

Porcelain waste and porcelain production in Worcester: the landscape evidence from fieldwalking

Helen L. Loney & Andrew Hoan

To cite this article: Helen L. Loney & Andrew Hoan (2023) Porcelain waste and porcelain production in Worcester: the landscape evidence from fieldwalking, *Post-Medieval Archaeology*, 57:2, 268-290, DOI: [10.1080/00794236.2023.2252136](https://doi.org/10.1080/00794236.2023.2252136)

To link to this article: <https://doi.org/10.1080/00794236.2023.2252136>



© 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 04 Oct 2023.



Submit your article to this journal [↗](#)



Article views: 301



View related articles [↗](#)



View Crossmark data [↗](#)

Porcelain waste and porcelain production in Worcester: the landscape evidence from fieldwalking

By HELEN L. LONEY and ANDREW HOAEN

SUMMARY: Field survey can provide a longitudinal sample of ceramic production from the porcelain factories which operated in the city of Worcester from 1751 to 2009. Until the twentieth century domestic and industrial waste from the city was used as manure/hard core on fields throughout the county. We have found kiln waste and biscuit wasters from the earliest phases of production to wares made in the late 19th/twentieth century, along with contemporaneous domestic discard. This assemblage provides a series of snapshots of porcelain and semi-porcelain production allowing us to identify trends in types of fabrics, forms, manufacturing and consumption.

INTRODUCTION

This paper discusses the archaeology of industrial porcelain production in Worcester from 1751 to approximately the end of the nineteenth century. Traditionally, industrial archaeology was focused on monumentality, e.g., the conservation and recording of factories.¹ To this has been added the study of production and consumption, in glass, pottery, and metal.² Johnson has characterized the archaeology of the period between 1750 and the present as the archaeology of capitalism, a perspective that Belford has also advanced for the West Midlands *via* the West Midlands Research Strategy.³ Belford highlights one of the biggest challenges of this era as the complexity and interconnectivity of factories, their outputs and the landscape, as the scale of production increases throughout the 19th and 20th centuries.⁴

In this paper we want to address the scale of industrially produced ceramics and its mundanity. This material had social relevance and meaning. Robb cites Gell's 'technology of enchantment' as a way of understanding how everyday technologies and their design are seen by people to have both

social and economic relevance.⁵ Often in the study of porcelain it is the pieces of most importance to art that are studied. Pieces designed for elite consumption and produced by the elite artists at the factory. Robb suggests that there is also meaning to be found in the 'invisible' everyday items created by these factory systems which ultimately were discarded in huge numbers in the landscape of Worcestershire. This perspective gives scope for the study of the archaeology of both factory and domestic waste disposal, allowing for the sheer quantities involved to have meaning in and of themselves.

The archaeology of porcelain and refined earthenware production has focussed on the factory site,⁶ with *in situ* analysis of wasters, e.g. Owen for Worcester Tonquin,⁷ Edwards for Nantgwy,⁸ or more commonly, through chemical analysis of items from museum or private collections thought to derive from specific factories.⁹ As Palmer, Nevell & Sissons state, industrial archaeology must also take a landscape approach to understand the impact of factory life on the surrounding environs.¹⁰

The project formed part of the University of Worcester's former undergraduate degree in

Archaeology and Heritage, Introduction to Fieldwork module. The pedagogical aims were to train students in field walking and finds processing techniques. We used a total pickup strategy, which recovered everything from Middle Palaeolithic flint to modern plastic.¹¹ In addition to the pedagogical aims we were aiming to understand the landscape history and archaeology of the environs of St. Johns a suburb of Worcester. This paper is concerned with our findings relating to the record of porcelain and refined earthenware production. Worcester from the 18th to the twentieth century was home to a number of ceramic factories.¹² The impact of these expanding enterprises includes more than the footprint of the individual manufactories, it includes transportation networks, the economic impact of the employees, and extensive transportation of factory and domestic waste to the rural hinterlands.

Specifically, we wanted to use material collected through field survey to contribute to the historical and technological narrative of porcelain, bone china and semi-porcelain production in Worcester; to assess the proportion of porcelain and bone china consumption in the local market; to identify periods of deposition of both domestic and industrial waste in the landscape.

Fieldwalking has several advantages for this type of study. Firstly, excavation of the sites of production is rarely possible so new information is only available as and when development takes place. Secondly, it is important to understand what the extent and composition of these artefactual assemblages is. Finally, fieldwalking is relatively cheap and can be learned relatively quickly and is an ideal technique to use with students, volunteers, and community groups. As none of the factory and domestic discard material was *in situ* we used a simplified fieldwalking technique that we had previously used in Mediterranean field surveys where large amounts of ceramic material is often found.¹³ By using these methods we were able in two mornings work to recover a sample of domestic and industrial discard from the city of Worcester covering the main periods of ceramic production.

The use of plough zone fieldwalking and collection has a well-established pedigree in archaeological methodology. Artifact collection from ploughed fields has previously been disregarded as lacking stratigraphic context and therefore useless in providing meaningful knowledge apart from site reconnaissance. From the 1970s onwards prehistoric archaeologists have studied and analysed plough zone artifact assemblages, producing reports which emphasize larger scale artifact distributions and interpretations.¹⁴ Historical archaeology has some different challenges in accessing plough zone data. Firstly, as Brooks et al. state¹⁵ for the case of Australia, there may not that many historical sites which have been subjected to ploughing, and so the technique has

tended to be under-utilized. Secondly, there is a perception that historical archaeology is more complicated, sites more detailed, and hence anything other than clear stratigraphic relationships are too coarse grained for study.¹⁶

Within the United Kingdom, there is even less use of plough zone data in Historical Archaeology, despite the long pedigree in prehistoric research. There are a few field survey projects published with 18th-twentieth century materials recorded or analysed, such as the Tamar Valley, Cornwall field training event,¹⁷ and the Bingham Heritage Trails Association community project.¹⁸ In these cases, only limited analysis of the ceramic assemblage could be completed, due to the large quantities of materials recovered as well as a lack in expertise with refined earthenwares and porcelains. Historical Archaeology has traditionally focussed on *in situ* strata, whether domestic¹⁹ or factory²⁰. However, until the late 19th and early twentieth century, waste dumping on agricultural land for both domestic and industrial purposes, comprised a significant cultural activity and should therefore be considered archaeologically relevant.

Rathje's long running Garbology project in Arizona demonstrated the cultural value of secondary deposition, albeit in a landfill context.²¹ Outside of landfill, the dumping of midden and factory waste for agricultural purposes means the archaeology will have undergone ploughing deformation. With that caveat, we can confidently analyze the data provided and answer a number of relevant questions. First, what was being deposited in the field and when was it deposited. Second, what is the make-up of the factory waste material being deposited, and what can it tell us about the industrial activities of the porcelain factories at that time. Third and related, what is the make-up of the domestic midden was being dumped, and what can it tell us about the consumption patterns of the residents of the city of Worcester and the St John's environs.

Fieldwalking has a vital role to play in contributing to the historical archaeological narrative of Worcester, both industrial and domestic. At the time of press, there are few published excavations relating to porcelain production in Worcester, though one is forthcoming, and so the data presented here represents a significant contribution in our knowledge of both manufacturing techniques and waste disposal habits. Fieldwalking is also a relatively cheap and accessible form of archaeological activity, can be learned relatively quickly and is an ideal technique to use with students, volunteers, and community groups, as demonstrated by the Tamar Valley project, amongst others. We used the techniques of collection pioneered in Mediterranean field surveys where large amounts of ceramic material are often found.²² By using these methods we were able in two mornings work to recover a sample of domestic and industrial

discard from the city of Worcester covering the main periods of ceramic production.

