much in evidence when only typologically LIA wares are considered. For the most part, wheel-coiled and thrown vessels were both produced in similar repertoires, and as such (in modern capitalist terms) should have been competing for similar sections of the market. There is nothing to suggest that these were chronologically successive techniques. The fact that less-efficiently-made wheel-coiled wares were able to compete with, and potentially outnumber, thrown wares in consumption contexts suggests the existence of an economic situation that did not include modern notions of profit motives or production efficiency. This has been assumed to be the case for some time, with – for example – Peacock (1982, pp.80–81) considering the possibility of socially-embedded economies as a possible precursor to the systems evident in the Roman period. Such ideas were also explicit in Morris' studies of the Severn Valley (1981; 1982; 1994a, pp.377–378; 1996, p.44). While this study has not sought to study pottery distributions, the technological data described above do lend weight to the argument that potters remained unmotivated by notions of profit or productivity going into the LIA, this appearing to be only a minor factor – if a factor at all – in why the potter's wheel was taken up. Nevertheless, production centralisation does appear to have been ongoing throughout the Later Iron Age. For example, Peacock's studies (1968; 1969) of ceramics with diagnostic rock or mineral inclusions (e.g. Glastonbury ware) have demonstrated the centralised distributions of either pottery or raw clay. Morris' studies of western England (1981; 1982) expanded upon Peacock's analyses and bolstered the notion of centralised production during the Later Iron Age. Knight (1999, pp.137–141), meanwhile, in addition to identifying gabbroic fabrics deriving from Cornwall, discovered the occurrence of granodiorite inclusions in pottery from several sites in the East Midlands in a pattern that is suggestive of centralised production in the vicinity of Mountsorrel. The particulars of provenance and distribution are difficult to resolve in many cases (particularly where homogeneous geology frustrates the efforts of petrography, i.e. for much of south-eastern England), but there is a general impression of the emergence of centralised production in some areas, alongside continued household manufacture of pottery, during this period (Henderson 1991, pp.105–107; 2000, pp.144–147; Morris 1994a, pp.377–384; 1996, pp.43–49; Knight 1999, pp.137–141). This background doubtless provided a certain degree of facilitation (if not motivation) to potters seeking to take up more elaborate technologies and skills (or even taking the decision to specialise), even though the economic motivation to changing production remains obscure.

7.3.2 The role of consumer feedback

As has been discussed at several points above, the potter's wheel afforded the production of a range of particular shapes that were based on the kinds of vessel morphologies common on the La Tène continent and in the later Gallo-Roman repertoire. Contrary to Rigby & Freestone's thesis that the potter's wheel and other technological developments were of blanket economic benefit, I argue that the key unifying factor between all of the developments that we see in this period is the accommodation of new forms of material culture, and novel practices. In relation to material culture, this accommodation highlights the role of consumer feedback processes in trajectories of technological change: desires associated with the consumption of coarse pottery influenced the ways in which that pottery is made. This is implicitly identified by J.D. Hill in his consideration of the social dimensions of wheel technology (2002).

As has already been discussed, the evidence from Region 2 is suggestive of a relatively slow uptake for the potter's wheel. While, in the years following its introduction, the wheel found extensive use in making certain vessel types based on continental prototypes, the C3 and C8-1 types that formed the core of the repertoire were made wholly by hand. These forms were also developing gradually under the influence of both 'vertical' influences from earlier, related vessel types and 'horizontal' pressures from contemporary ceramics known from other geographical regions. Analysis of vessel morphologies is consistent with widespread changes to consumption habits within which both handmade and wheel-made pottery was implicated: this is interpreted by Hill as being representative of the changing social role of the meal and increasing categorisation of material culture (*ibid*. pp.148-151). Overall, Region 2 exhibits far less technological heterogeneity than does Region 1: Sandy-Organic Group wares predominate overwhelmingly in the MIA, as do Grog Group wares in the LIA.

The situation in Region 1 appears to have been somewhat different in terms of the processes and economic influences behind technological change. The relative abundance of quantified assemblages in this area also makes Region 1 an interesting case-study that allows a detailed look at both generalised and localised features of pottery consumption.

The beginning of typologically LIA pottery in Region 1 is different to the process in evidence in Region 2. The date of (widespread) introduction of La Tène forms, grog tempering, and wheel technology was almost certainly far later in Region 1 than in Region 2: probably by several decades[6]. Additionally, typological change is less marked: the typical bead-rim form that is the core of the MIA and LIA repertoires effectively persists substantially unmodified from one period to the other, the only clear difference being the use of wheel technology in its production by certain groups in the latter period. Unlike in Region 2, where there appears to have been some initial reluctance to use the wheel to make certain forms, there is no suggestion of such an 'incipient' phase in Region 1. Instead, reluctance to interact with new technologies seems to have taken the form of continued production of kinds of pottery known from the MIA by certain groups – most prominently by the Flint Group potters from the southern part of the region.

The economic processes that are implicated in this different form of innovative diversity may have been related to the localised nature of consumer feedback processes. The earliest LIA contexts, such as those from Ufton Nervet Pit H, Aldermaston Site I, F12, and the earliest Silchester contexts, yield ceramics that do not appear significantly functionally different from those known from the MIA. Although no formal morphological analysis can be conducted on these groups because of their small size and lack of complete profiles, it may be said with some confidence that the types represented continue to be dominated by jars and bowls, the new necked types that are added to the repertoire falling into this pattern. Saucepan pots go largely out of use except in the group from Ufton Nervet Pit H: there may be an argument to say that

[6] The only potential challenge to this assertion is the radiocarbon date associated with the Latchmere Green urn: see Chapter 4.2.3.

these were replaced by necked forms in their somewhat specialised role in service and/or preparation.

Certain later groups do demonstrate the kind of developing functional heterogeneity discussed by Hill, though. In the pre-conquest contexts from Silchester Insula IX, for example, nearly 20% of the pottery from key groups can be assigned a primary association with drinking, while an additional 9% is represented by forms that would have afforded the service of more 'solid' foods than are implied by the jars and deep bowls of earlier periods (i.e. platters and dishes). This corroborates with, for example, the archaeobotanical evidence from Iron Age Silchester, which demonstrates an increasing range of food items being brought to the site during this period (Lodwick 2014). Silchester may be an unusual case. Although non-standardised conventions of pottery quantification make direct comparison between assemblages difficult, where analysis has been done the pattern seems to represent minimal consumption of specialised vessel types at sites other than the *oppidum*. For example, of the 379 vessels reported from LIA/early Roman levels at Brighton Hill South, 356 (93.9%) were jars of various sizes (including 64 (16.9%) "high-shouldered rounded jars" – i.e. bead-rim types – and 93 (24.5%) saucepans). 'Specialist' vessels (e.g. beakers, flagons, platters, dishes, and lids) were found only 18 times (4.7%): 7 of these were lids (Rees 1995, Table 6). Similarly, in the – admittedly far smaller – assemblage from Jennett's Park, Bracknell, jars represented 2.85 of the total 3.21 EVEs of LIA pottery (89%). Bowls added an additional 0.03 EVEs (1%). Lids represented the remaining 0.33 EVEs (10%): no 'specialist' types were found at all (Biddulph et al. 2009, p.41–43, Table 5). At Park Farm, Binfield, of the 4.14 EVEs of LIA 'E' wares, all vessels apart from one (a saucepan pot: Booth 1995, fig.52 No.11) were classified as bead-rim jars or related types (*ibid.* p.108).

These data suggest that in Region 1 the spread of novel foodways was limited in the LIA, evidence largely being restricted to the *oppidum* at Silchester. Inhabitants of other sites appear to have been markedly less interested in new kinds of pottery that would have facilitated different forms of food and drink consumption. In this context it is easier to envisage how the kind of diversity in pottery technology and production that we see in the LIA of Region 1 was able to be maintained – the consumer feedback processes in this case did not necessitate the large-scale production of new kinds of pottery throughout the region, with many outlying sites seeming to rely on jar and bowl forms that were made in both traditional and novel ways. There may have been some drive to take up novel forms such as necked jars, but these do not appear to have been part of larger-scale changes to the actual practices associated with food and drink consumption. This contrasts with Region 2, where grog-tempered, wheel-made vessels were ubiquitous by the close of the first century BC and there appears to have been widespread demand for the new vessel types. Localised processes of massive-scale population growth may have been a factor in this difference and in the more widespread employment of the wheel – while lightly settled during the MIA, Region 2 is densely populated with several nucleated settlement clusters in the LIA. This suggests an increase in the population, the material needs of whom will have had to be catered for by craftspeople. This may have been a factor in why the more efficient 'throwing' method was somewhat more popular here than in Region 1 (represented in 31.0% of LIA vessels in Region 2 against 18.3% of Region 1 LIA vessels). Nevertheless, the popularity of the less-efficient wheel-coiling methods still suggests that profit or productivity were not overriding economic concerns.

In sum, therefore: where technological change is in evidence, the key driver of this appears not to have been shifting values around the nature of economics, but rather a variety of changing relationships with pottery as a form of material culture. In some social circles, the nature of the meal was changing. This led to demand for new types of utensil for the preparation and presentation of food and drink. In areas such as Region 1, these practices were restricted to only certain segments of society – potentially those with divergent social status, political or cultural affiliation to much of the rest of the population, i.e. those inhabiting the *oppidum*. The demand for stylistically different vessel types (e.g. necked jars) may have been more widespread, but in contexts away from the Silchester *oppidum* in Region 1 there is little suggestion that these were used for novel culinary practices. This concern with novelty was held by craftspeople in particular as well as by the mainstream population in general. Both the production and consumption of pottery shows evidence for experimentation with new ways of doing things, and familiarity with new kinds of object. Consumer feedback provided some potters with favourable circumstances within which to experiment with new technologies in the production of new objects. However, the case-study of Region 1 demonstrates that not all of these interactions involved similar value structures: not all consumers were interested in/had access to new objects; fewer still had involvement with new practices. These attitudes are also reflected by producers who, in some cases, were not prompted to change their behaviours to interact with new technologies.

7.4 SOCIAL AND MATERIAL NETWORKS AND IDENTITIES

A corollary of the notion of innovation put forward in this chapter is that, in being incremental and cumulative, each instance of innovation (and indeed, each object) can be conceived of as the recombination of various technological, practical, and design-based elements, each of which with its own meanings, values, and associations. The richness of these various elements was the subject of analysis in Chapter 6. Each object is therefore the result of a network of available technologies and designs within which craftspeople were situated, these networks essentially providing the 'raw materials' for the creative exercise of innovation. Considering these networks in their own right may therefore be revealing as to the kinds of experiences and influences craftspeople were exposed to, while the different technological choices made from amongst these available elements will be significant of the various socioeconomic conditions affecting different segments of society in each period. This background owes a debt to frameworks such as Actor-Network Theory (Latour 2005), 'entaglement' (Hodder 2012) and other more formal network approaches (e.g. Knappett 2013; Brughmans et al. 2015), as well as to concepts from within social constructionism such as 'interpretive flexibility' and the 'seamless web' of technology and society (Hughes 1986; Bijker 1995; 2010).

The remainder of this chapter will look in detail at the different forms of social and object-based networks in evidence in the MIA and LIA of the two study-regions. Patterns will be sought as to the various forms of knowledge circulation implied by technological and design elements identified, following which interpretations will be offered pertaining to the various socioeconomic conditions that may have helped shape the decision-making processes of craftspeople in each period.

7.4.1 Middle Iron Age networks

Chapter 6 touched upon the topic of multi-scalar elements of technical practice known in the MIA with the example of coiling and associated secondary forming techniques (ch.6.2.3). In this discussion, coiling was identified as a technique bound into large-scale systems of knowledge circulation in Later Iron Age Britain, being the predominant primary forming technique in both study-regions and probably also more widely. Similarly, the knowledge system implied by the 'saucepan pot' tradition covered a broad swathe of south-central Britain at this time, cross-cutting the traditions known in Region 1 and also being found in some wooden vessels (fig.7.3: e.g. Glastonbury vessels X2 and X85: Bulleid & Gray 1911, p.312–313; 347). The 'scored ware' tradition (Elsdon 1992) is similarly broad-based, covering a large area of the East Midlands and

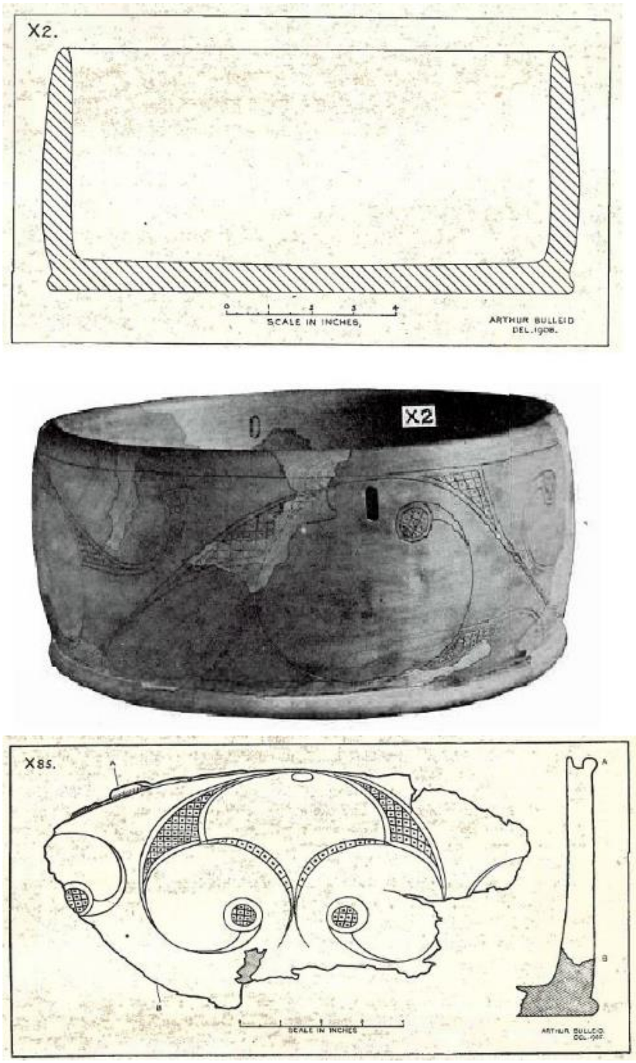


Figure 7.3. Turned wooden vessels from Glastonbury Lake Village. Top: X2, section illustration (Bulleid & Gray 1911, fig.64); middle: X2, photograph of reconstruction (Bulleid & Gray 1911, pl.LI); bottom: X85, section & illustration (Bulleid & Gray 1911, fig.129).

contributing – at least – the vessel forms and decorative techniques to the Sandy-Organic Group potters of Region 2.

This evidence of broad-based connectivity existed alongside a concern with the localised exploitation of certain techniques and bodies of knowledge. Saucepan pottery is again a good example of this, including amongst the overarching tradition a number of distinct decorative styles with identifiable but overlapping distributions (Cunliffe 1984, pp.23–24; fig.7.4). Another example can be found in the use of calcined flint for temper, which linked together communities living in the area of chalk geology occupied by the modern county of Hampshire. Sandy Group potters, meanwhile, may have had links with the 'scored ware' potters north of the Thames: their upright-rim jars apparently being produced with a similar method of pinching the rim to those examples found in these groups. However, lack of scored decoration on Region 1 pottery (and the occurrence of burnished motifs on Sandy Group wares) indicates that the connections that led to the decorative techniques and styles used by these potters were probably similar to those held by the Flint Group. The 'scored ware' potters of Region 2, meanwhile, utilised silty clays native to the Thames Basin and Chiltern dip-slope, tempering these with sand and organic matter. This contrasted with the (probably) naturally shelly clays utilised by their neighbours to the north and west, which did not require tempering and provided a very different outward appearance by virtue of the natural white shell inclusions.