CONTEXT AND PREVIOUS WORK

Fieldwalking was carried out at Oldbury Farm (SO827 554) in 2016 (Fig. 1).²³ CgMs had produced two desk-based assessments and a magnetometry survey of the area fieldwalked.²⁴ The results of the desk-based survey showed that there are no known settlements within the area walked. The nearest habitations are Ambrose Mill/Farm to the east, and Oldbury Farm to the west, dating from at least the eighteenth century. The wider area began to be infilled in the middle of the nineteenth century, and remained dominated by orchards and farms well into the 1960s.

The site at Oldbury Farm consists of long standing arable which had been allowed to go fallow for a season before fieldwalking. Historic and Ordnance

Survey maps indicate that this area has been under cultivation since the eighteenth century and was part of the Temple Laugherne estate.²⁵ Fieldwalking was conducted by two supervised teams of students. Collection was based on the British School of Rome's survey technique, with students organized into transects. All cultural material was collected regardless of age, with the transect context retained throughout the analysis. Finds collected spanned from the Middle Palaeolithic through Roman, Medieval and Post-Medieval periods.²⁶

The post-medieval and modern material recovered from Oldbury Farm could come from a number of activities, though the likeliest is through manuring activities from the newly established Ambrose Mill/Farm. This supposition is supported by the large quantity of buff slipwares and redwares which date locally from the late 16th through to the 19th centuries, and the lack of high-status materials such as tin-enamelled earthenware (Delft). The appearance of 18th and nineteenth century porcelains and refined

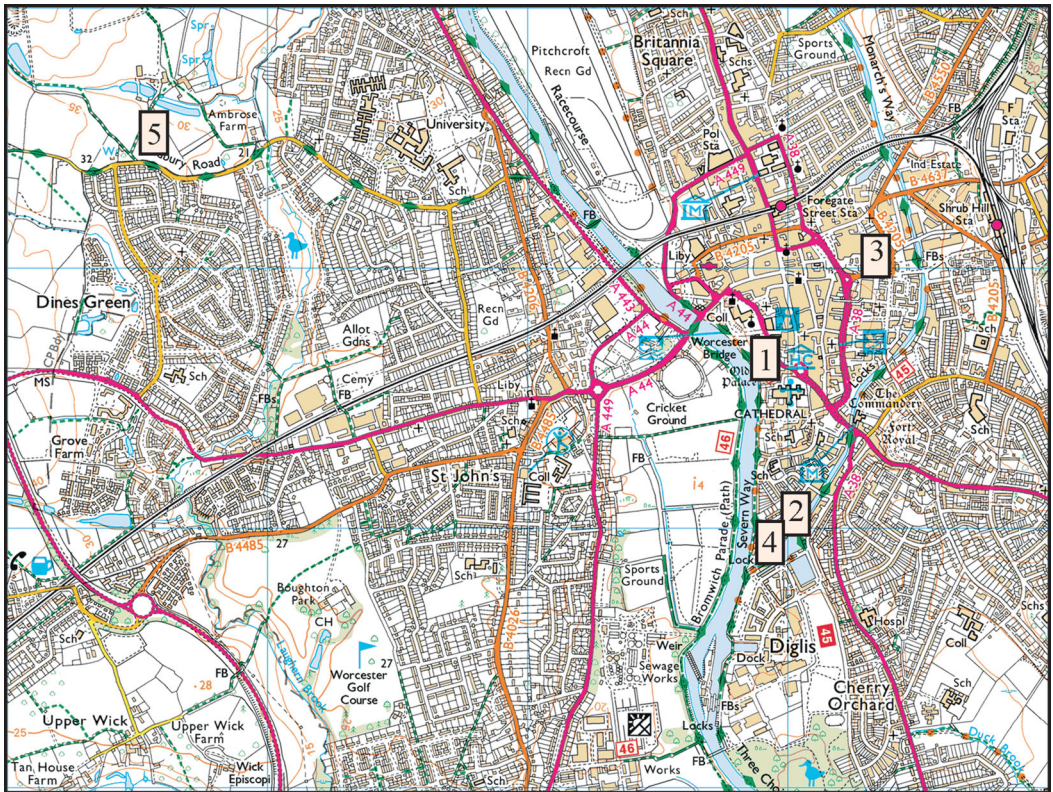


FIG. 1

Location map showing oldbury farm and worcester porcelain factories, worcester, including holywell.¹³⁷

earthenwares in the form of both domestic discard and factory waste coincides with the expansion of the St John's suburbs, as well as of factory production in the city itself. In 1764 a manure depot was established at Pitchcroft to receive the city 'miskins' or local middens, before redistribution on local fields.²⁷ Irregular dumping of city waste occurred in the environs surrounding Worcester until the establishment of the first official landfill site in 1930.²⁸

HISTORY OF PORCELAIN AND THE WORCESTER PORCELAIN INDUSTRIES

The history of the invention and development of porcelain dates from the Tang dynasty in China in the tenth century where the combination of kaolin clay, feldspathic rock and high fire kilns produced a glassy, translucent, almost vitreous fabric.²⁹ In the thirteenth century during the Yuan dynasty, the Chinese potters developed what became known as 'eggshell' porcelain, introducing blue underglazes as decoration.³⁰ Between the 16th and early 18th centuries, Italian, French and German potters began to develop successful versions of porcelain, aided by the availability of kaolin-type clays as well as royal patronage.³¹

British experiments in porcelain production were hampered by two key factors: the lack of appropriate clays³² and the absence of royal or parliamentary patronage.³³ The solution was the combination of access to Cornish white clays and the results of close to half a century of experimentation in key factories such as Limehouse in London,³⁴ Derby,³⁵ and Lund's in Bristol,³⁶ funded by early investors including the East India Company.³⁷ However, with the lack of access to appropriate 'true hard-paste' porcelain clays, the end products were essentially synthetic porcelain substitutes.³⁸

The 18th and 19th centuries are periods of industrial expansion and globalization of trade in the West Midlands. The city of Worcester expanded into light and heavy industry from the eighteenth century onwards. There were three main ceramic factories within the city limits which produced and traded in porcelain and refined earthenwares between the 18th and 20th centuries (Fig. 1). Dr John Walls opened the Worcester Tonquin (later Royal Worcester Porcelain) at Warmstry House in 1751, after a period of experimentation on a site on Broad Street.³⁹ The first kilns were sited along the river at the end of Copenhagen Street.⁴⁰ By the end of the eighteenth century a second porcelain factory had opened, Chamberlain's on Severn Street, and by the beginning of the nineteenth century, a third, Grainger and Wood joined them, producing semi-porcelain as well as porcelain at a site at Lowesmoor.⁴¹ In addition to these factories, there is evidence of early porcelain experimentation and a kiln site at Holywell House, St

John's sometime in the mid eighteenth century (Fig. 1).⁴²

THE ARCHAEOLOGY OF WORCESTER PORCELAIN PRODUCTION

Sandon and Barker conducted a rescue excavation of an eighteenth century Worcester Tonquin kiln in 1968.⁴³ Large quantities of the earliest soft-paste porcelain production were recovered including wasters of the prototype sauce boat which was Worcester Tonquin's earliest commercial success.⁴⁴ This material, much of which is still in storage in the Worcester Museums archives, has not been fully published, with the bulk of material unavailable for access.⁴⁵ A number of chemical analyses have been produced on a handful of waster, confirming the close relationship between the Bristol factory soft-paste recipe and Worcester Tonquin.⁴⁶

Subsequently, two developer-led projects of porcelain factory remains have taken place, a Grainger's kiln site in Lowesmoor, and at the Chamberlain/Royal Worcester Porcelain factory at Severn Street. The Severn Street factory has produced a comprehensive historic building record, as well as revealing a quantity of modern material in fills and during watching briefs across the site.⁴⁷ The industrial period materials were only analysed if found in sealed deposits or contexts.⁴⁸ Unfortunately, this has inadvertently resulted in a lack of reporting of modern pottery in the finds reports. For example, in a report on a watching brief held for service trenches and ground reduction at the Severn Street factory, the pottery report excluded refined earthenwares,⁴⁹ though within the body of the report a number of such sherds are mentioned.⁵⁰ The as yet unpublished excavation in advance of development of a Grainger's Kiln in Lowesmoor, revealed the floor and subsurface structures of a kiln and other factory elements, along with a substantial quantity of materials.⁵¹ There are a number of grey literature reports of excavations of pits and quarry pits in the city in which large quantities of factory waste material are noted, but it is not clear from the report summaries if the ceramic assemblages were kept or analysed.

Elsewhere in the UK there are a number of publications which have dealt exclusively with 18th and nineteenth century porcelain materials from domestic excavations such as Pearce⁵² and Pearce et al.⁵³ for London. These suggest that Worcester was a major exporter of porcelain in these early periods. There are also an increasing number of reports on excavations and finds analysis of other porcelain factories, for instance the Limehouse porcelain manufactory, London,⁵⁴ and Musselburgh Pottery, Scotland.⁵⁵

In summary, despite the potential for the archaeological investigation of the three factories which

ultimately made up the entity of Royal Worcester Porcelain, there has been only limited archaeological analysis to date, with no large-scale exploratory excavations yet published. Scientific analysis has been restricted to small scale studies of a few sherds, and the largest potential collection of excavated sherds from the Warmstry House kiln has never been fully analyzed or published.⁵⁶ The scale of the volume of material created through excavation has led to problems in which significant assemblages from the city languish in the stores for many decades unanalysed. Subsequent chemical analysis of both archaeological and museum materials demonstrates a complex history of porcelain innovation and competition in the city. The advantage of fieldwalking to locate the products of the factories is that the resource is readily available in the fields for collection.

RESULTS

The aim of this paper is to provide a chronological record of factory deposition on the site of Oldbury farm, as part of understanding the technological changes in manufacturing which occurred amongst the Worcester porcelain factories in the 18th and nineteenth century. We will use factory waste as a proxy for the change and continuity taking place in Worcester, as the companies compete and merge over time. The finds also include evidence of domestic consumption and discard of both porcelain and refined earthenwares (e.g. creamware, pearlware and whiteware or 'CC' ware). The results presented here are those attributes which reveal these processes, including: (1) change from one fabric ware to another, (2) fabric variability within fabrics, (3) variations in sherd dimension, particularly wall thickness and sherd weight and decoration. For the domestic discard material, we only examined the porcelain for its origin and decoration. Aside from whiteware wasters, we will not be reporting in depth on the creamware and pearlware domestic material.

The sample ($n = 547$) consists of porcelains, refined earthenwares and kiln furniture which have a production span of between c. mid eighteenth century to potentially the early twentieth century. The porcelain material is divided by ware types - soft-paste and hard-paste porcelain and bone china, and the refined earthenware is divided into the ware types creamware, pearlware and whiteware (Table 1). Each ware type is further divided into domestic discard and factory waste, with the porcelain categories dominated by factory waste, as will be discussed below.

Determining the presence of porcelain and bone china in large assemblages of modern material is problematic.⁵⁷ We used a three-step process in identification, transmitted light to detect translucency, a scratch test to separate soft-paste from hard-paste and bone china and finally shortwave UV light to

TABLE 1.
Sherd counts by fabric for soft paste, hard paste, bone China, whiteware and kiln furniture.

| | Domestic | Waster | Total |
|----------------------------|----------|--------|-------|
| Soft paste porcelain | 33 | 42 | 75 |
| Hard paste porcelain | 38 | 18 | 57 |
| Bone China | 18 | 43 | 61 |
| Cream ware | 66 | 1 | 67 |
| Pearlware | 129 | 0 | 129 |
| White WARE | 81 | 23 | 104 |
| Kiln furniture porcelain | 0 | 25 | 25 |
| Kiln furniture earthenware | 0 | 26 | 26 |

determine origin of the porcelain (European, British, Asian).⁵⁸ In the absence of sophisticated instruments to analyse the paste we used the transmitted light colour as a proxy for variation in fabric composition.⁵⁹

Wasters were identified by the following criteria: white bodied unglazed biscuit fired sherds, white bodied crazed or burned glazed sherds, warped sherds either biscuit or glazed.⁶⁰ Domestic sherds were identified by sound glazing and clear decoration. These criteria are based on a conservative definition of waster which ignores the presence of factory seconds. This will inevitably result in the over representation of porcelain wasters in the domestic category. However, the results show that porcelain is a low percentage of the domestic assemblage overall, suggesting that the criteria as set is adequate for the analysis.

We used the Worcestershire Ceramic Database codes for our database.⁶¹ Though an excellent resource, it is, however, limited for post-medieval and modern ceramics. There are single codes for creamware (84), 'Worcester Porcelain' (83.1), and 'modern china' (85). There are no separate codes for pearlware or whiteware, or for soft-paste, hard-paste and bone china.

SOFT-PASTE PORCELAIN

Soft-paste porcelain production began in 1751 at Wall and Davis's Worcester Tonquin factory, Warmstry House, and continued in production until 1792, when it is said to have been replaced by a hard-paste fabric.⁶² Soft-paste porcelain is a synthetic porcelain comprising soaprock and ball china clay which when fired at high temperature produces a white bodied, thin walled, translucent vessel.⁶³

First period soft-paste fabrics undergo a number of modifications, some of which are better documented than others.⁶⁴ There have been several attempts to investigate Worcester first period fabrics, usually using samples from museum or private collections.⁶⁵ One of the few chemical analysis of sherds

from an archaeological context is by Owen of wasters from the Warmstry House excavation.⁶⁶ This analysis verified that prior to 1751, Wall and Davis were experimenting with a phosphatic-magnesium paste.⁶⁷ A similar study by Jay of a group of sherds from the same excavation using Raman-spectroscopy and electron microscopy confirmed the identification of an early fabric utilizing flint glass.⁶⁸ This fabric is soon replaced by the Bristol soaprock recipe, undergoing further modifications by 1760,⁶⁹ until the Flight and Barr period at the Warmstry House factory 1792, and soft-paste recipes are replaced by hard-paste (see below).⁷⁰

Decoration of first period porcelain was usually blue hand painted underglaze, particularly pre-1760, followed by a clear over glaze and less commonly, polychrome.⁷¹ Further colours, including yellows and purples in addition to gilts occur more frequently after 1770.⁷²

SOFT-PASTE WASTERS

There were 42 waster sherds, representing 57% of the soft-paste sample. Within the waster sample, there were 36 biscuit fired sherds and six glazed sherds. The main type of transmitted light was a red colour, with 29 sherds and thirteen sherds in other

shades (Table 2). The single waster with a green transmission was a glazed waster and may represent a pre-1760 firing.⁷³ Glazed wasters had either a clear or a creamy glaze, with no transfer or painted decoration.

The waster sample was dominated by bases and body sherds, with a significant minority of teapot rims (Table 3). The reconstructed vessel classes included two bowls, two plate/platters, eight teapots, and fifteen teacups, including fourteen bases with reconstructed EVE diameters of between 50 mm and 100 mm. Two sherds had moulded decoration: a platter with raised features and a fluted sherd from a cup or teabowl.