7.4.2 Knowledge circulation and identity in the MIA

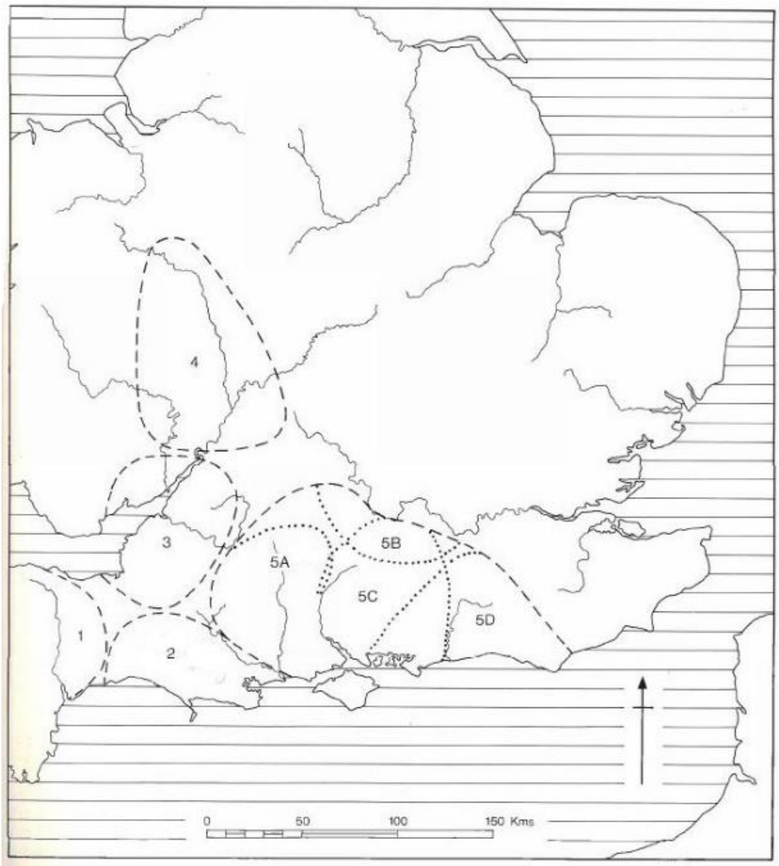


Figure 7.4. Distribution of saucepan-pot and other MIA styles in south-central Britain (Cunliffe 1984b, fig.2.13).

In the case of coiling, it was noted in 6.2.3 that different techniques circulating at different scales served to emphasise affiliation with different knowledge structures, and similar may be said of the other examples discussed above. In particular, Gosselain (Gosselain 2000) asserts that in his ethnographic study of sub-Saharan Africa, certain practices – such as those associated with forming – related to knowledge transmitted during apprenticeship, this involving the development of particular motor skills that are resistant to change and which require concerted tuition to master. Such knowledge was found likely to relate to highly-embedded forms of identity (such as ethnicity or gender), with teacher and learner often being members of the same identity group. Other practices, such as decorative technique, were found to be more easily influenced by immediate aspects of social or material conditions due to their relative ease and lack of association with developed motor skills. These practices derived from different and potentially temporary forms of identity (such as those implied by intermarriage). The MIA pattern of multi-scalar knowledge circulation therefore seems to contribute to the definition of distinct communities of practice and identity that operated on all of these levels; in particular, these appear to have coalesced into localised forms of know-how through the recombination of various disparate elements of localised and wider-scale technical knowledge.

Following the studies of David Peacock (1968; 1969) and Elaine Morris (1981; 1982; 1994a, pp.377–384; 1996, pp.43–49), evidence for specialised or centralised ceramic production has become tentatively identifiable in the MIA in at least some cases (cf. Henderson 1991, pp.105–107). This seems to imply that the place of pottery production within society may have been changing in some areas. In this context, the definition of distinct communities of practice may have been significant. For example, the creation of distinctive bodies of material culture that could be linked back to particular producers/groups/locations may have been of importance in maintaining social ties between producers and consumers who may have been increasingly geographically divorced. Meanwhile, adherence to shared practices by potters working in the same area, or who were members of the same identity-group, will have served to strengthen bonds between individuals even when those individuals were not practicing together or at the same time. Passing down of such skills may also have been of relevance in creating shared experience, knowledge, and skill between individuals within a community. This will also have been of great relevance within the setting of a predominantly dispersed settlement pattern, wherein individuals within societies may not have encountered each other on a regular basis, and in which people often appear to have emphasised the maintenance of local community: in, for example, the construction of monuments (Sharples 2010, pp.120–123).

7.4.3 Late Iron Age networks

Going into the LIA, the Grog Groups (and, to a more limited extent, the Region 1 Sandy Group) represent an expansion of the social networks within which potters were situated. The best example of this is the evidence for various relations with continental Europe: specifically, the evidence for grog-tempering and wheel-use, as well as the introduction of various novel vessel-types and decorative styles. Expansion of these networks may well have also incorporated the import of ideas from different industries such as wood- or shale-working, or the household use of querns, which were also establishing the common use of rotary motion for the amplification of manual effort around this time. Significantly, these other rotary technologies see the breakdown of predominantly localised patterns during the LIA: while evidence of lathe-working – particularly for turning shale – occurred on a small number of sites in Dorset prior to the LIA, it is not until perhaps the first century BC that the technology is in evidence in Hertfordshire. Similarly, while rotary querns were established in the south-central counties by the MIA, it is not until the LIA that these objects found more widespread use. These other rotary ideas made the transition from predominantly localised to far broader distribution patterns, and may have been the subject of experimentation on a far wider basis, including having interactions around ideas to do with the rotary technologies being utilised in potting.

Alongside this evidence for expansion in the ideas and skills available to potters, some traditional techniques were maintained as the basis for technological change. Good examples are provided by coiling and bonfire firing, both of which were at the core of widely-used practices in the LIA.

7.4.4 Localised networks

7.3.2, above, has already described the significance of localised processes of consumer feedback and how these were implicated in different formats of innovation in each study-region. This has also been related to the economic circumstances that facilitated the continued maintenance of localised communities of practice such as that represented by the Region 1 Flint Group. Localised variation is also in evidence among the variants of wheel-made pottery known from both regions: for instance, in the use of sandy or untempered clays in some Region 1 vessels; or in the regional differences in vessel repertoires noted in 6.3.2 and 6.3.3. These represent the emergence of LIA production from those of the MIA not just on a practical level, but also in the sense of the kinds of expectations that local communities will have had of the pottery they sought to use.

Chronological and processual characteristics also signify differences between the ways in which networks were constituted in the two study-regions. Most prominently, there is a strong argument to say that the typological and technological changes associated with the emergence of very similar suites of LIA pottery occurred at different times in each region – around the beginning of the first century BC in Region 2, and probably around the middle-to-late first century BC in Region 1. There are grounds to say that the technical developments noted in LIA Hertfordshire were the result of more direct interaction with continental communities than were those in Berkshire/Hampshire. In Region 2, grog tempering and wheel-use developed separately, as apparent parts of processes of introduction, innovation, and negotiation of the new techniques amongst the background of localised and pre-existing forms of production. In particular, the introduction of grog temper (and, coincidentally, of novel decorative traits/techniques) can be associated with communities living in the Picardy/Flanders/Artois/Hainaut area. In Region 1, meanwhile, interaction with continental Europe may have been less direct, the later date of commencement and the fact that wheel-use and grog tempering were associated with one-another from the beginning suggesting that these technologies may have been introduced as a ‘package’, via interactions with communities living in areas further east (such as Region 2).

There is also evidence that craftspeople in general, particularly in Region 2, were engaging extensively with the far wider range of technological principles and ideas in circulation in the LIA in order to create a far richer body of material culture. Shale vessel and rotary quern production were established here during the first centuries BC and AD, utilising both continental (e.g. vessel and quern forms) and British (e.g. lathe technology) design choices. The adoption of these technologies will, to at least a certain extent, have been influenced by the existence of certain raw materials in Region 2: specifically, shale and puddingstone, but may well have played a part in the initial adoption – here in particular – of a suite of distinctive rotary technologies.

7.4.5 Objects, materials, and the circulation of technical knowledge

Throughout this discussion of networks, the circulation of knowledge and skill has been discussed mainly in terms of the movement of technical ideas between groups of people (potters). The implication of this is that networks were predominantly comprised of people between whom information flowed. It is worth noting that this may not have been the case universally: one of the key tenets of frameworks such as actor-network theory is that non-human actors are also implicated in these relationships. Implicit reference has been made to examples of the involvement of non-human media at several points also: for example, with the use of the rotary motion in Region 1 Flint Group vessel 1/SIX-015, wherein it has been suggested that the limited experimentation that this represents may have derived from exposure to vessels that had been wheel-shaped rather than to the actual performance of technical practices involving the potter's wheel. In this context it is worth considering that as well as representing increased social connectivity, the LIA period may also represent increased connectivity between people and objects. It is well-established that the LIA period in general sees marked change in the material culture environment, specifically involving an increase in the variety and sheer amount of objects that were in circulation. In the case of brooches, this is something that has been referred to as the 'fibula event horizon' (Hill 1995c, p.85), and it is also clearly visible in pottery in the form of the expanding ceramic repertoires that will have produced far more variable categories of vessel (Hill 2002, pp.144–151). With more objects in circulation, and more productive activities taking place in order to make them, the sheer amount of technical, stylistic, and functional information that will have been accessible to people will have increased drastically. This may well have been a factor in the spread of technical knowledge and the development of traditions such as that represented by the Grog Group. This is perhaps clearest in the example of the imitation of Gallo-Roman forms commencing in the final couple of decades BC. Vessels such as platters and flagons were never produced in fineware fabrics in LIA Britain, their production in indigenous coarseware fabrics resulting from the circulation of the fineware vessels within Britain. Similar may have been true in the case of the various rotary technologies that have been discussed, of which the potter's wheel was one. There is evidence to suggest that lathe and rotary quern technologies were actually introduced to/invented in Britain as early as the 5th century BC, but it was not until the Later Iron Age that these technologies expanded into areas further east and north, or indeed became predominant in the areas within which they had been known previously (Peacock & Cutler 2011). The increased circulation of material culture may well have been significantly implicated in these dynamics, the better-populated object landscapes of the LIA providing a greatly enriched body of experience with objects that could be used to inform technical practice; and the increased demand for different kinds of material culture providing the kind of socioeconomic conditions within which the use of these techniques was facilitated.

7.4.6 Identity and grouphood

Even though there is evidence that instances of variability persisted on a localised level during the LIA, a key difference with the MIA arrangement is the way in which networks were constituted. The MIA saw numerous bounded knowledge systems overlapping and interacting to the end of defining localised suites of practice and material culture. By the Roman conquest, however, the Grog Group(s) saw one overarching tradition come to dominate over much of southern England: this tradition, by contrast, being defined by the absorption and circulation of technical principles from numerous sources. These technical principles, while variably employed, do not easily coalesce in ways that allow us to define notions of localised potting in the ways in which they do in the MIA; instead, they serve to define different interactions with technological novelty and past practice that are in themselves revealing of how different potters experienced their craft and defined themselves within it and as part of wider society.

The nature of this change – from configurations of knowledge circulation that emphasise the local, to those that emphasise broader-scale connectivity – deserves consideration in its own right. While the individualised analysis of techniques is revealing regarding the nature and extent of social and object networks that provided the inspiration for innovation, the fact that widespread – though not universal or all-encompassing – changes to the ways in which potters worked occurred in the ways in which they did is suggestive of equally widespread changes to social values that will have informed the technological choices being made. These have been addressed in passing in the above section on economics, wherein it was proposed that potters were making new kinds of vessel (and using new techniques in doing so) in response to demand for novel pottery by certain sections of society. Implicit in this is that, in the case of both producer and consumer, a trend for the valuation of novelty can be identified that is not in evidence in the MIA (when new technologies – such as those employing rotary motion - were developing, but appear to have predominantly been used on a localised level). The LIA pattern demonstrates that potters were actively engaged in developing new methods of production, often integrating innovations/introductions into pre-existing *chaînes opèratoires*. Specifically, I suggest that the overarching Grog Group represents a shared, widespread, and expanding system of knowledge that defined a community of craftspeople who valued novelty, creativity, and elaborate skills, making efforts to integrate these into their technical practices. It also signifies that pottery production had by this period reached a socioeconomic position that was capable of accommodating these particular innovations (see 7.3.1, above).

Making such efforts to integrate technological novelty into production practices no doubt highlights the value of novel methods and object-types to potters in the LIA relative to the MIA. Novelty is in evidence in many aspects of LIA society, and this has normally been interpreted in terms of the rejuvenation of the axis of contact across the channel (e.g. Champion 1994; Cunliffe 1982; 1988; 2005, pp.600-604; Fitzpatrick 1989; 2001; Haselgrove 1995; 2001; 2002; Hill 1995; Morris 2010); grog-tempered pottery is no exception to this (Tyers 1980; 1981; Thompson 1982, p.26; Rigby & Freestone 1997). The accommodation of practices and objects that were derived from communities on the continent presupposes certain changing social values that led to communities in Britain being more open to new ideas and ways of doing things. Additionally, the specifics of material culture change seem to highlight the increased valuation of, for example, consumption practices/hospitality (e.g. Carver 2001; Hill 2002; Fitzpatrick 2007; Ralph 2007). I propose that the valuation of novelty, as well as skill and creativity in its use, may be added to the list of social values that serve to distinguish many groups in the LIA south-east. On the basis of the evidence for the continuation of traditional practices alongside the novel to various extents, we may discern different value-structures at work within the different decisions made by potters during this period: the ‘traditional’ must also have been of value to the groups motivated to preserve such skills. Importantly, British communities were not necessarily

	Forming						Roux & Courty Methods						
	Thrown	%	Wh-fashioned	%	Coiled	%	1/2	%	3	%	4	%	Total
Region 1	8	25.0%	32	100.0%	13	40.6%	10	31.3%	3	9.4%	0	0.0%	32
Region 2	16	42.1%	37	97.4%	19	50.0%	15	39.5%	0	0.0%	1	2.6%	38
Overall	24	34.3%	69	98.6%	32	45.7%	25	35.7%	3	4.3%	1	1.4%	70

Table 7.1. Necked jar/bowl forming methods.

'isolated' during the MIA (e.g. Webley 2015), but what distinguishes patterning in the dominant pottery tradition of the LIA (the Grog Group) is that the objects and practices that constituted this tradition cross-cut so many previously-established social boundaries, including the English channel. The relatively free movement of ideas and technical principles that this demonstrates contrasts with the localised patterning defining the traditions of the MIA, in turn suggesting that while larger-scale connectivity did exist, this was not operative in the definition of different localised groups of craftspeople.

In the LIA, therefore, it may be argued that localised grouphood was of decreased importance, and that individuals sought to define themselves on the basis of their positions within wider spheres of experience. Forming methods illustrate this point well. To again refer to Gosselain's (2000) ideas of different forms of technical practice representing different forms of identity and social networks, analysing forming techniques (as a category of more cognitively-embedded technique, normally requiring the development of complex motor skills) should be informative regarding aspects of the more highly embedded forms of social identity that, in general, will have been less likely to have been the subject of change during a person's lifetime (e.g. ethnicity or gender). Whereas the MIA is dominated by one primary forming method (coiling) that acted as the flexible basis for the expression of localised secondary practices, the LIA presents a plurality of primary and secondary forming techniques that do not appear to coalesce to represent localised traits. This is best considered via the analysis of one common type among the LIA repertoire: the necked jar/bowl. This type demonstrates a wide variety of forming techniques utilising both novel (rotary) and traditional (coiling) technologies in various ways: e.g. with the difference between wheel-coiling and throwing; or the differences between the various subdivisions of wheel-coiling (Roux & Courty methods 1-4: table 7.1). Essentially, this variability suggests that there was no single accepted way of making this one, relatively standardised, vessel type. Variation therefore probably represents several different forms of technical knowledge in circulation at any one time during the LIA. Significantly, comparable forms of technical practice were known even over the relatively large distance between the two study-regions. The social interactions that the widespread but non-nucleated circulation of these technical practices implies is suggestive of ways of learning and relations between craftspeople that were somewhat different to those represented in the MIA. In the context of Gosselain's notions of identities, we may see such patterns as forms of practice that served to distinguish individual craftspeople within the wider Grog Group tradition, with these individuals being defined by their relationships to numerous forms of grouphood that did not manifest into localised communities, but existed throughout the geographical expanse of the wider tradition. More specifically, the act of concertedly learning a forming technique (or other technique involving the development of complex motor skills) will have served to tie together two or more people for an extended period of time in which significant mutual effort and experience will have been implicated. Subsequent use of a technique, and the act of passing it on to others, may have been a potent connection to those from whom the technique was learned, or to others who had undertaken similar experiences in the learning of similar methods. The fact that these knowledge systems do not appear to have been operating on a primarily localised basis during the LIA seems to signify the relative importance of other forms of kinship during this period. Additionally, it is worth recalling the significant increase in time and effort required to learn wheel-using techniques. This greater investment in apprenticeship may well have served to amplify the bonds between those with shared experiences relative to those felt in the production of MIA pottery. In this context, the constitution of new forms of personhood/grouphood, the kinds of social networks that these embodied, and the valuation of novelty and skill by an increasing number of communities, provided a social backdrop into which technologies such as the wheel fit. More specifically, we may consider the possibility that processes of increasing craft specialisation that were at work throughout the Later Iron Age in many areas (see 7.4.5, above) – and which are implied by the uptake of complex technologies such as the potter's wheel – may have actually been operative in developing these new social networks. With increasing specialisation/centralisation of potting in many areas, we may envisage a smaller number of more highly-invested craftspeople interacting with one-another for the purposes of skill and knowledge-transmission. In order to achieve this, this smaller number of potters will have had to move around the landscape to a greater extent than was necessary previously. Within these groups of emergent specialists there appear to have existed subdivisions reflected by their respective technological choices (e.g. throwing vs wheel-coiling). These choices may have acted as identity markers, referring to affiliations with different forms of grouphood within the overaching bracket of 'specialist potter', in turn borne out of the ways in which the potter's craft had been learned by the members of each group.

Individualised (versus communal) identities have been discussed most recently by Lamb in his paper on the M-LIA burial record of south-central England (2016), as well as by, e.g., Haselgrove (1989, p.17), Hill (1995c, pp.84–86), and Sharples (2010, chap.5). Although it is admittedly difficult to observe the activities of discrete producers within the Grog Group, the variability in practices identified in producing often very similar vessels suggests that the variety of technical procedures in use in this period may have not only been responses to new technologies, but also to new and varied forms of perceived personhood of which people were becoming increasingly conscious: ethnicity, social status, gender, or political affiliation, for example. Different forms of creativity, skill, and experimentation may well have been important media by which people constituted and represented themselves as part of far wider social networks. This is highly relevant in the context of the changed settlement patterns visible in the archaeological records of both study-regions. MIA occupation was dispersed in both study-regions, comprising scatters of small settlements occasionally punctuated by monumental hillforts. The establishment of numerous nucleated '*oppida*' during the LIA probably represents segments of the community living in far closer quarters than had hitherto been the case. As such, whereas in the MIA much effort will have been required to maintain social ties over potentially long distances and spans of time (Sharples 2010, pp.120–123), during the LIA those groups inhabiting the *oppida* will have had less need to characterise their practices on the basis of the definition of localised community. Region 2, wherein the occupation pattern is characterised by numerous nucleated settlement clusters and the pottery is overwhelmingly dominated by an abundance of Grog Group wares, may be a particularly good illustration of this. It may have been, though, that a preoccupation with the definition of more individualised identities was simply a correlate of increased connectivity, with individuals becoming increasingly aware of their place within a far wider world, and concerned with the definition of their place within it (Hill 1995c, pp.84–88; Pitts 2008). Whatever the specific background, changes in the ways in which social relations were constituted in the LIA appear to be reflected in the ways in which technical knowledge circulated.

7.5 SUMMARY

The intention of this chapter has been to provide a notion of innovation that is non-deterministic and as such is capable of acknowledging the complexity of the patterns of pottery production identified in the previous three chapters. This perception of innovation was developed from current understandings of innovation from a variety of sources, finally perceiving innovation as a multi-stage process of incremental and cumulative development. Creativity was invoked as a significant component of this process. Different aspects of the innovative process were identified as being sensitive to different socioeconomic forces, investigation of which would potentially be revealing of the nature of past technological change.

Following this, these ideas of innovation were applied to the study of ceramic technology in the two study-regions. Examples of the incremental and cumulative development of ceramic technology were identified, as were important examples of creativity in the production of categories of object that could outwardly be seen as evidence of conspicuous continuity. Economic factors were evaluated, and elements of the consumption of pottery considered in the context of technological innovation. Importantly, differences in the uptake of novel consumption practices were seen as being operative in providing economic circumstances that did not necessitate technological change in many cases. Additionally, the patterns of innovation seen in, for example, the introduction of wheel potting, were evaluated and considered to represent an economic situation that did not include notions of increasing productivity or profit-motive.

Finally, a network-style analysis was conducted in order to consider the variety of social elements involved in the circulation of technical knowledge that contributed to Later Iron Age technological change and continuity. For the MIA, a situation involving the combination of disparate elements of technical knowledge to produce distinctive, localised patterns of material culture and practice was identified, this existing within larger-scale systems of understanding (represented by, for example, broad categories such as saucepan pottery, or scored wares), was identified. This was contrasted with a LIA situation in which emphasis appeared to have shifted from the definition of localised communities, to that of individual identities derived from the differential employment of technical practices by craftspeople operating within an overarching understanding of the changed and changing nature of pottery production in relation to industrial organisation, social values, notions of identity, and peoples' relationships with material culture. These changes, identifiable via the medium of techniques as a form of practice, represent some fundamental changes to how potters will have experienced their craft during the Later Iron Age, and also feed into wider changes to the ways in which society, personhood, and grouphood operated in the first centuries BC and AD.

CHAPTER 8: CONCLUSIONS

8.1 FINDINGS

8.1.1 Pottery and practice

This study has presented a practice-based approach to ceramic production through the analysis of pottery vessels themselves. This was deemed necessary in the absence of substantial amounts of production-site evidence from the south-eastern counties until the very end of the LIA. Analysis utilised ceramic petrography, point-counting, and x-radiography alongside observation of pottery in hand-specimen, to characterise vessel *chaînes opèratoires* and group these according to the existence of shared technological features. The overall aim of analysis was to establish the technical practices – 'techniques' – involved in producing different categories of vessel.

Analysis revealed or clarified our understanding of numerous technological features. In Region 1 (Berkshire and northern Hampshire), important findings included the assertion – based on fabric analysis – that the Flint Group fabrics were identical between the MIA and LIA, thereby signifying continuous elements of technical practice (in terms of clay procurement, processing, and tempering) between the two periods. Additionally, similarities in the ways in which Sandy and Grog Group clays appear to have been tempered (revealed through petrographic point-counting) – as well as the raw materials to which this temper was added – demonstrated continuity between these groups, implying that the Grog Group potters probably emerged from the Sandy Group tradition in this area. These examples present crucial evidence of technological continuity between the MIA and LIA which is often overlooked in the example of pottery production in the south-eastern counties. Another crucial element of continuity was found to exist in forming practices. Coiling was identified as the predominant primary forming technique in all MIA Region 1 ceramic groups, and was also found to exist in many wheel-shaped LIA vessels. Technological change was clear in the example of the introduction of the potter's wheel, but a key finding was the great variability with which this new technology was used – multiple forms of 'secondary' wheel-use were identified, as was primary wheel-throwing. Analysis of select types such as necked jars and bowls, and Gallo-Belgic platter imitations, demonstrated the variability (and therefore, flexibility) with which technologies – particularly new technologies – were used. Meanwhile, the Flint Group and some elements of the LIA Sandy Group, showed no evidence for the influence of rotary technology or other novel techniques/designs at all.

In Region 2, key findings included the identification of similar elements of continuity between the technical practices in evidence in the MIA and those found in the LIA. Petrographic analysis revealed that a similar range of probably local clays were used for making the MIA Sandy-Organic wares to those used to make the LIA Grog Group wares. Additionally, point-counting data suggested that the ways in which these clays were tempered was similar between the two groups/periods, the differences in tempering technology coming down to different raw material choices (sand and organic matter versus grog). Coiling was again found to overlap the two periods, with wheel technology introduced and adopted in a more complex way than was observed in Region 1. Certain vessel types – early forms such as the Thompson C3 (saucepan/barrel-like vessels with simple rims) and C8-1 (combed everted-rim jars with stabbed/impressed shoulders) – were never found to have been wheel-made in any way, whilst the full range of other vessel types (including late La Tène forms such as necked jars/bowls and pedestal urns; and Gallo-Belgic types) were noted as having being made with the aid of rotary motion. Analysis of a far larger sample of Grog Group vessels than were available in Region 1 led to the assertion that amongst these wheel-made vessels a size differential was in evidence which saw throwing associated mainly with smaller vessels, and wheel-coiling with larger vessels. This differential did not map well onto typological divisions, aside from where obvious size differences could be seen to be the operative factor.

8.1.2 Circulation of technical knowledge

The analysis reported in chapters 4 and 5 served to characterise the techniques involved in producing several different categories ('groups') of pottery. These groups presented themselves relatively easily, being defined on the basis of forming and firing techniques, and vessel repertoires, and being characterised on the basis of distinctive fabrics. These groups provided a framework for the discussion of technology and how different technological variables may have related to one-another as features of wider bodies of knowledge.

The groups identified in the MIA are characterised by the localised circulation of technical knowledge. The large-scale distribution of vessels made using, e.g., the coiling technique (common in all MIA groups), or pinched rims (Region 1 Sandy Group and Region 2 Sandy-Organic Group) demonstrated that many techniques were known and used over broad areas of southern Britain during this period, cross-cutting even the two geographically-divorced study-regions. Such large-scale features sit alongside stylistic/typological features that have been recognised for some time (e.g. the ‘saucepan pot continuum’ and ‘scored ware’). However, groups distinguished themselves easily and conveniently in their unique combinations of these widely-used techniques and design elements. This arrangement was taken to represent the multi-scalar circulation of technical knowledge in a system that privileged the small-scale, serving to create unified bodies-of-knowledge that circulated primarily on a localised basis. This was seen as being revealing of the kinds of social networks that potters will have experienced during the MIA, which appear to have predominantly involved interactions between localised groups for the purpose of the transmission of technical knowledge. Such localised communities of practice fit well with what we know of social interactions within MIA societies at large (Sharples 2010): such societies, in many regions of southern Britain, appear to have valued localised community, putting elaborate effort into the maintenance of such identities. The particulars of different systems of pottery production appear to have acted as means of binding communities of craftspeople together through mutual experience and shared skill and understanding. The production of sensually different bodies of material culture may also have served to bind communities of users together, to distinguish these communities from others, and to situate the producers of pottery within wider social systems.

The groups identified in the LIA were found to have been constituted differently. The emergence of grog-tempered (‘Grog Group’) pottery throughout many of the counties of the south-east and south midlands represented a new system of technical knowledge that cross-cut many pre-existing boundaries. This tradition has to-date been perceived as another example of an overarching system analogous to those represented by saucepan pottery or scored ware (within which there was significant internal variation on a localised level: cf. Thompson 1982). However, this study has identified that while the processes of technological change that are implicated in the emergence of the Grog Group in different areas (i.e. Regions 1 and 2) were different, the technical characteristics of the group once it had emerged (including forming techniques, firing procedures, tempering regimes, and the broad characteristics of vessel repertoires) were similar between the two study-regions. Unlike MIA systems of technical knowledge, LIA potters were part of far wider systems of movement of technical knowledge and skill, and these aspects of pottery production did not serve to define localised communities. Variation within the Grog Group – which was found to be extensive: for example, in the wide variety of different forming techniques identified – was identified as being structured in such a way that suggests that potters acquired their skills from far wider social networks. Evidence from other kinds of (non-ceramic) material culture also suggests that technical knowledge was moving far more fluidly in this period, and there is a significant possibility that innovations in other industries helped to develop, inspire, or legitimate innovations undertaken by potters. Such evidence for expanding social networks, alongside evidence for the use of more sophisticated techniques such as wheel-potting (which will have required more investment in the process of learning the pottery craft), implies the changing nature of the interpersonal relations and identities that will have been experienced by many potters in this period. This may have been related to processes of increasing specialisation implied by developing technological complexity: a smaller number of more specialised/centralised potters may have been interacting and moving around the landscape, within whom were contained numerous subdivisions derived from different identity-markers (e.g. ethnicity or geographical origin), these being expressed as variations in practice.

8.1.3 Variable stances to technological change

Changing forms of interpersonal relationships and identities imply that some groups of potters were experiencing new forms of grouphood during the LIA. One particular variable that seems to have been operative – and perhaps contentious – in the definition of new forms of identity was potters' attitudes to novel technologies. Novel elements of technical practice (such as wheel potting and other rotary technologies; oxidising pyrotechnologies; grog temper) were crucial parts of the expanding networks of knowledge of which potters were a part. While many of these necessarily moved through interpersonal relations (such as increasingly formalised apprenticeships), the increasingly rich object environment of the LIA was probably intimately involved in at least some instances of technical creativity, such as that represented by Flint Group vessel 1/SIX-015. Variability in the uptake of new technologies has been identified at several points in the analysis: for example, in the differential use of rotary technology (or its wholesale rejection), and this represents selectivity on the part of potters who clearly valued different techniques in different ways and for different reasons. This was most clearly discussed in the context of the Region 1 Flint Group, which could be seen to have rejected the use of new technologies in preference for the continued use of traditional methods derived from MIA practices. It could also be seen in the widespread popularity of wheel-coiling, a hybrid technique involving the use of both the traditional coiling method alongside rotary techniques. This example – rather than demonstrating rejection of novelty – shows how potters were often making significant efforts to incorporate new practices into established notions of production. Meanwhile, evidence for wheel-throwing demonstrates that this technique was available in the LIA but that some potters either decided to use a combination of techniques that incorporated the new alongside the traditional, and/or that they were part of social networks within which the skill of throwing did not circulate.

These examples have all served to demonstrate how social forces can be seen as acting 'selectively' on instances of technological change. Different technological characteristics can be seen as signifying different forms of non-localised identities within the overarching Grog Group, itself representative of a large-scale regional community-of-practice contrasting with others around it (cf. Hamilton 2007). Meanwhile, the examples of the Region 1 Sandy and – most prominently – Flint, groups demonstrate that in some cases a particular stance to technological change does seem to have been taken in order to (re)define a localised communal identity. In the case of the Flint Group this may have been related to a perception of marginalisation combined with a particularly staunch, pre-existing attitude towards the maintenance of community. These interpretations again serve to demonstrate how pottery production can be seen as being thoroughly socially embedded. In particular, this analysis sits alongside recent contributions to Later Iron Age studies which have emphasised the roles of social agencies in dealing with aspects of novelty in the past, including in particular the emergence of individual (e.g. Sharples 2010; Lamb 2016), and new forms of communal (e.g. Hamilton 2007; Moore 2007), identities.

Economic forces have also been considered in the development of technological variability in the LIA. Findings suggested, building upon the work of J.D. Hill (2002), that 'consumer feedback' was an important variable in motivating some potters to take up new techniques for the purpose of the production of new vessel types. These processes were found to be variable and complex: in the case of Region 1, the adoption of novel mealtime practices and the full range of new vessel types was shown to be localised to the area immediately around the Silchester *oppidum*. The localised economic circumstances that this presented are likely to have been operative in the maintenance of traditional forms of potting in certain areas of Region 1.