SOFT-PASTE DOMESTIC DISCARD

The remainder of the sample (*n* = 33) is domestic discard. Of that sample, 20 sherds were undecorated apart from a clear glaze, with the remaining thirteen sherds decorated in a variety of ways. Three sherds had blue and white hand painting, two sherds had blue transfer printing and another two had brown and white and grey and white transfer printing (Fig. 2).

The domestic discard is dominated by a clear transmitted light (*n* = 20), with smaller numbers in the other colours. Three sherds had the characteristic

TABLE 2. Colour transmission of translucent sherds, soft paste, hard paste, bone china and kiln furniture.

| | Soft Paste | | Hard Paste | | Bone China | | Kiln furniture |
|--------|------------|----|------------|----|------------|---|----------------|
| | w | d | w | d | w | d | |
| Clear | 2 | 20 | 3 | 11 | 5 | 8 | 10 |
| Yellow | 5 | 2 | 5 | 12 | 0 | 2 | 0 |
| Orange | 5 | 3 | 2 | 6 | 2 | 1 | 10 |
| Red | 29 | 5 | 5 | 1 | 3 | 0 | 5 |
| Green | 1 | 3 | 3 | 8 | 29 | 9 | 0 |

TABLE 3.

Vessel sherd types comparing wasters (w) and domestic discard (d), soft paste, hard paste, bone china, white-ware (wasters only).

| Sherd type | Soft paste | | Hard paste | | Bone china | | Whiteware |
|---------------|------------|----|------------|----|------------|----|-----------|
| | w | d | w | d | w | d | w |
| Base | 18 | 3 | 5 | 8 | 5 | 1 | 2 |
| Body | 13 | 18 | 5 | 18 | 16 | 14 | 15 |
| Rim | 3 | 8 | 4 | 8 | 10 | 6 | 4 |
| Teapot rim | 8 | 1 | 3 | 1 | 10 | | |
| Handle | | | 1 | 1 | | | 1 |
| Figurine | | | | 1 | | | |
| Spout | | | | 1 | | | |
| Miscellaneous | | | | | | | 1 |
| Total | 42 | 33 | 18 | 38 | 41 | 21 | 23 |



FIG. 2

Soft-paste porcelain. 1. 1622280 waster base; 2. 16222148 waster tea pot rim; 3. 16804 decorated rim; 4. 16988 decorated rim; 5. 928 decorated rim; 6. 16444187 undecorated fluted rim/base.

green transmitted light thought to be associated with the earliest phases of Worcester. Both the wasters and the domestic discard are similar, in that they are dominated by a particular transmitted colour. In the case of the wasters, it is a red transmitted colour, and

in the case of the domestic discard, it is clear. It shows that there were a variety of pastes in production and circulation at this time.

There were proportionately fewer bases ($n = 4$) and teapot rims ($n = 1$) in the domestic sample which

was dominated by body sherds ($n=19$) (Table 3). There were more rims ($n=8$) in the domestic discard possibly representing tea bowls or similar. As with the wasters, the assemblage was dominated by vessels associated with liquid consumption with teapots and teacups/bowls forming the majority with few identifiable fragments of plates or platters.

HARD-PASTE PORCELAIN

Using a scratch test, it was possible to identify a harder paste porcelain material. This was a surprising result as early British hard-paste porcelains are rarely reported from the archaeological and fine art literature.⁷⁴ It was identified as hard-paste using two methods firstly a steel file leaves a grey mark and secondly is distinguished from bone china, European and Asian hard-pastes by UV analysis. It fluoresces a pale pink producing a similar colour to the soft-paste porcelain wasters (Fig. 3).

There are several documented attempts at producing a synthetic hard-paste porcelain prior to 1780 in the UK, including Bristol (1749), Bovey Tracey (1750, 1766) and Plymouth (1768).⁷⁵ Documentation of the transition from soft-paste to hard-paste in Worcester is unclear. The period in which hard-paste fabric recipes began to be widely adapted coincides with the end of the first period at Worcester, and the beginning of new ownership under John Flight and Martin Barr.⁷⁶ However, it also coincides with the foundation of Chamberlain's porcelain works in Worcester, in direct competition with Flight and Barr.⁷⁷ According to Godden, a chemical analysis of an early Chamberlain's cup yielded a recipe very similar to samples from both Bristol and New Hall,⁷⁸ sharing a high firing temperature.

When a similar analysis of firing temperature was carried out on a sherd of Flight and Barr 'hard-paste' from ca 1795, the sherd melted thus highlighting two very different fabrics.⁷⁹ It is worth noting therefore that so called 'hard-paste' porcelain refers to the harder quality of the fabric against scratching and possibly not a higher kiln temperature. This is the first time this fabric has been recognised archaeologically as far as the authors are aware. As such it represents a significant addition to our knowledge of the production at the factory sites in Worcester and elsewhere.

HARD-PASTE WASTERS

The hard-paste waster sample is less than 50% of the total hard-paste collection ($n=17$). Ten of the wasters were biscuit fired and eight were glazed. The decorations for the wasters ranged from embossing, incising, and moulding, through to hand painted concentric lines (Fig. 4). There is a single waster sherd with blue hand painted chinoiserie. The transmitted colour for wasters was highly variable with red

($n=5$) and yellow ($n=5$) the most common, followed by clear ($n=3$), green ($n=3$) and orange ($n=2$) (Table 2). UV fluorescence was a consistent dull pink (Fig. 3). Sherd type was evenly distributed across base ($n=5$), body ($n=5$), rim ($n=4$) and teapot rim ($n=3$) (Table 3). Finally, there is a single thick slab of hard-paste porcelain, very crudely formed and unfinished, which may have served as a test tile for firing.

HARD-PASTE DOMESTIC DISCARD

The collection of 38 pieces of hard-paste domestic discard contains European and Asian, as well as presumably English porcelain examples. The transmitted colours were dominated by yellow ($n=12$) and clear ($n=11$), followed by green ($n=8$) and orange ($n=6$), with a single example of red (Table 2). The UV fluorescence revealed three different fabrics, with six examples of magenta and a single example of lilac, in addition to the 31 pieces with a pale pink fluorescence (Fig. 3). Asian hard-paste porcelain fluoresces magenta, and European hard-paste porcelain fluoresces lilac (Fig 3). There are six examples of Asian hard-paste porcelain, all body sherds, a single sherd of which is clobbered, and a single fragment of unglazed European hard-paste possibly a branch or vegetative fragment from a figurine (Fig. 4).

Of the 38 pieces of hard-paste domestic discard, eight were base sherds, 18 were body sherds, eight were rim sherds, with single examples of a handle, a spout and a teapot rim (Table 3). The decorations of the domestic discard ranged from simple hand painted blue lines, transfer patterns, including blue and white basket weave, moss/vermicelli, and geometric transfer prints, embossing and underglazing (Fig. 4). Though some sherds were decorated in chinoiserie, there were no examples of Willow pattern.

BONE CHINA

The first commercially successful bone china is produced by Josiah Spode around 1790.⁸⁰ According to Edwards,⁸¹ 'porcelain is defined as a vitreous ceramic material which has been subjected to high temperatures during which key elemental oxides and compounds used in its formulation have been converted into a translucent body... Bone china is defined as a porcelain compound containing bone ash, a feldspathic material and kaolin, producing a ware with a translucent body which contains a minimum 30% bone ash derived from calcined animal bones.' Bone china has the distinction of being the strongest of the porcelains, as well as one of the easiest to pot and to fire. Edwards also notes that though bone china technically is in common use by 1815, variants of bone ash are a constituent component of many of the earlier soft-paste experiments, including



FIG. 3

UV. 1. Asian Hard-paste clockwise from top center 16862, 16867, 161010, 16865, 16808, 1610129; 2. Bone china clockwise from top right 16444104, 1610136, 1610127; 3. Worcester soft and hard-paste, clockwise from top right 16444187 sp, 16444189 sp, 16444193, hp. 4. European Hard-paste 1610261.