8.1.4 Being a potter in Later Iron Age southern Britain

In essence, this study has served to reveal different experiences of being a potter in the context of a rapidly changing socioeconomic environment. The process of technological change has been considered in detail, but it has been increasingly apparent throughout this project that potters had diverse experiences and dispositions towards the changes (both social and technological) ongoing during this period, and that this frustrates any effort to render a simplistic version of increasing technological or industrial complexity. Potters were members of wider communities and will have held different roles with these communities. The skills that they will have learned, decisions that they will have been compelled to make in the production of each vessel, and their attitudes to processes of change, have been demonstrated to have been bound up with the particular and variable socioeconomic conditions within the wider world. Addressing the experiences of potters in particular is appropriate in a period in which we see the emergence of more visible status distinctions, yet within which the role of 'status' or 'class' is rarely considered other than in reference to 'high-status' groups (Haselgrove & Moore 2007a, p.11). It is hoped that by focusing on a group of craftspeople who are unlikely to have been particularly wealthy or affluent members of their communities, some aspects of the experiences of social and industrial change amongst these lower tiers of society have been elucidated.

8.2 REFLECTIONS ON THE PROJECT

This study aimed to reconsider the nature of changing ceramic technology at the end of the British Iron Age. Attempts were made to consider – in a far fuller way than has been possible previously – the nature of the technological changes that we see in this period, and to contextualise these in respect to the potential social, economic, cultural, etc., variables that may have influenced it. Based on a review of previous work done on the ceramic technology of this period, it was judged that a new database as well as a new theoretical approach would be of benefit to our understanding. In terms of theory, this took the form of a practice-oriented methodology concerning the reconstruction of the *chaînes opèratoires* of individual vessels, considering evidence for techniques employed in producing pottery in the MIA and LIA periods.

A regional approach was a necessary component of this. Previous studies variously emphasised (Thompson 1982) or downplayed (Rigby & Freestone 1997) the significance of local variation in the archaeological record. Two study-regions were eventually concluded upon: one lying within Thompson's original study-area; the other outside of it. This multi-regional approach was considered fundamental to the analysis: such an approach would allow the consideration of localised features of the settlement pattern and economy alongside what were suspected of being localised patterns of technological change. Had a larger area been the subject of this study it is likely that the analysis would have been less able to properly detect variation on localised levels within the timescale available to the project: this would inevitably privilege overarching narratives at the expense of potential diversity. Had a single region been chosen, meanwhile, there would have been little scope for comparisons between different areas with potentially different emergent technological characteristics. Identification of variation in the ways in which pottery was produced (and new technologies adopted) has been one of the fundamental outcomes of this study.

However, the crucial question of exactly how pottery was produced by continental potters in these periods has remained unanswered. There was an initial intention to study a third region (along with potentially another region in Britain), based on the continent. However, plans for any more than the two regions had to be cancelled when it became apparent the amount of time and effort that was required to analyse each region. The question of introduction versus innovation has been addressed here (7.2.2), but no data have been able to be provided regarding the precise ways in which technological knowledge may have arrived from continental Europe.

On a methodological level, the practice-based framework that informed data collection can be seen to have been of great benefit to the eventual output. By focusing on techniques rather than artefacts the integrity of individual objects did not remain a barrier to interpretation. Many of the conclusions made in chapters 6 and 7 are based upon the notion that ceramic artefacts are the result of numerous technical decisions that can be rearranged and selected to create different outcomes, and it is these individual decisions that are of relevance to the discussion here.

In this regard the analysis of forming techniques was crucial. Still rarely considered by ceramic analysts, the recent resurgence in radiography studies (e.g. Berg 2008) means that we are now in a position to properly consider this important part of the *chaîne opèratoire*. This study has served to identify the complexity of the introduction of a technology such as the potter's wheel/rotary motion, which in itself was represented by several different discernible technological decisions within the two regional datasets. Additionally, point-counting – facilitated enormously by the PETROG system – proved itself to be of great use in analysing the technological characteristics of fabrics. Considering this information in the context of knowledge transmission led to other revealing patterns in the data pertaining to the continuity of technical knowledge.

Not all avenues were successful, however. SEM analysis was originally scoped to have been far more extensive than has been reported in this thesis. In particular, a geochemical study of clay matrices was initially attempted in order to consider patterns in clay sourcing; however issues with instrumentation and the time-consuming nature of such analysis meant that this part of the study had to be abandoned. Additionally, no attempt was made to assess archaeometrically the firing stage of the *chaîne opèratoire*. While such analysis may well have been fruitful in revealing patterns around the development of pyrotechnology, it was again decided against attempting such analysis on the basis of the demands of the analytical programme already decided upon.

Overall, the author feels that this project has been revealing of the significance of a different aspect of social change taking place in the LIA. The details of how new technologies and designs were used has revealed that pottery production was intimately connected to how craftspeople experienced the world. Potters were not only concerned with the use of new techniques in order to allow them to capitalise on changing economic circumstances, but had complex and highly variable relationships with new objects and methods that led them to employ them in different ways and through different combinatory innovations. This, in turn, promoted and enabled the emergence of new kinds of professional identity during the LIA, with this taking place both in the context of increasing craft specialisation and changing notions of interpersonal relations this period, as well as in defiance of these factors in some cases (e.g. the Region 1 Flint Group potters). The study has therefore succeeded in tapping into an area of significant behavioural variability that had not been viewed with clarity previously, finding its place alongside recent works concerned with the emergence of new kinds of personhood (e.g. Sharples 2010; e.g. Lamb 2016), and other studies that acknowledge the complex roles of individual and communal agencies in dealing with novelty during this period (e.g. Hamilton 2007). It has also sought to be a contribution to our understanding of the interlinked aspects of long-term continuity and change that are apparent throughout the Later Iron Age (e.g. Haselgrove 1989; 1995; 2002; Hill 1995c; Champion 1994).

8.3 FURTHER WORK

As mentioned above, a crucial aspect to the circulation of technical knowledge that has not been assessed in this study concerns the continental pottery. The British material is in need of situation within broader processes of technological change and knowledge circulation, and, as such, similar, regional programmes of analysis to those conducted here may well be of great help in clarifying exactly when, how, and why change occurred in different areas (and assist in theorising why it did not occur in these ways in others). Additionally, it may be of benefit in the context of regional research agendas to consider undertaking analysis of the kinds conducted here in other areas of southern Britain. The conclusions offered by this study serve to emphasise context-specific responses to technological change, and while the expectation for such responses may thus be expected in all areas, work may be done to evaluate interactions around novel technologies in specific settings where this is thought to be of relevance to local research priorities: e.g. in assessing economic/industrial conditions with the rise of specialised industry, or in assessing the degree of interaction with outside groups for the procurement of technological skills, etc.

Certain areas of ceramic production would also serve to be investigated further. The potential for considering changing pyrotechnologies using modern archaeometric methods such as x-ray diffraction or raman spectroscopy, for example, has already been mentioned. Further, geochemical studies may serve to elucidate upon the movement of pottery and therein clarify the nature of distribution. In the geologically-homogeneous landscape of southeastern England, a powerful technique utilising trace element analysis at high precision and accuracy may be required: for example, neutron activation analysis. This kind of work would be of use in both periods under study here, and particularly the LIA.

BIBLIOGRAPHY

Albero-Santacreu, D., 2014. *Materiality, Techniques and Society in Pottery Production*, Berlin: De Gruyter.

Allen, D.F., 1944. The Belgic dynasties of Britain and their coins. *Archaeologia*, 90, pp.1–46.

Allen, D.F., 1961. The origins of coinage in southern Britain: A reappraisal. In S. S. Frere, ed. *Problems of the Iron Age in Southern Britain*. London: Institute of Archaeology, University of London, pp. 97–302.

Allen, J.R.L., 2013. Geochemistry of the Slags. in J. Lewis, S. Crabb, and S. Ford Bronze Age Urns, Iron Age Iron Smelting and Saxon Charcoal Production at Sadler's End, Sindlesham, Wokingham, Berkshire. In S. J. Preston, ed. *Iron Age Iron Production Sites in Berkshire*. Reading: Thames Valley Archaeological Services Monograph 16, pp. 23–29.

Anderson-Whymark, H., Garrow, D. & Sturt, F., 2015. *Continental Connections: Exploring cross-Channel relationships from the Mesolithic to the Iron Age*, Oxford & Philadelphia: Oxbow.

Applebaum, E.S., 1949. Excavations at Wilbury Hill, an Iron-Age Hill-Fort near Letchworth, Hertfordshire, 1933. *Archaeological Journal*, 106, pp.12–45.

Arthur, W.B., 2009. *The Nature of Technology: What it is and how it evolves*, London: Penguin.

Bailey, H. & Wood, C., 2010. The Upper Cretaceous Chalk. In J. Catt, ed. *Hertfordshire Geology and Landscape*. Welwyn Garden City: Hertfordshire Natural History Society, pp. 36–60.

Barnes, I. et al., 1997. *Excavations at Thames Valley Park, Reading, Berkshire, 1986-88*, Salisbury: Wessex Archaeological Report 14.

Barnett, C., Pankhurst, N. & Wheeler, D., 2016. Excavation and Coring at Pond Farm Hillfort. In M. G. Fulford, C. Barnett, & A. Clarke, eds. *Silchester & its Environs. Excavation and Survey 2015*. Reading: Department of Archaeology, University of Reading, pp. 3–8.

Barnett, C., Wheeler, D. & Pankhurst, N., 2017. Excavation and Coring of the Silchester Linears. In M. G. Fulford, C. Barnett, & A. Clarke, eds. *Silchester & its Environs. Excavation and Survey 2016*. Reading: Department of Archaeology, University of

Reading, pp. 5–13.

Basalla, G., 1988. *The Evolution of Technology*, Cambridge: Cambridge University Press.

Basso, E. et al., 2008. A particular temper: mineralogical and petrographic characterisation of ceramic fabrics with glauconitic inclusions. *ArchaeoSciences*, 32, pp.93–7.

Berg, I., 2007. Meaning in the making: The potter's wheel at Phylakopi, Melos (Greece). *Journal of Anthropological Archaeology*, 26(2), pp.234–252.

Berg, I., 2008. Looking through pots: recent advances in ceramics X-radiography. *Journal of Archaeological Science*, 35(5), pp.1177–1188.

Berg, I., 2009. X-radiography of Knossian Bronze Age vessels: the potential of a new technique for identifying primary forming methods. *Annual of the British School at Athens*, 104, pp.137–73.

Berg, I., 2011. What's in a forming technique? An investigation into wheel-throwing and wheel-coiling in Bronze Age Crete. *Old Potter's Almanack*, 16, pp.9–12.

Best, J. & Woodward, A., 2011. Late Bronze Age Pottery Production: Evidence from a 12th – 11th century cal BC Settlement at Tinney's Lane, Sherborne, Dorset. *Proceedings of the Prehistoric Society*, 78, pp.207–261.

Biddulph, E., Blinkhorn, P. & Brown, L., 2009. "The pottery." In A. Simmonds et al., eds. *Archaeology in the Park: Excavations at Jennett's Park, Bracknell, Berkshire*. Oxford: Oxford Archaeology Occasional Paper No.18, pp. 37–48.

Bijker, W.E., 1995. *Of bicycles, Bakelites, and bulbs: toward a theory of sociotechnical change*, Cambridge, MA: MIT Press.

Bijker, W.E., 2010. How is technology made? - That is the question! *Cambridge Journal of Economics*, 34, pp.63–76.

Bijker, W.E., Hughes, T.P. & Pinch, T., 1987. *The Social Construction of Technological Systems: new directions in the sociology and history of technology*, Cambridge, MA: MIT Press.

Birchall, A., 1965. The Aylesford-Swarling Culture: The problem of the Belgae reconsidered. *Proceedings of the Prehistoric Society*, 31, pp.241–367.

Birley, M., 1984. *Blackhorse Road, Letchworth, Hertfordshire: The Iron Age Site and its Pottery*. Unpublished BA Dissertation, University of Reading.

Blandino, B., 1984. *Coiled Pottery*, London: A & C Black.

Boon, G.C. & Wymer, J., 1958. A Belgic cremation burial from Burghfield. *Berkshire Archaeological Journal*, 66, pp.46–53.

Booth, P., 1995. Iron Age and Roman Pottery. in 'M.R. Roberts Excavations at Park Farm, Binfield, 1990: an Iron Age and Romano-British Settlement and Two Mesolithic Flint Scatters. In I. Barnes et al., eds. *Early Settlement in Berkshire: Mesolithic-Roman occupation in the Thames and Kennet Vallleys*. Salisbury: Wessex Archaeology Report No.6, pp. 106–117.

Bourdieu, P., 1977. *Outline of a Theory of Practice*, Cambridge: Cambridge University Press.

Bradley, R., 1984. *The Social Foundations of Prehistoric Britain*, London: Longman.

Bronitsky, G., 1989. Ceramics and Temper: A Response to Feathers. *American Antiquity*, 54(3), pp.589–593.

Bronitsky, G. & Hamer, R., 1986. Experiments in ceramic technology: the effects of various tempering materials on impact and thermal-shock resistance. *American Antiquity*, 51, pp.89–101.

Brown, L., 1991. Iron Age Pottery. In B. W. Cunliffe & C. Poole, eds. *Danebury: an Iron Age hillfort in Hampshire. Vol. 5: The excavations 1979-1988: the finds*. London: Council for British Archaeology Research Report 73, pp. 277–319.

Brown, L., 2000a. The Pottery. In B. W. Cunliffe & C. Poole, eds. *The Danebury Environs Programme: Prehistory of a Wessex Landscape Vol. 2 Pt. 2 - Bury Hill, Upper Clatford, Hants., 1990*. Oxford: English Heritage and Oxford University Committee for Archaeology Monograph No.49, pp. 37–44.

Brown, L., 2000b. The Pottery. In B. W. Cunliffe & C. Poole, eds. *The Danebury Environs Programme: Prehistory of a Wessex Landscape Vol. 2 Pt. 5 - Nettlebank Copse, Wherwell, Hants., 1993*. Oxford: English Heritage and Oxford University Committee for Archaeology Monograph No.49, pp. 53–84.

Brown, L., 2000c. The Pottery. In B. W. Cunliffe & C. Poole, eds. *The Danebury Environs Programme: Prehistory of a Wessex Landscape Vol. 2 Pt. 6 - Houghton Down, Stockbridge, Hants., 1994*. Oxford: English Heritage and Oxford University Committee for Archaeology Monograph No.49, pp. 75–102.

Brown, L., 2000d. The Pottery. In B. W. Cunliffe & C. Poole, eds. *The Danebury Environs Programme: Prehistory of a Wessex Landscape Vol. 2 Pt. 3 - Suddern Farm, Middle*

Wallop, Hants, 1991 and 1996. Oxford: English Heritage and Oxford University Committee for Archaeology Monograph No.49, pp. 65–115.

Brown, L., 2008. Pottery. in A. Norton & A. Marshall 'Iron Age and Roman Activity at Rectory Road, Oakley, Hampshire. *Proceedings of the Hampshire Field Club & Archaeological Society*, 63, pp.106–107.

Brown, N.R., 1995. Ardleigh reconsidered: Deverel-Rimbury pottery in Essex. In I. Kinnes & G. Varndell, eds. *Unbaked Urns of Rudely Shape*. Oxford: Oxbow, pp. 123–144.

Brughmans, T., Collar, A. & Coward, F., 2015. *The connected past: Challenges to network studies of the past*, Oxford: Oxford University Press.

Bryant, S., 1995. The Late Bronze Age to the Middle Iron Age of the North Chilterns. In R. Holgate, ed. *Chiltern Archaeology: recent work*. Dunstable: The Book Castle, pp. 17–27.

Bryant, S.R. & Niblett, R., 2001. The Late Iron Age in Hertfordshire and the north Chilterns. In J. R. Collis, ed. *Society and Settlement in Iron Age Europe*. Sheffield: J.R. Collis, pp. 98–110.

Bulleid, A. & Gray, H.S.G., 1911. *The Glastonbury Lake Village. A full description of the excavations and the relics discovered, 1892-1907, Vol.1*, Taunton: The Glastonbury Antiquarian Society.