Worcester.⁸² Bone china or English china production continues today and is one of the most common fine-ware fabrics.⁸³

BONE CHINA WASTERS

There were 41 wasters identified in the bone china collection, of which 36 were undecorated biscuit fired and five were glazed.

The dominant transmitted light colour for the wasters was green ($n=29$), followed by clear ($n=5$), red ($n=3$), and orange ($n=2$) (Table 2). Two sherds were unavailable for colour analysis. As stated above, the UV translucence was uniformly bright white (Fig. 3).

The waster sample was dominated by body sherds ($n=16$) along with rims ($n=10$) and teapot rims ($n=10$), and finally, five base sherds (Table 3). All of the teapot rims recovered were wasters as well as

the majority of the base and rim sherds. The reconstructed base diameters ranged from 50 mm to 180 mm, though the most common measurements fell between 40 mm and 80 mm, indicating cup or small bowl vessel classes. The reconstructed rim diameters fell between 70 mm and 200 mm, with the most common measurements between 70 mm and 100 mm, also confirming cup or small bowl vessel classes. Bone china sherds were noticeably thinner, lighter, and smaller than their earlier predecessors (Table 4). Simple comparison of means and modes of breadth and length comparisons, due to the clear differences. These fine vessels perhaps being at more risk of breakage into smaller fragments. They are also easy to spot due to their brilliant white appearance.

Of the decorated sherds, one had abstract embossing, one had a black and white hand painted floral design, one had a black and white floral transfer pattern, one had hand painted blue concentric circles,

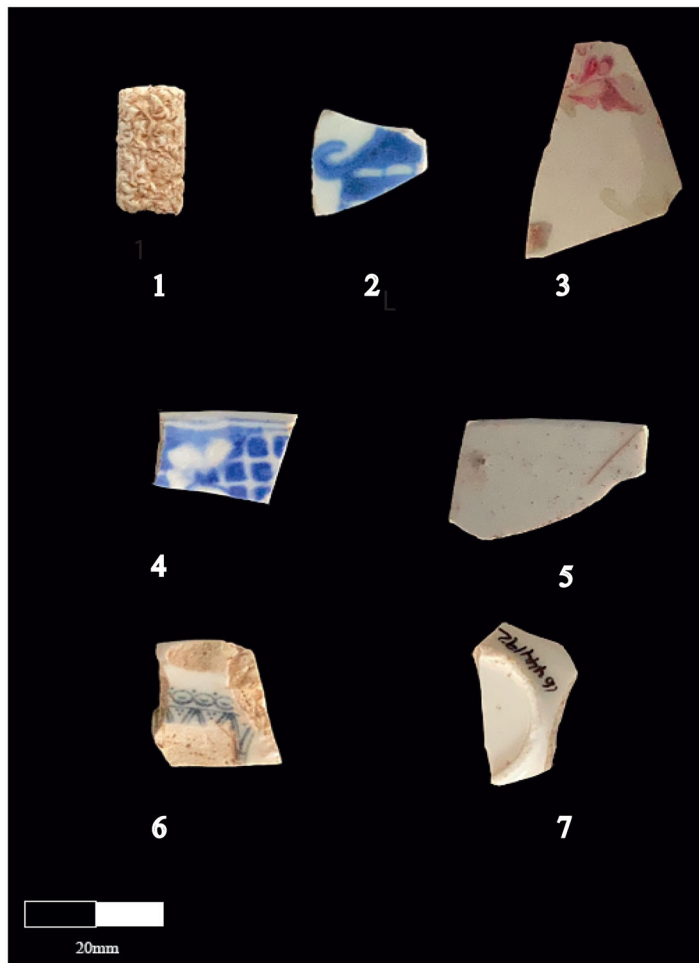


FIG. 4

Hard-paste porcelain. 1. 1610261 European figurine fragment; 2. 16444191 Asian body hand painted; 3. 16808 Asian body clobbering; 4. 16444190 domestic decorated rim; 5. 1610097 glazed waster rim; 6. 978 domestic decorated rim; 7. 19444192 domestic undecorated base.

and one sherd had scallop patterns pencilled in, presumably as a guide (Fig. 5). In addition, the sherd with the hand painted floral underpaint design had evidence of grinding or smoothing along one edge (Fig. 5).

BONE CHINA DOMESTIC DISCARD

The sample of bone china domestic discard ($n=21$) consisted of fourteen body sherds, six rim sherds and a single base (Table 3). The domestic discard was dominated by clear ($n=8$) and green ($n=9$) transmitted light, with a single example of transmitted red

and two examples of orange. The UV light fluorescence was bright white (Fig. 3). Overall, bone china, both waster and domestic discard, shows far less variability in transmitted light colour than either soft or hard-paste porcelain.

Sherd types for the domestic discard included fourteen body sherds, six rim sherds and a single base (Table 3). There were no teapot rims, handles or other shapes.

Taking together both wasters and domestic discard is a similar pattern of discard to the hard-paste collection as a whole. The identifiable vessel types were almost exclusively teapots ($n=10$) along with two teacups/teabowls and a single larger bowl.

The decoration on the bone china was far and away the most interesting and varied of the porcelain collection. There were fewer glazed undecorated sherds, and again, though some transfer patterns, no Willow pattern. The most common transfer pattern was three sherds of Royal Lily, a very popular pattern used by Worcester Porcelain, Chamberlain's and Caughley (Fig. 5).⁸⁴ The Royal Lily pattern appears during the Flight period at the Worcester Porcelain and is found on soft and hard-paste porcelains and bone china from 1788 until well into the twentieth century.⁸⁵ The most common pattern for both hand-painted and transfer sherds are floral designs. A single sherd had embossing.

WHITEWARE

Among the wasters were a number with no translucency and which could not be scratched with a file. These could potentially be what Grainger's called 'semi-porcelain' though there is little archaeological literature around this material. Increasingly white bodied refined earthenwares, otherwise known as CC ware (e.g. Miller) appear widely after 1820.⁸⁶ Grainger & Co., began trading ca. 1800, concentrating primarily on decorating porcelain blanks purchased from companies such as Caughley.⁸⁷ They were also notable for producing a form of 'hybrid hard-paste', but also by the early to mid 1800s had developed 'chemical porcelain' and 'semi-porcelain', for use in industry as well as household items such as doorknobs and knife handles.⁸⁸ They were bought out by Royal Worcester in 1889, though the factory continued production until 1902.⁸⁹ Excavation in advance of development of a Grainger & Wood kiln in Lowesmoor, Worcester, has revealed substantial whiteware production.⁹⁰

WHITEWARE WASTERS

There were 23 sherds, two base sherds, fifteen body sherds, four rim sherds, and a single handle, lid, and miscellaneous piece (Table 3). The measurable diameters of both bases and the lid were 70 mm. The single vessel rim sherd had a measurable diameter of 140 mm. The only unidentifiable class was the piece of tile which was 400 mm x 360 mm in dimension, with a thickness of 60 mm and a weight of 14 g (Table 4). The whiteware wasters were undecorated biscuit fired sherds, with no evidence of underglazing or embossing. There are three whiteware biscuit fired wasters showing evidence of bloating, which Edwards attributes to the makers struggling with the chemical balance of their ingredients, particularly the presence of calcium.⁹¹

TABLE 4.
Comparison of sherd dimensions, soft paste, hard paste, bone china, and whiteware.