Burleigh, G.R., 1995. A Late Iron Age Oppidum at Baldock, Hertfordshire. In R. Holgate, ed. *Chiltern Archaeology: recent work*. Dunstable: The Book Castle, pp. 103–113.

Bushe-Fox, J.P., 1925. *Excavation of the late-Celtic urn-field at Swarling, Kent*, London: Society of Antiquaries of London.

Carr, C., 1990. Advances in ceramic radiography and analysis: Applications and potentials. *Journal of Archaeological Science*, 17(1), pp.13–34.

Carr, C., 1993. Identifying individual vessels with X-radiography. *American Antiquity*, 58, pp.96–117.

Carr, C. & Riddick, E.B., 1990. Advances in ceramic radiography and analysis: laboratory methods. *Journal of Archaeological Science*, 17(1), pp.35–66.

Carver, E., 2001. *The Visibility of Imported Wine and its Associated Accoutrements in Later Iron Age Britain*, Oxford: BAR British Series 325.

Catt, J., 2010a. Concealed Bedrock Geology. In J. Catt, ed. *Hertfordshire Geology and*

Landscape. Welwyn Garden City: Hertfordshire Natural History Society, pp. 21–35.

Catt, J., 2010b. Neogene deposits and early landscape development. In J. Catt, ed. *Hertfordshire Geology and Landscape*. Welwyn Garden City: Hertfordshire Natural History Society, pp. 79–117.

Catt, J., Edmonds, C., et al., 2010. Mineral resources and church building stones. In J. Catt, ed. *Hertfordshire Geology and Landscape*. Welwyn Garden City: Hertfordshire Natural History Society, pp. 299–321.

Catt, J., 2010c. Introduction. In J. Catt, ed. *Hertfordshire Geology and Landscape*. Welwyn Garden City: Hertfordshire Natural History Society, pp. 7–20.

Catt, J., Perry, B., et al., 2010. Prehistoric archaeology and human occupation of Hertfordshire. In J. Catt, ed. *Hertfordshire Geology and Landscape*. Welwyn Garden City: Hertfordshire Natural History Society, pp. 226–254.

Catt, J. & Cheshire, A., 2010. Quarternary deposits and later landscape development. In J. Catt, ed. *Hertfordshire Geology and Landscape*. Welwyn Garden City: Hertfordshire Natural History Society, pp. 118–184.

Catt, J. & Doyle, J., 2010. The Palaeogene Period. In J. Catt, ed. *Hertfordshire Geology and Landscape*. Welwyn Garden City: Hertfordshire Natural History Society, pp. 61–78.

Champion, T., 1975. Britain in the European Iron Age. *Archaeologia Atlantica*, 1, pp.127–45.

Champion, T., 1994. Socio-economic development in eastern England in the first millennium BC. In K. Kristiansen & J. Jensen, eds. *Europe in the First Millennium BC*. Sheffield: J.R. Collis, pp. 125–44.

Champion, T.C., 1979. The Iron Age (c.600 BC - AD 200), A. Southern Britain and Ireland. In J. V. S. Megaw & D. D. A. Simpson, eds. *Introduction to British Prehistory*. Leicester, pp. 344–421.

Champion, T.C., 1985. Written sources and the study of the European Iron Age. In T. C. Champion & J. V. S. Megaw, eds. *Settlement and Society: aspects of West European prehistory in the first millennium BC*. Leicester: Leicester University Press, pp. 9–22.

Cleal, R.M.J., 1995. Pottery fabrics in Wessex in the fourth to second millennia BC. In I. Kinnes & G. Varndell, eds. *Unbaked Urns of Rudely Shape*. Oxford: Oxbow, pp. 185–194.

Collis, J.R., 1981. Coinage, oppida, and the rise of Belgic power: a reply. In B. W. Cunliffe, ed. *Coinage and Society in Britain and Gaul: some current problems*. London: Council for British Archaeology Research Report 38, pp. 53–5.

Collis, J.R., 1984. *Oppida. Earliest Towns North of the Alps*, Sheffield: J.R. Collis.

Collis, J.R., 1996. Hill-forts, enclosures and boundaries. In T. C. Champion & J. R. Collis, eds. *The Iron Age in Britain and Ireland: recent trends*. Sheffield: J.R. Collis, pp. 87–94.

Colonese, A.C., Lucquin, A. & Craig, O.E., forthcoming. Organic residue analysis of ceramic vessels. In M. G. Fulford et al., eds. *Late Iron Age Calleva. The Pre-Conquest Occupation at Silchester Insula IX*. London: Society for the Promotion of Roman Studies.

Cool, H., 2007. *Eating and Drinking in Roman Britain*, Cambridge: Cambridge University Press.

Copley, M.S., Berstan, R., Dudd, S.N., Straker, V., et al., 2005. Dairying in Antiquity. I. Evidence from absorbed lipid residues dating to the British Iron Age. *Journal of Archaeological Science*, 32, pp.485–503.

Copley, M.S., Berstan, R., Dudd, S.N., Aillaud, S., et al., 2005. Processing of milk products in pottery vessels through British prehistory. *Antiquity*, 79, pp.895–908.

Cosentino, P., 1990. *The Encyclopaedia of Pottery Techniques*, London: Headline.

Cotton, M.A., 1961. Robin Hood's Arbour: and rectilinear enclosures in Berkshire. *Berkshire Archaeological Journal*, 59, pp.1–35.

Courty, M.A. & Roux, V., 1995. Identification of wheel throwing on the basis of ceramic surface features and microfabrics. *Journal of Archaeological Science*, 22(1), pp.17–50.

Cowell, R.W., Fulford, M.G. & Lobb, S., 1980. Excavations of prehistoric and Roman settlement at Aldermaston Wharf 1976-77. *Berkshire Archaeological Journal*, 69, pp.1–35.

Cox, P. & Woodward, P., 1987. The Kimmeridge Shale. In N. Sunter & P. J. Woodward, eds. *Romano-British industries in Purbeck*. Dorchester: Dorset Natural History and Archaeological Society, pp. 165–172.

Creighton, J., 2000. *Coins and Power in late Iron Age Britain*, Cambridge: Cambridge University Press.

Creighton, J. & Fry, R., 2016. *Silchester: Changing Visions of a Roman Town: Integrating geophysics and archaeology: the results of the Silchester Mapping Project 2005-10*, London: Society for the Promotion of Roman Studies, Britannia Monograph 28.

Crummy, P. et al., 2007. *Stanway: an elite burial site at Camulodunum*, London: Britainnia Monograph 24.

Cunliffe, B., 1978. *Iron Age Communities in Britain* (2nd ed.)., London: Routledge.

Cunliffe, B., 1991. *Iron Age Communities in Britain* (3rd ed.)., London: Routledge.

Cunliffe, B.W., 1974. *Iron Age Communities in Britain* (1st ed.)., London: Routledge.

Cunliffe, B.W., 1982a. Britain, The Veneti, and Beyond. *Oxford Journal of Archaeology*, 1(1), pp.39–68.

Cunliffe, B.W., 1982b. Settlement heirarchy and social change in southern Britain in the Iron Age. *Analecta Praehistorica Leidensia*, 15, pp.161–81.

Cunliffe, B.W., 1982c. Social and economic development in Kent in the pre-Roman Iron Age. In P. E. Leach, ed. *Archaeology in Kent to AD 1500*. London: Council for British Archaeology Research Report 48, pp. 40–50.

Cunliffe, B.W., 1984a. *Danebury: an Iron Age hillfort in Hampshire - Volume 2, The Excavations 1969-1978: The Finds*, London: Council for British Archaeology Research Report 52.

Cunliffe, B.W., 1984b. Iron Age Wessex: Continuity and Change. In B. Cunliffe & D. Miles, eds. *Aspects of the Iron Age in Central Southern Britain*. Oxford: Oxford University Committee for Archaeology Monograph 2, pp. 12–45.

Cunliffe, B.W., 1984c. Relations between Britain and Gaul in the First Century BC and early First Century AD. In S. Macready & F. H. Thompson, eds. *Cross-Channel Trade between Gaul and Britain in the pre-Roman Iron Age*. London: Society of Antiquaries of London, pp. 3–23.

Cunliffe, B.W., 1988. *Greeks, Romans and Barbarians: Spheres of interaction*, London: Batsford.

Cunliffe, B.W., 2001. *Facing the Ocean: the Atlantic and its peoples*, Oxford: Oxford University Press.

Cunliffe, B.W., 2005. *Iron Age Communities in Britain* (4th ed.)., Abingdon: Routledge.

Cunnington, B.H., 1932. Was there a second Belgic invasion (represented by bead-rim pottery)? *Antiquaries Journal*, 12(1), pp.27–34.

Darvill, T., 1987. *Prehistoric Britain*, London: Batsford.

Dasgupta, S., 1996. *Technology and Creativity*, Oxford: Oxford University Press.

Davis, O., 2014. Excavations of a second Iron Age enclosure on Winnall Down, Winchester, Hants, 2006. *Proceedings of the Hampshire Field Club & Archaeological Society*, 69, pp.23–48.

DeMarrais, E., Gosden, C. & Renfrew, C., 2004. *Rethinking Materiality: The engagement of mind with the material world*, Cambridge: McDonald Institute for Archaeological Research.

Desrayaud, G., 2011. Ferme gauloise et etablissements ruraux gallo-romains du Bois de l'Homme Mort, Saint-Pathus (Seine-et-Marne) milieu IIe s. av.-debut Ve ap. J.-C. *Revue archaeologique du centre de la France*, 50, pp.315–384.

Dietler, M. & Herbich, I., 1998. Habitus, techniques, style: An integrated approach to the social understanding of material culture and boundaries. In M. T. Stark, ed. *The archaeology of social boundaries*. Washington, D.C.: Smithsonian Institution Press, pp. 232–263.

Dilly, G., 1992. La ceramique latenienne recente. In *Le Site d'Hornaing (Nord): Protohistoire, La Tene I, La Tene III, Gallo-romain, Merovingien*. Douai: Archaeologia Duacensis No.5, pp. 37–51.

Dobres, M.A., 1999. Technology's links and chaines: the processual unfolding of technique and technician. In M. A. Dobres & C.R. Hoffman, eds. *The Social Dynamics of Technology: Practice, Politics and World Views*. London: Smithsonian Institution Press, pp. 124–146.

Dobres, M.A., 2000. *Technology and Social Agency*, Oxford: Blackwell.

Dobres, M.A. & Hoffman, C.R., 1994. Social agency and the dynamics of prehistoric technology. *Journal of Archaeological Method and Theory*, 1(3), pp.211–258.

Dobres, M.A. & Hoffman, C.R., 1999. *The Social Dynamics of Technology: practice, politics, and world views*, Washington, D.C.: Smithsonian Institution Press.

Drury, P., 1978. *Excavations at Little Waltham*, London: Council for British Archaeology Research Report 26.

Dyer, J., 1976. Ravensburgh Castle, Hertfordshire. In D.W. Harding, ed. *Hillforts: later prehistoric earthworks in Britain and Ireland*. London: Academic Press, pp. 153–159.

Edgerton, D., 1999. From innovation to use: Ten eclectic theses on the historiography of technology. *History and Technology*, 16(2), pp.111–136.

Edgerton, D., 2008. *The Shock of the Old: Technology and Global History since 1900*, London: Profile Books.

Ehrenreich, R.M., 1995. Early Metalworking: A Heterarchical Analysis of Industrial Organisation. *Archaeological Papers of the American Anthropological Association*, 6(1), pp.33–39.

Ellison, R.A., 2004. *Geology of London: Special Memoir for 1:50,000 Geological sheets 256 (North London), 257 (Romford), 270 (South London) and 271 (Dartford)(England and Wales)*, Nottingham: British Geological Survey.

Elsdon, S., 1992. East Midlands Scored Ware. *Transactions of the Leicestershire Archaeological and Historical Society*, 44, pp.83–91.

Evans, A., 1890. On a late-Celtic urn-field at Aylesford, Kent. *Archaeologia*, 52(2), pp.315–338.

Fasham, P.J. & Keevil, G., 1995. *Brighton Hill South (Hatch Warren), an Iron Age farmstead and deserted medieval village in Hampshire*, Salisbury: Wessex Archaeology Report 7.

Feathers, J.F., 1989. Effects of temper on strength of ceramics: response to Bronitsky and Hamer. *American Antiquity*, 54, pp.579–588.

Fell, C.I., 1961. The Coarse Pottery of Bagendon. In E. M. Clifford, ed. *Bagendon: A Belgic Oppidum. A record of the excavations of 1954-56*. Cambridge: W. Heffer & Sons Ltd., pp. 212–267.

Fitzpatrick-Matthews, K.J. & Burleigh, G.R., 2007. *Excavations at Baldock 1978-1994: Fieldwork by G.R. Burleigh*, Norwich: East Anglian Archaeology.

Fitzpatrick, A.P., 1989a. *Cross-channel relations in the British later Iron Age*. Unpublished PhD Thesis, University of Durham.

Fitzpatrick, A.P., 1989b. The uses of Roman Imperialism by the Celtic Barbarians in the Later Republic. In J. C. Barrett, A. P. Fitzpatrick, & L. Macinnes, eds. *Barbarians and Romans in North-West Europe from the Late Republic to Late Antiquity*. Oxford: BAR International Series 471, pp. 27–54.

Fitzpatrick, A.P., 1993. Ethnicity and exchange: Germans, Celts and Romans in the late (pre-Roman) Iron Age. In C. Scarre & F. Healy, eds. *Trade and exchange in prehistoric Europe*. Oxford: Oxbow, pp. 233–44.

Fitzpatrick, A.P., 2001. Cross-channel exchange, Hengistbury Head, and the end of hillforts. In J. R. Collis, ed. *Society and Settlement in Iron Age Europe*. Sheffield: Sheffield

Academic Press, pp. 82–97.

Fitzpatrick, A.P., 2003. Roman amphorae in Iron Age Britain. *Journal of Roman Pottery Studies*, 10, pp.10–25.

Fitzpatrick, A.P., 2007. The fire, the feast and the funeral. Late Iron Age burial rites in southern England. In V. Kruta & G. Leman-Delerive, eds. *Feux des morts, foyers des vivants. Les rites et symboles du feu dans les tombes de l'Age du Fer et de l'epoque romaine*. Lille: Revue de Nord Hors serie. Collection Art et Archeologie 11, pp. 123–42.

Fitzpatrick, A.P. & Timby, J., 2002. Roman pottery in Iron Age Britain. In A. Woodward & J. D. Hill, eds. *Prehistoric Britain: The Ceramic Basis*. Oxford: Oxbow, pp. 161–172.

Ford, S., Pine, J. & Weale, A., 2013. Middle Iron Age occupation and iron production and a late Saxon hearth at Grazeley Road, Three Mile Cross, Reading, Berkshire. In S. J. Preston, ed. *Iron Age Iron Production Sites in Berkshire*. Reading: Thames Valley Archaeological Services Monograph 16, pp. 37–60.

Freestone, I.C., 1989. The petrography of the pottery from the Iron Age cemetery. In I. M. Stead & V. Rigby, eds. *Verulamium: the King Harry Lane site*. London: English Heritage Archaeological Report 12, pp. 264–7.

Freestone, I.C. & Rigby, V., 1982. Class B cordoned and other imported wares from Hengistbury Head, Dorset. In I. C. Freestone, C. Johns, & T. Potter, eds. *Current Research in Ceramics: Thin-section studies*. London: British Museum Occasional Paper 32, pp. 29–42.

Freestone, I.C. & Rigby, V., 1988. The introduction of Roman ceramic styles and techniques into Roman Britain: A case study from the King Harry Lane cemetery, St Albans, Hertfordshire. *Materials Research Society Symposia Proceedings*, 123, pp.109–115.

Fulford, M.G., 2000. Synthesis. In *Late Iron Age and Roman Silchester: Excavations on the site of the forum-basilica 1977, 1980-86*. London: Society for the Promotion of Roman Studies, Britannia Monograph 15, pp. 545–564.