| Soft paste | Mean | Median | Mode |
|--------------|------|--------|------|
| Length mm | 295 | 260 | 220 |
| Breadth mm | 205 | 185 | 150 |
| Thickness mm | 36 | 30 | 30 |
| Weight g | 5.1 | 3 | 1 |
| Hard Paste | | | |
| Length mm | 278 | 250 | 250 |
| Breadth mm | 192 | 170 | 170 |
| Thickness mm | 39 | 39 | 30 |
| Weight g | 4.1 | 3 | 2 |
| Bone China | | | |
| Length mm | 256 | 234 | 260 |
| Breadth mm | 189 | 170 | 130 |
| Thickness mm | 30 | 23 | 20 |
| Weight g | 3.0 | 1 | 1 |
| Whiteware | | | |
| Length mm | 253 | 240 | 230 |
| Breadth mm | 193 | 170 | 160 |
| Thickness mm | 49.7 | 48.5 | 50 |
| Weight g | 5.0 | 3.0 | 1.0 |

WHITEWARE DOMESTIC DISCARD

There were 81 sherds identified as domestic discard. There were thirteen bases, 50 body sherds, fifteen rim sherds, a single handle, and a miscellaneous piece (Table 3). Decoration ranges from blue and white transfer ware, dominated by Willow pattern through to coloured transfer prints in chinoiserie, floral, vermicelli/moss and landscape patterns.⁹²

In the overall assemblage we see a very different collection to the earlier porcelains and contemporary bone china with the emphasis on thicker heavier robust vessels and less emphasis on tea and other drinks consumption. The identifiable vessel types were plates, open bowls and a tile. We have not investigated the fabrics further.

KILN FURNITURE

Kiln furniture is made up of pieces of clay used to support and protect pottery during biscuit firing.⁹³ The clays used can range from earthenwares, such as redwares, to whitewares.⁹⁴ The forms vary greatly, and to date there is no published typology for kiln props, sag-gars, or other ceramic aids of manufacturing.⁹⁵

There were 51 pieces of kiln furniture collected from Oldbury farm. Twenty-five pieces of kiln furniture transmitted light and so are porcelain or bone china, with the remaining 26 opaque. Ten pieces transmitted a clear light, ten pieces transmitted orange, and the remaining five pieces transmitted red



FIG. 5

Bone China. 1. 1610287 waster base; 2. 1610287 waster base showing underglaze marks; 3. 100019 waster rim showing underglaze marks; 4. 100018 waster rim showing underglaze; 5. 100017 waster body showing pencil scalloping; 6. 100016 waster body showing underglaze, post breakage shaping; 7. 16444184 decorated body; 8. 1610321 decorated glazed waster; 9. 1610322 decorated body 'Royal Lily'; 10. 988 decorated body hand painted.

(Table 2). No UV analysis was conducted on the kiln furniture.

The kiln furniture came in four forms: ring, ribbon, strap and triangular cone/prop (Fig. 6). There were 36 rings, ten ribbons, four straps, and a single triangular prop. All of the pieces which had

transmitted light were rings. Ribbons had dimensions on average of 197 mm x 110 mm, with a mean thickness of 9 mm and weight of 2 g. Rings had dimensions on average of 310 mm x 120 mm, with a mean thickness of 11 mm and weight of 6.2 g. The four straps ranged between 220 mm x 130 mm to 320 mm

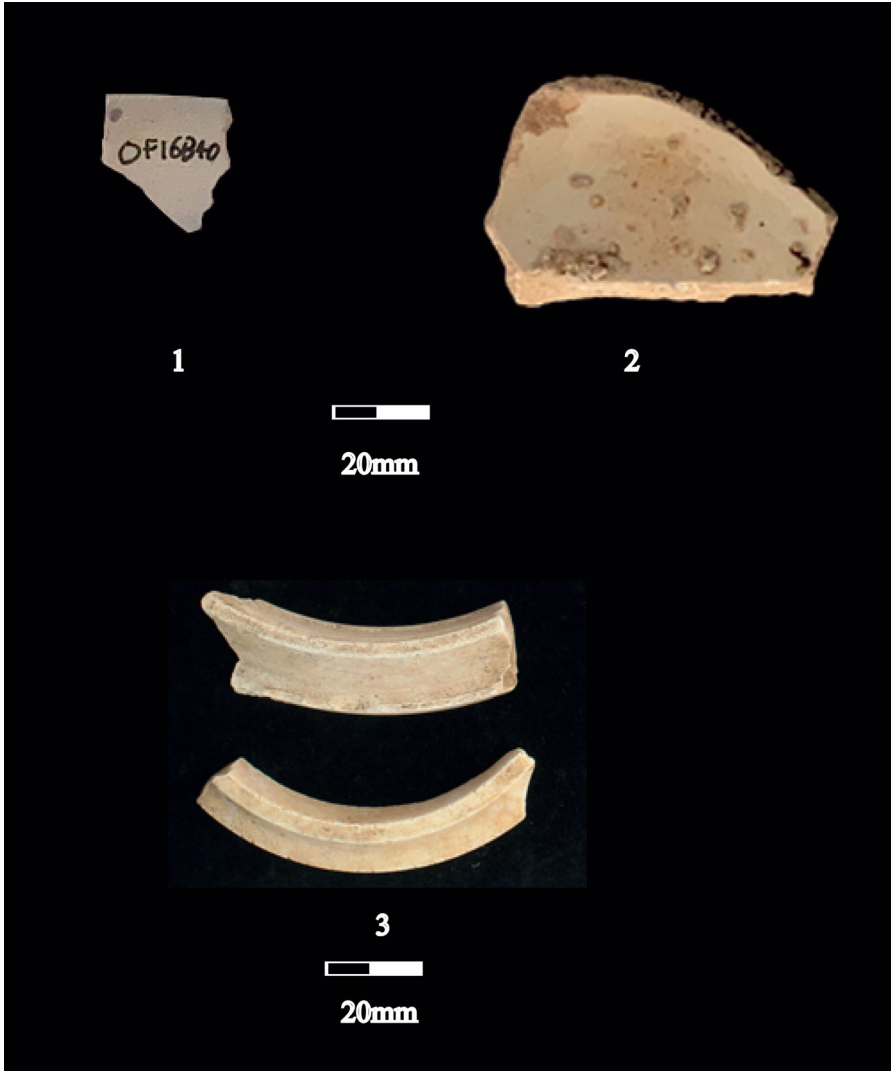


FIG. 6
1. 16W57 creamware waster; 2. 16840 lilac waster rim; 3. Kiln furniture.

x 170 mm in dimension, and between 3 g and 9 g in weight (Table 4).

It was possible to calculate EVE's diameters for the thrown rings. Reconstructed diameters ranged from 50 mm to 310 mm, with a median and mode of 90 mm. If we understand that rings are used to support bases of pots during firing, we can estimate that the majority of the rings were used in the firing of small to medium sized cups, bowls and other vessels. Saggars were treated as brick and tile, counted in the field and discarded. Approximately 57 pieces of

course kiln furniture, e.g. sagger fragments, were counted and discarded.

MISCELLANEOUS STONEWARE AND CREAMWARE WASTERS

In addition to the porcelain/bone china and whiteware wasters identified, there were low numbers of stoneware wasters, a single creamware waster, and sherds which either demonstrated inconsistencies in

fabric and firing, or which demonstrate ongoing experimentations.

There is a single glazed creamware base, with visible inclusions in the fabric (Fig. 6). There is no documented evidence that any of the factories produced a creamware during the eighteenth century, though this suggests experimentation must have occurred. There are two stoneware wasters, despite the lack of a known stoneware producer in Worcester, and there is a single sherd of very thin, biscuit fired lilac coloured refined earthenware (Fig. 6).