Fulford, M.G., 2011. The Silchester Hinterland: Introduction. In S. Preston, ed. *Archaeological Investigations in the Silchester hinterland*. Reading: Thames Valley Archaeological Services Monograph 9, pp. 1–6.

Fulford, M.G., Barnett, C. & Clarke, A., 2016. *Silchester & its Environs. Excavation and Survey 2015*, Reading: Department of Archaeology, University of Reading.

Fulford, M.G., Barnett, C. & Clarke, A., 2017. *Silchester & its Environs. Excavation & Survey*

2016, Reading: Department of Archaeology, University of Reading.

Fulford, M.G. & Creighton, J., 1998. A Late Iron Age Mirror Burial from Latchmere Green, near Silchester, Hampshire. *Proceedings of the Prehistoric Society*, 64, pp.331–342.

Fulford, M.G. & Timby, J., 2000. *Late Iron Age and Roman Silchester: Excavations on the site of the forum-basilica 1977, 1980-86*, London: Society for the Promotion of Roman Studies, Britannia Monograph 15.

Garrow, D. et al., 2009. Dating Celtic Art: a Major Radiocarbon Dating Programme of Iron Age and Early Roman Metalwork in Britain. *Archaeological Journal*, 166(1), pp.79–123.

Garrow, D. & Gosden, C., 2012. *Technologies of Enchantment? Exploring Celtic Art: 400 BC to AD 100*, Oxford: Oxford University Press.

Gelbert, A., 1997. De l'elaboration au tour au tournage sur motte: Difficultes motrices et conceptuelles. *Techniques et Culture*, 30, pp.1–23.

Gell, A., 1992. The Technology of Enchantment and the Enchantment of Technology. In J. Coote & A. Shelton, eds. *Anthropology, Art and Aesthetics*. Oxford: Blackwell, pp. 40–67.

Gell, A., 1998. *Art and Agency: An Anthropological Theory*, Oxford: Clarendon.

Gibson, A. & Woods, A., 1997. *Prehistoric Pottery for the Archaeologist* (2nd ed.)., London: Leicester University Press.

Gibson, C., 2004. The Iron Age and Roman site of Viables two (Jays Close), Basingstoke. *Proceedings of the Hampshire Field Club & Archaeological Society*, 59, pp.1–30.

Giddens, A., 1979. *Central Problems in Social Theory: Action, Structure, and Contradiction in Social Analysis*, Berkeley, CA: University of California Press.

Giddens, A., 1984. *The Constitution of Society: Outline of a Theory of Structuration*, Berkeley, CA: University of California Press.

Giles, M., 2007. Making metal and forging relations: ironworking in the British Iron Age. *Oxford Journal of Archaeology*, 26(4), pp.395–413.

Gosden, C., 2005. What do objects want? *Journal of Archaeological Method and Theory*, 12(3), pp.193–211.

Gosselain, O.P., 1992. Technology and style: potters and pottery among the Bafia of Cameroon. *Man*, 27, pp.599–586.

Gosselain, O.P., 1998. Social and technical identity in a clay crystal ball. In M. T. Stark, ed. *The archaeology of social boundaries*. Washington: Smithsonian Institution Press, pp. 78–106.

Gosselain, O.P., 1999. In pots we trust: the processing of clay and symbols in Sub-Saharan Africa. *Journal of Material Culture*, 4(2), pp.205–230.

Gosselain, O.P., 2000. Materializing Identities: An African Perspective. *Journal of Archaeological Method and Theory*, 7(3), pp.187–217.

Green, C., 1980. Handmade pottery and society in late Iron Age and Roman East Sussex. *Sussex Archaeological Collections*, 118, pp.69–86.

Green, C., 2011. Hertfordshire Puddingstone querns: working with a difficult rock. In *Bread for the People: The Archaeology of Mills and Milling*. Oxford: BAR International Series 2274, pp. 123–130.

Green, C., 2016. Querns and millstones in late Iron Age and Roman London and south-east England. In *Agriculture and Industry in south-eastern Roman Britain*. Oxford: Oxbow Books, pp. 156–179.

Green, S., 2004. Late Iron Age and Roman Pottery. In G. Lambrick & T. Allen, eds. *Gravelly Guy, Stanton Harcourt, Oxfordshire: The development of a prehistoric and Romano-British community*. Oxford: Oxford University School of Archaeology, pp. 303–334.

Hachmann, R., 1976. The problem of the Belgae seen from the continent. *Bulletin of the Institute of Archaeology of the University of London*, 13, pp.117–37.

Hamer, F. & Hamer, J., 2004. *The Potter's Dictionary of Materials and Techniques* 5th ed., London: A & C Black.

Hamilton, S., 2007. Cultural choices in the "British Eastern Channel Area" in the late pre-Roman Iron Age. In C. Haselgrove & T. Moore, eds. *The Later Iron Age in Britain and Beyond*. Oxford: Oxbow, pp. 81–106.

Harding, D.W., 1972. *The Iron Age in the Upper Thames Basin*, Abingdon: Oxford University Press.

Haselgrove, C., 1982. Wealth, prestige and power: the dynamics of late iron age political centralisation in south-east England. In C. Renfrew & S. Shennan, eds. *Ranking, resource and exchange: aspects of the archaeology of early European society*. Cambridge: Cambridge University Press, pp. 79–88.

Haselgrove, C., 1984. Romanization before the conquest: Gaulish precedents and British consequences. In T. Blagg & A. King, eds. *Military and Civilian in Roman Britain*. Oxford: BAR British Series 136, pp. 5–30.

Haselgrove, C., 1989. The later Iron Age in southern Britain and beyond. In M. Todd, ed. *Research on Roman Britain 1960-89*. London: Britainnia Monograph 11, pp. 1–18.

Haselgrove, C., 1995. Late Iron Age society in Britain and northwest Europe: Structural transformation or superficial change? In B. Arnold & D. Gibson, eds. *Celtic Chiefdom, Celtic State*. Cambridge: Cambridge University Press, pp. 81–7.

Haselgrove, C., 1997. Iron Age brooch deposition and chronology. In A. Gwilt & C. Haselgrove, eds. *Reconstructing Iron Age Societies*. Oxford: Oxbow, pp. 51–72.

Haselgrove, C., 2001. Iron Age Britain in its European setting. In J.R. Collis, ed. *Society and Settlement in Iron Age Europe*. Sheffield: J.R. Collis, pp. 37–72.

Haselgrove, C., 2002. Contacts between Britain and the Continent during the Iron Age. In A. Lang & V. Salac, eds. *Fernkontakte in der Eisenzeit*. Prague: Archaeologisches Institut der Akademie der Wissenschaften der Tschechischen Republik, pp. 282–97.

Haselgrove, C. & Moore, T., 2007a. New narratives of the Later Iron Age. In C. Haselgrove & T. Moore, eds. *The Later Iron Age in Britain and Beyond*. Oxford: Oxbow, pp. 1–15.

Haselgrove, C. & Moore, T., 2007b. *The Later Iron Age in Britain and beyond*, Oxford: Oxbow.

Hawkes, C.F.C., 1959. The ABC of the British Iron Age. *Antiquity*, 33, pp.170–82.

Hawkes, C.F.C., 1968. New thoughts on the Belgae. *Antiquity*, 42, pp.6–16.

Hawkes, C.F.C. & Dunning, G.C., 1930. The Belgae of Gaul and Britain. *Archaeological Journal*, 87, pp.150–335.

Hawkes, C.F.C. & Dunning, G.C., 1932. The Second Belgic Invasion. *Antiquaries Journal*, 12(4), pp.411–430.

Hawkes, C.F.C. & Hull, M.R., 1947. *Camulodunum: First report on the excavations at Colchester, 1930-1939*, London: Society of Antiquaries of London.

Hawkes, J.W., 1985. The Pottery. In P. J. Fasham, ed. *The Prehistoric Settlement at Winnall Down, Winchester: Excavations of MARC3 Site R17 in 1976 and 1977*. Gloucester: Hampshire Field Club Monograph No.2, pp. 57–76.

Heidegger, M., 1977. *The Question Concerning Technology*, New York: Garland.

Henderson, J.C., 1991. Industrial specialization in Late Iron Age Britain and Europe. *Archaeological Journal*, 148, pp.104–148.

Henderson, J.C., 2000. *The Science and Archaeology of Materials*, London & New York: Routledge.

Henderson, J.C., 2007. *The Atlantic Iron Age. Settlement and Identity in the First Millennium BC*, Abingdon: Routledge.

Hill, J.D., 1995a. How should we understand Iron Age societies and hillforts? A contextual study from southern Britain. In J. D. Hill & C. G. Cumberpatch, eds. *Different Iron Ages: Studies on the Iron Age in Temperate Europe*. Oxford: BAR International Series 602, pp. 45–60.

Hill, J.D., 1995b. *Ritual and rubbish in the Iron Age of Wessex*, Oxford: British Archaeological Reports 242.

Hill, J.D., 1995c. The Pre-Roman Iron Age in Britain and Ireland (c.800BC - AD100): an overview. *Journal of World Prehistory*, 9(1), pp.47–98.

Hill, J.D., 1997. “The end of one kind of body and the beginning of another kind of body?” Toilet instruments and “Romanization.” In A. Gwilt & C. Haselgrove, eds. *Reconstructing Iron Age Societies*. Oxford: Oxbow, pp. 96–107.

Hill, J.D., 2002. Just about the Potter’s Wheel? Using, Making and Depositing Middle and Later Iron Age Pots in East Anglia. In A. Woodward & J. D. Hill, eds. *Prehistoric Britain : the ceramic basis*. Oxford: Oxbow, pp. 143–160.

Hill, J.D., 2007. The dynamics of social change in Late Iron Age eastern and south-eastern England, c. 300BC-AD43. In C. Haselgrove & T. Moore, eds. *The Later Iron Age in Britain and Beyond*. Oxford: Oxbow, pp. 16–40.

Hill, J.D. & Braddock, P., 2006. The Iron Age pottery. In C. Evans & I. Hodder, eds. *Marshland Communities and Cultural Landscapes: The Haddenham Project Volume 2*. Cambridge: McDonald Institute for Archaeological Research, pp. 152–194.

Hill, J.D. & Horne, L., 2003. Iron Age and Early Roman pottery. In C. Evans, ed. *Power and island communities: Excavations at the Wardy Hill ringwork, Coveney, Ely*. Cambridge: Cambridge Archaeological Unit Report 103, pp. 145–184.

Hingley, R., 1990. Iron Age “Currency Bars”: The Archaeological and Social Context. *Archaeological Journal*, 147, pp.91–117.

Hingley, R., 1997. Iron, ironworking and regeneration: a study of the symbolic meaning of metalworking in Iron Age Britain. In A. Gwilt & C. Haselgrove, eds. *Reconstructing Iron Age Societies*. Oxford: Oxbow, pp. 9–18.

Hoard, R.J. et al., 1995. A materials-science approach to understanding limestone-tempered pottery from the midwestern United States. *Journal of Archaeological Science*, 22, pp.823–832.

Hodder, I., 2012. *Entangled: An Archaeology of the Relationships between Humans and Things*, Chichester: Wiley-Blackwell.

Hodson, F.R., 1975. Review of D.W. Harding, The Iron Age in Lowland Britain. *Antiquaries Journal*, 55, pp.430–432.

Hopson, P.M., Aldiss, D.T. & Smith, A., 1996. *Geology of the country around Hitchin*, London: British Geological Survey.

Hughes, T.P., 1986. The Seamless Web: Technology, Science, Etcetera, Etcetera. *Social Studies of Science*, 16(2), pp.281–292.

Ingold, T., 2007. Materials against materiality. *Archaeological Dialogues*, 14(1), pp.1–16.

Jarvis, M.G., 1973. *Soils of the Wantage and Abingdon District*, Harpenden: Memoirs of the Soil Survey of Great Britain.

Jeffra, C., 2013. A Re-examination of Early Wheel Potting in Crete. *The Annual of the British School at Athens*, 108, pp.31–49.

Joy, J., 2012. Exploring status and identity in later Iron Age Britain: re-interpreting mirror burials. In T. Moore & X.-L. Armada, eds. *Atlantic Europe in the First Millennium BC: Crossing the divide*. Oxford: Oxford University Press, pp. 468–87.

Joy, J., 2014. “Fire Burn and Cauldron Bubble”: Iron Age and Early Roman Cauldrons of Britain and Ireland. *Proceedings of the Prehistoric Society*, 80, pp.327–362.

Kennett, D.H., 1977. Shale vessels of the Late Pre-Roman Iron Age. *Bedfordshire Archaeological Journal*, 12, pp.17–22.

Killick, D., 2004. Social constructionist approaches to the study of technology. *World Archaeology*, 36(4), pp.571–578.

Kimball, D., 1933. Cholesbury Camp. *Journal of the British Archaeological Association*, 39(1), pp.197–208.

Knappett, C., 1999. Tradition and innovation in pottery forming technology: wheel-throwing at Middle Minoan Knossos. *The Annual of the British School at Athens*, 94, pp.101–

129.

Knappett, C., 2004. Technological innovation and social diversity at Middle Minoan Knossos. *British School at Athens Studies*, 12, pp.257–265.

Knappett, C., 2005. *Thinking Through Material Culture: An Interdisciplinary Perspective*, Philadelphia, PA: University of Philadelphia Press.

Knappett, C., 2012. Materiality. In I. Hodder, ed. *Archaeological Theory Today*. Cambridge: Polity Press, pp. 365–399.

Knappett, C., 2013. *Network analysis in archaeology: New approaches to regional interaction*, Oxford: Open University Press.

Knappett, C. & Malafouris, L., 2008. *Material Agency: Towards a non-anthropocentric approach*, New York: Springer.

Knight, D., 1993. Late Bronze Age and Iron Age pottery from Pennyland and Hartigans (MK19). In R. J. Williams, ed. *Pennyland & Hartigans. Two Iron Age and Saxon sites in Milton Keynes*. Aylesbury: Buckinghamshire Archaeological Society Monograph Series No.4, pp. 219–238.

Knight, D., 1999. A regional ceramic sequence: pottery of the first millennium BC between the Humber and the Nene. In J. D. Hill & A. Woodward, eds. *Prehistoric Britain: The Ceramic Basis*. Oxford: Oxbow.

Kuhn, S., 2004. Evolutionary prespectives on technology and technological change. *World Archaeology*, 36(4), pp.561–570.

Lamb, A., 2016. The Rise of the Individual in Late Iron Age Southern Britain and Beyond. *Chronika*, 6, pp.26–40.

Latour, B., 1993. *We Have Never Been Modern*, London: Harvard University Press.

Latour, B., 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*, Oxford: Oxford University Press.

Laws, K., Brown, L. & Roe, F., 1991. Objects of stone. In B. W. Cunliffe & C. Poole, eds. *Danebury: an Iron Age hillfort in Hampshire. Vol. 5: The excavations 1979-1988: the finds*. London: Council for British Archaeology Research Report 73, pp. 382–404.

Lechtman, H., 1977. Style in Technology: Some Early Thoughts. In H. Lechtman & R. S. Merrill, eds. *Material Culture: Styles, Organization, and Dynamics of Technology*. St. Paul, MN: American Ethnological Society, pp. 3–20.

Lechtman, H., 1984a. Andean Value Systems and the Development of Prehistoric Metallurgy. *Technology and Culture*, 25(1), pp.1–36.

Lechtman, H., 1984b. Pre-Columbian Surface Metallurgy. *Scientific American*, 250, pp.56–63.

van der Leeuw, S.E., 1990. Archaeology, material culture, and innovation. *SubStance*, 19(3), pp.92–109.

van der Leeuw, S.E., 1993. Giving the potter a choice: conceptual aspects of pottery techniques. In P. Lemmonier, ed. *Technological Choices: Transformation in Material Cultures Since the Neolithic*. London: Routledge, pp. 238–288.

van der Leeuw, S.E. & Torrence, R., 1989. *What's New? A Closer Look at the Process of Innovation*, London: Unwin Hyman.