DISCUSSION

CHRONOLOGY

Our results demonstrate it is possible to provide approximate dates for the episodes of factory waste disposal, using known criteria. Our results also demonstrate that a more refined chronology can be achieved by the use of both translucency and UV luminescence. In particular we have shown that the hard-paste porcelain recovered from Oldbury Farm is likely to have been the earlier product of the Worcester Company and dating to the last part of the eighteenth century. Most importantly, we have demonstrated the importance of using UV to distinguish between hard-paste and bone china sherds, which are otherwise very similar in translucency and texture. This demonstrates clear episodes of waste disposal, relating to clear changes in fabric composition.

Fabric variability as measured by mean and modal thickness of sherds, decreased from soft-paste through hard-paste, with bone china both the thinnest and most consistent of vessel walls. Visual inspection also demonstrated a great degree of visible inclusion matter in both soft-paste and hard-paste sherds, with little visible inclusion matter in bone china.

DEVELOPMENT OF PRODUCTION AND TRENDS IN CONSUMPTION OF WORCESTER PORCELAIN

It is possible to identify several trends in production from the material located from the field survey. As

no makers marks were recovered and due to the relatively small sizes of sherds it was not possible to identify the individual factories producing either the finished products or the wasters. The exception is Grainger's which is the only factory thought to be producing whitewares (semi porcelain). Consequently, we are reliant on cross dating the fabric of our sherds with the historical record of porcelain production (Table 5).

Of the range of fabrics produced in Worcester we only have a sample of four types at Oldbury Farm, including the relatively rare hard-paste porcelain. It is documented that Worcester had a short phase of hard-paste production towards the end of the eighteenth century and beginning of the nineteenth century at several factory sites.⁹⁶

By using transmitted light as a proxy for paste recipes we have been able to assess variations within fabric composition. While a novel approach this is a quick and simple way of determining broad patterns in a sample. We have identified five different colours of transmitted light in all the translucency tests. This probably represents many more variations in fabric at any given time, than simply five recipes. Further work is needed to see how these colours correspond to the chemistry of the fabrics. For example, Owen⁹⁷ associates a green transmitted light with the earliest Flight and Barr production of soft-paste porcelain, while Ramsay and Ramsey associate green with early Bow hard-paste.⁹⁸ Given the variability, it is unlikely that transmitted colour is indicative of either period or place of production. Studies of soft-paste composition by Owen and Jay and for hard-paste porcelain by Godden and Ramsay & Ramsay all indicate variation in paste recipes and these results would tend to agree that paste composition could be highly variable within a particular fabric.⁹⁹

The narrative history of porcelain manufacturing in Worcester is broadly unilinear, emphasising the development of consistent fabrics,¹⁰⁰ that are hard,¹⁰¹ high fired,¹⁰² white,¹⁰³ and translucent.¹⁰⁴ And this is of course a primary concern in manufacturing development, producing a reliable, consistent and affordable product.¹⁰⁵ However, such unilinear narratives tend to mask the complexity and richness of the production process,¹⁰⁶ which Barrett hints at in John

TABLE 5. Approximate date ranges of production of british porcelains and refined earthenwares.

| Fabric type | Approximate dates of production |
|---|---------------------------------|
| Creamware | 1740 - c. 1779 |
| Soft paste porcelain | 1751 - c. 1792 |
| Pearlware | 1779 - c. 1820 |
| British hard paste porcelain | 1780 - c. 1811 |
| Whitewares, including chemical and semi-porcelain | 1820 - today |
| Bone China | 1796 - today |

Flight's diary entries.¹⁰⁷ We suggest our results, along with earlier chemical analyses, indicate a much less straightforward trajectory of experimentation and production. These variations in fabric may relate to a number of manufacturing issues, including composition and consistency of raw materials, consistency of equipment, including kilns, as well as human factors such as skill and preference of the relevant factory.

The waster sample covers a period from the mid-eighteenth century to the end of the nineteenth century. However, for all types of fabrics and both wasters and domestic discard, other than whitewares, the forms are dominated by vessels associated with drinking hot beverages such as tea, coffee and chocolate. Larger forms such as plates and platters are rare. There are also few examples of moulding or embossing amongst the sample, for instance, a single example of fluting in the soft-paste. The emphasis is on simple moulded or thrown forms for painting. This is in contrast to the historical narrative. Godden, for example, suggests that Chamberlain's produces few tea sets in the period 1820 to 1852, about the time of the merger with Barr and Barr, apparently preferring figurines, vases, and other intricate decorative items.¹⁰⁸ Grainger & Co. begin trading in 1805, using in the beginning a 'hybrid hard-paste' and 'derivative design',¹⁰⁹ moving into bone china in 1815. So, whilst there is an emphasis on decorative pieces in the antique literature, we see very little evidence for this in the survey sample.

The whiteware sample is larger and heavier than any of the porcelains. This is consistent with the observation that the attraction of porcelain as a fabric is that it can produce both lighter and thinner products, as opposed to the more durable and cheaper to produce whiteware fabric. There is also a preponderance of larger forms in the whiteware collection with more platters and bowls. The appearance of a creamware waster, a lilac biscuit waster and a piece of hard-paste tester/tile hints at the broad range of competitive product experimentation amongst the porcelain factories of Worcester.

FACTORY AND DOMESTIC WASTE DISPOSAL, WORCESTER IN THE 18TH AND 19TH CENTURIES

The results of the analysis demonstrate the preponderance of wasters, particularly porcelain wasters in this sample. This supports anecdotal evidence that the porcelain industries in Worcester disposed of significant proportions of their kiln waste on fields within Worcestershire. City wide collection of domestic waste did not begin until the 1930s when the first landfill sites were opened.¹¹⁰ Previously, domestic waste (miskins) was collected and emptied onto Pitchcroft racetrack and then carted away for manure.¹¹¹

The results of the excavation of an early Worcester Tonquin kiln demonstrated that at least for the earlier period waste appears to have been deposited on site, or perhaps into the river.¹¹² There is an anecdotal account that the earliest kiln was sited next to the Severn for convenience of waste disposal, but this was halted after the city complained that the river channel was being filled in. The Warmstry House factory site was sold to Chamberlain's in 1840, and production moved entirely to Severn Street in Diglis.¹¹³ Our results of the identification of soft-paste suggests that certainly by 1760–1780, kiln waste was being carted outside the city for disposal. Subsequently, factory waste appears in quantity around the city, usually in fields, including allotments. The large quantity of wasters domestic discard at Oldbury Farm suggests that there were three processes in operation; firstly, the farm's own manuring, secondly manure derived from the city and finally the disposal of factory waste.

The dates of deposition of the waste are best achieved by looking at the fabric of the wasters. Soft-paste porcelain is produced from 1751–1792. Bone china is introduced no earlier than 1815 and is continuously produced until 1997, leaving us a potentially long period in which that material could have been disposed of. Finally, hard-paste porcelain is thought to have been produced between 1780–1889, and Harry Frost suggests that the Worcester porcelain factory experimented with it on and off until WWII.¹¹⁴ We can at a minimum conclude that Oldbury Farm was repeatedly used for waste disposal from the city and factories between the mid 18th centuries through to potentially the mid twentieth century, alongside domestic manuring (Table 5).

The dating of the domestic decorated porcelains is not much more precise than that of the wasters. Soft-paste and locally produced hard-paste porcelains have the smallest potential production periods. Though some work on identifying forms and decoration was conducted, the small sherd size and preponderance of decorative styles, particularly printed ones, does not so far improve the accuracy of dating based on fabric type alone. The provenance of the domestic discarded porcelains is largely British, if not of Worcester origins. Though a local origin for particularly soft-paste domestic discard might be argued, it is safer to say that these sherds could have come from the broader area, specifically Bristol, Caughley's in Ironbridge, or Liverpool, all of whom produced significant material in the 18th and 19th centuries.¹¹⁵ Only a small number of Asian sherds were recovered, and only a single European sherd, suggesting that for the late 18th and early 19th centuries, Worcester was receiving limited materials from abroad.