Lemonnier, P., 1989. Bark capes, arrowheads and concorde: On social representations of technology. In I. Hodder, ed. *The Meanings of Things: Material Culture and Symbolic Expression*. London & New York: Routledge, pp. 156–171.

Lemonnier, P., 1992. *Elements for an Anthropology of Technology*, Ann Arbour, MI: Museum of Anthropology, University of Michigan.

Lemonnier, P., 1993. *Technological Choices: Transformation in material cultures since the Neolithic*, London: Routledge.

Leroi-Gourhan, A., 1964. *Gesture and Speech*, Cambridge, MA & London: MIT Press.

Lewis, J., Crabb, S. & Ford, S., 2013. Bronze Age urns, Iron Age iron smelting, and Saxon charcoal production at Sadler's End, Sindlesham, Wokingham, Berkshire. In S. J. Preston, ed. *Iron Age Iron Production Sites in Berkshire*. Reading: Thames Valley Archaeological Services Monograph 16, pp. 1–36.

Lobb, S.J. & Morris, E.L., 1993. Investigations of Bronze Age and Iron Age features at Riseley Farm, Swallowfield. *Berkshire Archaeological Journal*, 74, pp.37–68.

Lobert, H.W., 1984. Types of Potter's Wheels and the Spread of the Spindle-Wheel in Germany. In S. E. van der Leeuw & A. C. Pritchard, eds. *The many dimensions of pottery: ceramics in archaeology and anthropology*. Amsterdam: Universiteit van Amsterdam, pp. 203–230.

Lodwick, L., 2014. Condiments before Claudius: new plant foods at the Late Iron Age oppidum at Silchester, UK. *Vegetation History and Archaeobotany*, 23, pp.543–549.

Loney, H.L., 2000. Society and technological control: a critical review of models of technological change in ceramic studies. *American Antiquity*, 65(4), pp.646–668.

Lyne, M.A.B., 2015. *Late Roman Handmade Grog-tempered Ware Producing Industries in South East Britain*, Oxford: Archaeopress.

Lyne, M.A.B. & Jeffries, R.S., 1979. *The Alice Holt/Farnham Roman pottery industry*, London: Council for British Archaeology Research Report 30.

Major, H., 2004. The dating of puddingstone querns. *Lucerna*, 27, pp.2–4.

Malafouris, L., 2004. The Cognitive Basis of Material Engagement: Where Brain, Body and Culture Conflate. In E. DeMarrais, C. Gosden, & C. Renfrew, eds. *Rethinking Materiality: The engagement of mind with the material world*. Cambridge: McDonald Institute for Archaeological Research, pp. 53–62.

Malafouris, L., 2013. *How Things Shape the Mind*, Cambridge, MA: MIT Press.

Maniatis, Y. & Tite, M.S., 1981. Technological examination of Neolithic-Bronze Age pottery from Central and Southeast Europe and from the Near East. *Journal of Archaeological Science*, 8, pp.59–76.

Manning, W.H., 1974. Excavations on Late Iron Age, Roman and Saxon sites at Ufton Nervet, Berkshire, in 1961-1963. *Berkshire Archaeological Journal*, 67, pp.1–61.

Marney, P.T., 1989. *Roman & Belgic Pottery from Excavations in Milton Keynes, 1972-82*, Aylesbury: Buckinghamshire Archaeological Society Monograph Series No.2.

Marney, P.T., 1993. The Belgic and early Roman pottery from Hartigans (MK318 and 330). In R. J. Williams, ed. *Pennyland & Hartigans. Two Iron Age and Saxon sites in Milton Keynes*. Aylesbury: Buckinghamshire Archaeological Society Monograph Series No.4, pp. 238–243.

Mathers, S.J. & Smith, N.J.P., 2000. *Geology of the Reading district - A brief explanation of the geological map Sheet 268 Reading*, Nottingham: British Geological Survey.

Matthews, C.L., 1976. *Occupation sites on a Chiltern Ridge: Excavations at Puddlehill and sites near Dunstable, Bedfordshire, Part I: Neolithic, Bronze Age, and Early Iron Age*, Oxford: BAR British Series 29.

Mauss, M., 1936. Les techniques du corps. *Journal de Psychologie*, 32, pp.271–293.

May, T., 1916. *The Pottery Found at Silchester*, Reading: County Museum of Reading.

McKinley, J., 2008. In the heat of the pyre: Efficiency of oxidation in Romano-British cremations - did it really matter? In C. W. Schmidt & S. A. Symes, eds. *The Analysis of Burned Human Remains*. London: Elsevier, pp. 163–183.

Mepham, L., 1997. Iron Age and Romano-British Pottery. In I. Barnes et al., eds. *Excavations at Thames Valley Park, Reading, 1986-88*. Sailsbury: Wessex Archaeological Report 14, pp. 48–66.

Meskell, L., 2005. *Archaeologies of Materiality*, Oxford: Blackwell.

Middleton, A., 2005. Ceramics. In J. Lang & A. Middleton, eds. *Radiography of cultural material*. Oxford: Elsevier, pp. 76–95.

Miller, D., 2005. Materiality: An Introduction. In D. Miller, ed. *Materiality*. Durham and London: Duke University Press, pp. 1–50.

Millett, M., 1990. *The Romanization of Britain*, Cambridge: Cambridge University Press.

Millett, M.J. & Russell, D., 1984. An Iron Age and Romano-British site at Viables Farm. *Proceedings of the Hampshire Field Club & Archaeological Society*, 49, pp.49–60.

Moore, H., 2011. A Late Iron Age to Early Roman enclosure at Little London Road, near Silchester, Hampshire, 2003. In S. Preston, ed. *Archaeological Investigations in the Silchester hinterland*. Reading: Thames Valley Archaeological Services Monograph 9, pp. 93–107.

Moore, T., 2007. Life on the edge? Exchange, community and identity in the later Iron Age of the Severn-Cotswolds. In C. Haselgrove & T. Moore, eds. *The Later Iron Age in Britain and Beyond*. Oxford: Oxbow, pp. 41–61.

Moore, T. & Armada, X.-L., 2012. Crossing the divide: Opening a dialogue on approaches to western European first millennium BC studies. In T. Moore & X.-L. Armada, eds. *Atlantic Europe in the First Millennium BC: Crossing the divide*. Oxford: Oxford University Press, pp. 3–77.

Morris, E.L., 1981. Ceramic exchange in western Britain: a preliminary view. In H. Howard & E. L. Morris, eds. *Production and distribution: a ceramic viewpoint*. Oxford: BAR International Series 120, pp. 67–81.

Morris, E.L., 1982. Iron Age pottery from western Britain: another petrological study. In I. C. Freestone & C. Johns, eds. *Current Research in Ceramics: Thin-section studies*. London: British Museum Occasional Paper 32, pp. 15–27.

Morris, E.L., 1993. Pottery' in S.J. Lobb & E.L. Morris "Investigation of Bronze Age and Iron Age features at Riseley Farm, Swallowfield." *Berkshire Archaeological Journal*, 74(on fiche).

Morris, E.L., 1994a. Production and Distribution of Pottery and Salt in Iron Age Britain: a Review. *Proceedings of the Prehistoric Society*, 60, pp.371–393.

Morris, E.L., 1994b. Pottery. in C. Hearne & M. Heaton, eds., Excavations at a late Bronze Age Settlement in the Upper Thames Valley at Shorncote Quarry near Cirencester, 1992. *Transactions of the Bristol and Gloucestershire Archaeological Society*, 112, pp.34–45.

Morris, E.L., 1995. Study 10: Pottery production and resource locations: An examination of the Danebury collection. In B. W. Cunliffe, ed. *Danebury: an Iron Age hillfort in Hampshire. Vol. 6: A hillfort community in perspective*. London: Council for British Archaeology Research Report 102, pp. 239–245.

Morris, E.L., 1996. Iron Age Artefact Production and Exchange. In T. C. Champion & J. R. Collis, eds. *The Iron Age in Britain and Ireland: recent trends*. Sheffield: J.R. Collis, pp. 41–66.

Morris, F.M., 2010. *North Sea and Channel Connectivity during the late Iron Age and Roman Period (175/150 BC-AD 409)*, Oxford: BAR International Series 2157.

Morris, M. & Wainwright, A., 1995. Iron Age and Romano-British settlement and economy in the Upper Bulbourne Valley, Hertfordshire. In R. Holgate, ed. *Chiltern Archaeology: recent work*. Dunstable: The Book Castle, pp. 68–75.

Moss-Eckardt, J., 1964. Excavations on Wilbury Hill, an Iron Age Hill-Fort near Letchworth, Herts., 1959. *Bedfordshire Archaeological Journal*, 2, pp.34–47.

Moss-Eckardt, J., 1988. Archaeological investigations in the Letchworth area, 1958-1974: Blackhorse Road, Letchworth; Norton Road, Baldock; Wilbury Hill, Letchworth. *Proceedings of the Cambridge Antiquarian Society*, 77, pp.35–104.

Mulvaney, D.J., 1962. The Belgae and English economic history. *Historical Studies, Australia and New Zealand*, 10, pp.327–338.

Niblett, R., 1999. *The Excavation of a Ceremonial Site at Folly Lane, Verulamium*, London: Britainnia Monograph 14.

Niblett, R., 2001. *Verulamium: The Roman City of St Albans*, Stroud: The History Press.

O'Brien, M.J. & Shennan, S.J., 2010. *Innovation in Cultural Systems: Contributions from Evolutionary Anthropology*, Cambridge, MA: MIT Press.

O'Connor, S. & Maher, J., 2001. The digitisation of X-radiographs for dissemination, archiving and improved image interpretation. *The Conservator*, 25, pp.3–15.

Oliver, M., 1992. Excavations of an Iron Age and Romano-British settlement site at Oakridge, Basingstoke, Hampshire, 1965-6. *Proceedings of the Hampshire Field Club & Archaeological Society*, 48, pp.55–94.

Over, L.J., 1974. A Belgic occupation site at Knowl Hill, Berks. *Berkshire Archaeological Journal*, 67, pp.63–70.

Partridge, C., 1979. Excavations at Puckeridge and Braughing 1975-1979. *Hertfordshire Archaeology*, 7, pp.28–132.

Partridge, C., 1981. *Skeleton Green: A Late Iron Age and Romano-British site*, London: Society for the Promotion of Roman Studies, Britannia Monograph 2.

Partridge, C., 1989. *Foxholes Farm: A Multi-Period Gravel Site*, Hertford: Hertfordshire Archaeological Trust.

PCRG, 2010. *The Study of Prehistoric Pottery: General policies and guidelines for analysis and publication* (3rd Ed.)., Prehistoric Ceramics Research Group Occasional Paper Nos.1 & 2.

PCRG, 2016. *Prehistoric Ceramics Research Group Research Framework: Agenda and Strategy*, Prehistoric Ceramics Research Group Occasional Paper No.7.

Peacock, D.P.S., 1968. A petrological study of certain Iron Age pottery from western England. *Proceedings of the Prehistoric Society*, 34, pp.414–27.

Peacock, D.P.S., 1969. A contribution to the study of Glastonbury ware from south-western Britain. *Antiquaries Journal*, 49, pp.41–61.

Peacock, D.P.S., 1982. *Pottery in the Roman World: An Ethnoarchaeological Approach*, London: Longman.

Peacock, D.P.S. & Cutler, L., 2011. The earliest rotary querns in southern England. In *Bread for the People: The Archaeology of Mills and Milling*. BAR International Series 2274, pp. 77–80.

Percival, S., 2016. Pottery. In *An Iron Age Settlement at Land North of Hare Street Road, Buntingford, Hertfordshire*. Bar Hill: Oxford Archaeology East Report No.1870, pp121-169.

Pfaffenberger, B., 1988. Fetishised objects and humanised nature: toward an anthropology of technology. *Man*, 23, pp.236–252.

Pfaffenberger, B., 1999. Worlds in the making: technological activities and the construction of intersubjective meaning. In M.A. Dobres & C. R. Hoffman, eds. *The Social Dynamics of Technology: Practice, Politics and World Views*. London: Smithsonian Institution Press, pp. 147–164.

Pierret, A. & Moran, C.J., 1996. Quantification of orientation of pore patterns in X-ray images of deformed clay. *Microscopy Microanalysis Microstructures*, 7, pp.421–31.

Pierret, A., Moran, C.J. & Bresson, L.-M., 1996. Calibration and visualization of wall-thickness and porosity distributions of ceramics using X-radiography and image processing. *Journal of Archaeological Science*, 23(3), pp.419–48.

Pitts, M., 2008. Globalizing the local in Roman Britain: An anthropological approach to social change. *Journal of Anthropological Archaeology*, 27(4), pp.493–506.

Platt, D., 2013. A Middle Iron Age iron production site at Manor Farm, Lower Sandhurst Road, Finchampstead, Berkshire. In S. J. Preston, ed. *Iron Age Iron Production Sites in Berkshire*. Reading: Thames Valley Archaeological Services Monograph 16, pp. 101–112.

Pope, R., 2003. A functional ceramics analysis and its application in later Iron Age Dorset. In J. Humphrey, ed. *Re-searching the Iron Age: Proceedings of the Iron Age Research Student Seminar 1999-2000*. Oxford: Oxbow, pp. 1–9.

Pope, R. & Ralston, I., 2012. Approaching Sex and Status in Iron Age Britain with Reference to the Nearer Continent. In T. Moore & X.-L. Armada, eds. *Atlantic Europe in the First Millennium BC. Crossing the Divide*. Oxford: Oxford University Press, pp. 375–414.

Potter, J.F., 1977. Eocene, lower Bracklesham Beds, iron workings in Surrey. *Proceedings of the Geologists' Association*, 88, pp.229–241.

Pryor, F., 1984. *Excavation at Fengate, Peterborough, England: The Fourth Report*, Northampton & Toronto, ON: Northamptonshire Archaeological Society Monograph 2/Royal Ontario Museum Archaeology Monograph 7.

Pugsley, P., 2003. *Roman Domestic Wood. Analysis of the morphology, manufacture and use of selectec categories of domestic wooden artefacts with particular reference to the material from Roman Britain*, Oxford: BAR International Series 1118.

Quinn, P., 2013. *Ceramic Petrography: The interpretation of archaeological pottery and related artefacts in thin section*, Oxford: Archaeopress.

Ralph, S., 2007. *Feasting and social complexity in later Iron Age East Anglia*, Oxford: BAR British Series 451.

Reckwitz, A., 2002. The Status of the "Material" in Theories of Culture: From "Social Structure" to "Artefacts." *Journal for the Theory of Social Behaviour*, 32(2), pp.195–217.

Rees, H., 1995. Iron Age/Early Roman pottery. In P. J. Fasham & G. Keevil, eds. *Brighton Hill South (Hatch Warren): an Iron Age farmstead and Deserted Medieval Village in Hampshire*. Salisbury: Wessex Archaeology Report No.7, pp. 35–45.

Reina, R.E., 1966. *The Law of the Saints: A Pokomam pueblo and its community culture*, New York: Bobbs-Merrill.

Renfrew, C. & Scarre, C., 1998. *Cognition and Material Culture: The Archaeology of Symbolic Storage*, Cambridge: McDonald Institute for Archaeological Research.

Rice, P.M., 1987. *Pottery analysis: a sourcebook*, Chicago: University of Chicago Press.

Richardson, J.E., 1978. "Iron Age Pottery" in M. Oliver & B. Applin "Excavation of an Iron Age and Romano-British settlement at Ructstall"s Hill, Basingstoke, Hampshire, 1972-5'. *Proceedings of the Hampshire Field Club & Archaeological Society*, 35, pp.59–66.

Rigby, V. & Freestone, I.C., 1986. The petrology and typology of the earliest identified Central Gaulish imports. *Journal of Roman Pottery Studies*, 1, pp.6–21.

Rigby, V. & Freestone, I.C., 1997. Ceramic changes in late Iron Age Britain. In I. C. Freestone & D. R. M. Gaimster, eds. *Pottery in the Making: world ceramic traditions*. London: British Museum Press, pp. 56–61.

Rigby, V., Middleton, A.P. & Freestone, I.C., 1989. The Prunay workshop: technical examination of La Tene bichrome painted pottery from Champagne. *World Archaeology*, 21, pp.1–16.

Robb, J., 2015. What do things want? Object design as a middle-range theory of material culture. *Archeological Papers of the American Anthropological Association*, 26, pp.166–180.

Rodwell, W., 1976. Coinage, Oppida, and the rise of Belgic Power in South-Eastern Britain. In B. Cunliffe & T. Rowley, eds. *Oppida: the Beginnings of Urbanisation in Barbarian Europe*. Oxford: BAR International Series 11, pp. 181–366.

Rook, A.G., 1970a. A Belgic and Roman site at Brickwall Hill. *Hertfordshire Archaeology*, 2, pp.23–30.

Rook, A.G., 1970b. Investigation of a Belgic site at Grubs Barn, Welwyn Garden City. *Hertfordshire Archaeology*, 2, pp.31–6.

Roux, V., 2003. A Dynamic Systems Framework for Studying Technological Change: Application to the Emergence of the Potter's Wheel in the Southern Levant. *Journal of Archaeological Method and Theory*, 10(1), pp.1–30.

Roux, V., 2010. Technological innovations and developmental trajectories: Social factors as evolutionary forces. In M. J. O'Brien & S. J. Shennan, eds. *Innovations in Cultural Systems: Contributions from Evolutionary Anthropology*. Cambridge, MA: MIT Press, pp. 217–234.

Roux, V. & Corbetta, D., 1989. *The potter's wheel. Craft specialisation and technical competence*, New Delhi/Bombay/Calcutta: Oxford and IBH Publishing.

Roux, V. & Courty, M.A., 1998. Identification of wheel-fashioning methods: technological analysis of 4th-3rd millennium BC oriental ceramics. *Journal of Archaeological Science*, 25(8), pp.747–763.

Rye, O.S., 1976. Keeping your temper under control: materials and the manufacture of Papuan pottery. *Archaeology and Physical Anthropology of Oceania*, 11, pp.106–137.

Rye, O.S., 1977. Pottery manufacturing techniques: X-ray studies. *Archaeometry*, 19(2), pp.205–11.

Rye, O.S., 1981. *Pottery Technology: Principles and Reconstruction*, Washington: Taraxacum.

Schiffer, M.B. et al., 2001. Behavioural Archaeology and the Study of Technology. *American Antiquity*, 66(4), pp.729–737.

Schiffer, M.B., 2004. Studying technological change: A behavioural perspective. *World Archaeology*, 36(4), pp.579–585.

Schiffer, M.B. & Skibo, J.M., 1987. Theory and experiment in the study of technological change. *Current Anthropology*, 28, pp.595–622.

Schiffer, M.B. & Skibo, J.M., 1997. The explanation of artefact variability. *American Antiquity*, 62, pp.27–50.

Sharples, N., 2010. *Social Relations in Later Prehistory. Wessex in the First Millennium BC*, Oxford: Oxford University Press.

Sharples, N.M., 2007. Building communities and creating identities in the first millennium

BC. In C. Haselgrove & R. Pope, eds. *The Earlier Iron Age in Britain and the near Continent*. Oxford: Oxbow, pp. 174–184.

Sharples, N.M., 2014. Are the developed hillforts of southern England urban? In M. Fernandez-Gotz, H. Wendling, & K. Winger, eds. *Paths to Complexity. Centralisation and Urbanisation in Iron Age Europe*. Oxford: Oxbow, pp. 224–232.

Shepard, A.O., 1956. *Ceramics for the archaeologist*, Washington, D.C.: Carnegie Institution of Washington.

Sillar, B. & Tite, M.S., 2000. The challenge of “technological choices” for materials science approaches in archaeology. *Archaeometry*, 42(1), pp.2–20.

Skibo, J.M., 1992. *Pottery Function: A Use-Alteration Perspective*, New York: Plenum.

Skibo, J.M., 2012. *Understanding Pottery Function*, New York: Springer.

Smith, K., 1977. The Excavation of Winklebury Camp, Basingstoke, Hampshire. *Proceedings of the Prehistoric Society*, 43, pp.31–129.

Stead, I. & Rigby, V., 1986. *Baldock: the excavation of a Roman and pre-Roman settlement, 1968-72*, London: Society for the Promotion of Roman Studies, Britannia Monograph 7.

Stead, I.M., 1967. A La Tene III burial at Welwyn Garden City. *Archaeologia*, 101, pp.1–62.

Stead, I.M., 1976. The earliest burials of the Aylesford culture. In G. Sieveking, I. Longworth, & K. Wilson, eds. *Problems in Economic and Social Archaeology*. London: Duckworth, pp. 401–416.

Stead, I.M. & Rigby, V., 1989. *Verulamium: The King Harry Lane site*, London: English Heritage Archaeological Report 12.

Stevenson, R.B.K., 1953. Prehistoric pot-building in Europe. *Man*, 53, pp.65–68.

Stopford, J., 1987. Danebury: An alternative view. *Scottish Archaeological Review*, 4, pp.70–75.

Swan, V.G., 1984. *The Pottery Kilns of Roman Britain*, London: Her Majesty’s Stationery Office.

Swift, E., 2017. *Roman Artefacts and Society: Design, Behaviour, and Experience*, Oxford: Oxford University Press.

Thér, R., 2004. Experimental Pottery Firing in Closed Firing Devices from the Neolithic - Halstatt Period in Central Europe. *EuroREA: (Re)construction and Experiment in*

Archaeology - European Platform, 1, pp.35–84.

Thompson, I., 1979. Wheathampstead Reconsidered. *Bulletin of the Institute of Archaeology of the University of London*, 16, pp.159–85.

Thompson, I., 1982. *Grog-tempered "Belgic" Pottery of South-eastern England*, Oxford: BAR British Series 108.

Thompson, I., 2015a. When was the Roman conquest in Hertfordshire? In K. Lockyear, ed. *Archaeology in Hertfordshire: Recent Research*. Hatfield: University of Hertfordshire Press, pp. 117–134.

Thompson, I., 2015b. Late Iron Age Pottery - An Overview. In C. Evans, G. Appleby, & S. Lucy, eds. *Lives in Land - Mucking Excavations by Margaret and Tom Jones*. Oxford: Oxbow, pp. 394–401.

Thompson, J.T. & Manning, W.H., 1974. "The Pottery from Enclosures I and II" in W.H. Manning "Excavations on Late Iron Age, Roman and Saxon sites at Ufton Nervet, Berkshire, in 1961-1963." *Berkshire Archaeological Journal*, 67, pp.24–39.

Thurston, T., 2009. Unity and Diversity in the European Iron Age: Out of the Mists, Some Clarity? *Journal of Archaeological Research*, 17(4), pp.347–423.

Timby, J., 2000. The Pottery. In M. G. Fulford & J. Timby, eds. *Late Iron Age and Roman Silchester: Excavations on the site of the forum-basilica 1977, 1980-86*. London: Society for the Promotion of Roman Studies, Britannia Monograph 15, pp. 180–312.

Timby, J., 2003. Pottery. in L. Howell & T. Durden, Late Iron Age and Early Roman field systems and other features at Bath Road, Slough'. In S. J. Preston, ed. *Prehistoric, Roman and saxon sites in eastern Berkshire: Excavations 1989-1997*. Reading: Thames Valley Archaeological Services Monograph 2, pp. 112–116.

Timby, J., 2010a. Pottery. in D. Milbank, Roman landscape features at Mereoak Lane, Three Mile Cross. In S. Preston, ed. *Archaeological Investigations to the south of Reading, 2002-2008*. Reading: Thames Valley Archaeological Services Monograph 13, pp. 12–16.

Timby, J., 2010b. Pottery. in D. Milbank, Late Iron Age/early Roman and late Roman occupation at 68-72 Northcourt Avenue, Reading. In S. Preston, ed. *Archaeological Investigations to the south of Reading, 2002-2008*. Reading: Thames Valley Archaeological Services Monograph 13, pp. 30–4.

Timby, J., 2011. Pottery. in H. Moore, A Late Iron Age to Early Roman enclosure at Little

London Road, near Silchester, Hampshire, 2003. In S. Preston, ed. *Archaeological Investigations in the Silchester hinterland*. Reading: Thames Valley Archaeological Services Monograph 9, pp. 102–4.

Timby, J., 2012. The language of pots: an overview of pottery supply to Silchester and its hinterland. In M. Fulford, ed. *Silchester and the study of Romano-British urbanism*. Portsmouth, RI: Journal of Roman Archaeology Supplementary Series 90, pp. 127–150.

Timby, J., 2013a. “Excavation Pottery” in S. Ford, J. Pine and A. Weale “Middle Iron Age occupation and iron production and a late Saxon hearth at Grazeley Road, Three Mile Cross, Reading, Berkshire.” In S. J. Preston, ed. *Iron Age Iron Production Sites in Berkshire*. Reading: Thames Valley Archaeological Services Monograph 16, pp. 48–53.

Timby, J., 2013b. A French connection? A brief review of early Roman pottery production in southern Britain. In H. Eckardt & S. Rippon, eds. *Living and working in the Roman world: Essays in honour of Michael Fulford on his 65th birthday*. Portsmouth, RI: Journal of Roman Archaeology Supplementary Series 95, pp. 155–168.

Timby, J., forthcoming. Pottery. In M. G. Fulford et al., eds. *Late Iron Age Calleva. The Pre-Conquest Occupation at Silchester Insula IX*. London: Society for the Promotion of Roman Studies.

Tomber, R., & Dore, J., 1998. *The National Roman Fabric Reference Collection: A Handbook*. London: MoLAS Monograph 2.

Torrence, R. & van der Leeuw, S.E., 1989. Introduction: what’s new about innovation? In S. E. van der Leeuw & R. Torrence, eds. *What’s New? A closer look at the process of innovation*. London: Unwin Hyman, pp. 1–15.

Trow, S., James, S. & Moore, T., 2009. *Becoming Roman, Being Gallic, Staying British. Research and excavations at Ditches “hillfort” and villa 1984-2006*, Oxford: Oxbow.

Trow, S.D., 1990. By the northern shores of Ocean: some observations on acculturation process at the edge of the Roman world. In T. Blagg & M. Millett, eds. *The Early Roman Empire in the West*. Oxford: Oxbow, pp. 103–18.

Tuffreau-Libre, M., 1996. Ceramiques gallo-romaines precoces du Nord de la France: circuits commerciaux et problemes chronologiques. *Revue archeologique de Picardie*, 3–4, pp.71–77.

Tyers, P.A., 1980. Correspondances entre la ceramique commune La Tene III du sud-est de l'Angleterre et du nord de la France. *Septentrion*, 10, pp.61–70.

Tyers, P.A., 1981. *Aspects of the development of Late La Tene and Early Roman pottery industries of Gaul and Britain*. Unpublished PhD Thesis, University College Cardiff.

Van Oyen, A., 2016a. *How Things Make History: The Roman Empire and its Terra Sigillata Pottery*, Amsterdam: Amsterdam University Press.

Van Oyen, A., 2016b. Historicising Material Agency: from Relations to Relational Constellations. *Journal of Archaeological Method and Theory*, 23(1), pp.354–378.

Velde, B. & Druc, I.C., 1999. *Archaeological Ceramic Materials: origin and utilization*, London: Springer.

Waller, J., 1990. *The Complete Potter: Hand-built Ceramics*, London: Batsford.

Webley, L., 2015. Rethinking Iron Age connections across the Channel and North Sea. In H. Anderson-Whymark, D. Garrow, & F. Sturt, eds. *Continental Connections: Exploring cross-channel relationships from the Mesolithic to the Iron Age*. Oxford: Oxbow, pp. 122–144.

Wells, J., 2009. VI. Pottery. In M. Phillips, H. Duncan, & C. Mallows, eds. *Four millennia of human activity along the A505 Baldock Bypass, Hertfordshire*. Bedford: Albion Archaeology, pp. 48–51.

Wendrich, W., 2012. *Archaeology and Apprenticeship: Body Knowledge, Identity, and Communities of Practice*, Tucson, AZ: University of Arizona Press.

Wenger, E., 1998. *Communities of Practice: Learning, meaning, and identity*, Cambridge: Cambridge University Press.

West, S., 1989. *West Stow, Suffolk: The Prehistoric and Romano-British Occupations*, Bury St Edmonds: East Anglian Archaeology Report No.48.

Wheeler, D. & Pankhurst, N., 2017. Excavation of an Iron Age settlement and burial at Windabout Copse. In M. G. Fulford, C. Barnett, & A. Clarke, eds. *Silchester & its Environs. Excavation and Survey 2016*. Reading: Department of Archaeology, University of Reading, pp. 14–19.

Wheeler, R.E.M. & Wheeler, T.V., 1936. *Verulamium: A Belgic and two Roman cities*, London: Society of Antiquaries of London.

Whitbread, I.K., 1986. The characterisation of argillaceous inclusions in ceramic thin sections. *Archaeometry*, 28, pp.79–88.

Williams, D.F., 1984. A fabric analysis of some Iron Age pottery from Fengate. In F. Pryor, ed. *Excavation at Fengate, Peterborough, England: The Fourth Report*. Northampton & Toronto, ON: Northamptonshire Archaeological Society Monograph 2/Royal Ontario Museum Archaeology Monograph 7, p. 134.

Williams, D.F., 2003. Petrology. In C. Evans, ed. *Power and island communities: Excavations at the Wardy Hill ringwork, Coveney, Ely*. Cambridge: East Anglian Archaeology Reports no. 103, pp. 169–170.

Williams, D.F., 2006. Ceramic petrology. In C. Evans & I. Hodder, eds. *Marshland Communities and Cultural Landscapes: The Haddenham Project Volume 2*. Cambridge: Macdonald Institute for Archaeological Research, pp. 175–177.

Williams, D.F., 2016. A note on the petrology of a range of Late Iron Age and early Roman pottery from Elms Farm, Heybridge, Essex. In *Elms Farm Portfolio Project [data-set]*. York: Archaeology Data Service [distributor] for Essex County Council.

Woods, A., 1983. Smoke gets in your eyes: Patterns, variables and temperature measurement in open firings. *Bulletin of the Experimental Firing Group*, 1, pp.11–25.

Woods, A., 1984. The Old Pot-Boiler. *Bulletin of the Experimental Firing Group*, 2, pp.25–40.

Woods, A., 1989. Fired with enthusiasm: Experimental open firings at Leicester University. In A. Gibson, ed. *Midlands Prehistory: Some recent and current researches into the prehistory of central England*. Oxford: BAR British Series 204, pp. 196–226.

Woods, P.J., 1974. Types of Late Belgic and Early Romano-British Pottery Kilns in the Nene Valley. *Britannia*, 5, pp.262–281.

Woods, P.J. & Hastings, B.C., 1984. *Rushden: The Early Fine Wares*, Northampton: Northamptonshire County Council.

Woodward, A., 1995. Vessel size and social identity in the Bronze Age of southern Britain. In I. Kinnes & G. Varndell, eds. *Unbaked Urns of Rudely Shape*. Oxford: Oxbow, pp. 195–202.

Woodward, A., 1997. Size and style: an alternative study of some Iron Age pottery in southern England. In A. Gwilt & C. Haselgrove, eds. *Reconstructing Iron Age Societies*. Oxford: Oxbow, pp. 26–35.

Woodward, A. & Blinkhorn, P., 1997. Size is important: Iron Age vessel capacities in central and southern England. In C. Cumberpatch & P. Blinkhorn, eds. *Not So Much A Pot, More A Way of Life: Current Approaches to Artefact Analysis in Archaeology*. Oxford: Oxbow, pp. 153–162.

Wright, J., Powell, A.B. & Barclay, A., 2009. *Excavation of prehistoric and Romano-British sites at Marnel Park and Merton Rise (Popley), Basingstoke, 2004-8*, Salisbury: Wessex Archaeology.