There are few directly comparable sets of field-walking in the literature, but preliminary analysis of two other collections in the Worcester region show a

similar low percentage of Asian and European material (Loney and Hoaen nd). We can make a cautious comparison with the analysis of the Duke Street excavations to demonstrate the availability of locally produced vs imported wares in Worcester as opposed to the larger city of London. Pearce found there were five times the amount of Asian porcelain as either continental or English porcelain,¹¹⁶ despite the presence of several early porcelain factories in Limehouse and Chelsea.¹¹⁷ If you remove the Asian porcelain from Pearce's findings, the proportion of continental and English porcelain compared to the rest of the domestic discard is somewhat different to our results.¹¹⁸ For example, at Worcester soft-paste porcelain is present in high numbers in the domestic discard and assuming it to be broadly contemporary with creamware it represents a third of the late eighteenth century fineware assemblage. It may be suggested that over time that the proportion of porcelain and bone china consumed declines in Worcester as consumer taste switches to pearlwares and white-wares, though more research needs to be conducted to confirm this. We have only eighteen sherds of bone china while broadly contemporary types such as pearlware and whiteware are 129 sherds and 81 sherds respectively.

We have reported on an unusually high quantity of porcelain material at Oldbury Farm compared to elsewhere in the archaeological literature. Excavations at the Royal Worcester Porcelain factory on Severn Street, for example, have produced remarkably little reported whiteware or porcelain materials,¹¹⁹ and no further analysis as to period or chemistry. We have already reported on the findings of the excavation of the Warmstry House kiln site,¹²⁰ which has cumulatively produced a sample analysis of the materials, the rest awaiting funding to complete. Projects such as at the Limehouse porcelain factory excavations show that it is possible to produce a thorough porcelain analysis despite recovery of over 1400 sherds.¹²¹

Elsewhere in the literature, 18th and especially nineteenth century whitewares are often lumped together, with little porcelain identified or described.¹²² Projects focussing on nineteenth century working class dwellings often find very little porcelain to report on.¹²³ Porcelain is a rare commodity even within the context of high-status sites such as Manor House in Sheffield, and the Fulbourne Manor House, Cambridgeshire.¹²⁴ The exception appears to be Pearce's reporting for eighteenth century London, in which Asian, European and English porcelains appear regularly, though representing around 5% of the assemblages overall,¹²⁵ and Ratkai's analysis of the Bullring assemblages in Birmingham.¹²⁶

In summary, porcelain appears to be unevenly analyzed in the archaeological record in the UK, away from factory excavations. The high quantities

and wide variety of fabrics with the porcelain material at Oldbury Farm points to a complex history of both factory production and local consumption at a key time in the development of the British global market. The recovery from fieldwalking indicates the importance of looking at the landscape of manufacturing as a strategy in Industrial Archaeology and justifies the intensive quantification and analysis of the resulting materials.

SURVEY DATA AND INDUSTRIAL ARCHAEOLOGY

Field walking is not a traditional avenue of data collection in industrial archaeology, particularly pottery manufacturing.¹²⁷ Most published projects are based on excavation of *in situ* buildings and fills, with survey relegated to the identification of sites for future exploration.¹²⁸ Though there is a perception that survey data lacks context, particularly in understanding factory practice, we have demonstrated the contribution of survey collected data to a greater nuanced understanding of the technical process of the porcelain factories during the 18th and 19th centuries. Further, we can record some key differences in waste behaviour between pottery complexes, for instance, the practice of broadly spreading factory waste in Worcester as compared to the construction of dense waster mounds in Staffordshire.¹²⁹

Finally, field survey is an accessible form of archaeological methodology, suitable for community projects as well as University fieldwork projects. It remains amongst the least expensive forms of data collection and working in modern material has the benefits of ease of initial recognition. It also allows a closer personal association, particularly in places such as Worcester which was an iconic employer as well as manufacturer, or Staffordshire, where the industry continues. Projects such as this one, the Tamar Valley and the Fulbourn Manor Estate though not explicitly about pottery waste nonetheless can provide important evidence about the surrounding industries.¹³⁰

CONCLUSION

Whilst still in its infancy compared to the art historical and technological study of the porcelain industry in Worcester, archaeology provides a complementary source of information to the record from the literature and from museums. Our analysis of wasters suggests that there was significant experimentation with the recipes for the types of pottery produced in Worcester over time, and that at no point does there appear to have been a standard paste. Later period production in Worcester is best known for its architectural and sculptural pieces, however the assemblages we have examined are dominated by pieces

associated with drinking. It is only in the whitewares that we see a shift towards more domestic eating ceramics such as plates and platters. Robb refers to Technologies of Enchantment as a way of understanding how certain elements of technology become powerful and influential.¹³¹ Using Gell,¹³² he notes that the design of key things influences or recall feelings of power. In a world of the rationalist industrial revolution, he provides a more humane and socially centred explanation of how expensively produced and ultimately fragile items such as porcelain and bone china can remain at the top of the prestige hierarchy at the expense of equally lovely and more durable whitewares. That said, it also provides an explanation of how the history and recording of the factory outputs continue to emphasize the unique and highly prized items only available to the very few, whilst the actual outputs included the full range of domestic products, including transfer printed whitewares. This is an important concept, that of the everyday, the mundane, the 95% of stuff that makes up daily life, and the 95% of material found by archaeologists on a regular basis.

Material culture studies in industrial and historical archaeology emphasize the social context of the artefact, the use it is put to and the meaning we ascribe to its ownership,¹³³ community life,¹³⁴ and social and class structure.¹³⁵ Material Culture studies may also put emphasises on the rare, the identifiable and the powerful, at the expense of the banal mass,¹³⁶ for instance, the unidentifiable waster and the discarded teacup. This is particularly so with historical pottery studies, which may still question the appropriateness of field midden for recovering and understanding the manufacturing process. Further, historical periods are not as well prioritised in the planning process in the uk, and consequently, much material is simply discarded. For the 18th and nineteenth century materials, the inclusion of all elements of the factory product creates a balanced narrative of a highly prestigious industry that none the less created a very large amount of commercially successful products whilst maintaining the enchantment of the process. In this way, we can take the evidence of the less glamorous elements of Worcester porcelain production to provide balance to the art historical narrative of fine art and global influence, without detracting from the latter.

ACKNOWLEDGMENTS

The authors wish to acknowledge the following people and organizations for their support in this project. Funding and site access came through the University Worcester, School of Science and the Environment, Department of Archaeology and Geography. Field data was collected by the students of the Introduction to Archaeology, finds

analysis was conducted with the support of Samantha Elwell, Jordan Morris, as well as students of the Science and Archaeology module. Thanks to Rob Hedges of Worcestershire Archives and Archaeology Service, Malcolm Nixon, Harry Frost and Sophie Heath, director of the Museum of Royal Worcester, for additional support.

NOTES

- ¹ Palmer, Nevell & Sissons 2012, 7.
- ² Belford 2011, 211; Barker & Majewski 2006; Miller 1980, 1991 in Barker & Majewski 2006, 207.
- ³ Johnson 1996, 87-90 in Belford 2011, 217.
- ⁴ Belford 2011, 217.
- ⁵ Gell 1992, in Robb 2015, 169.
- ⁶ Palmer, Nevell & Sissons 2012, 12; Barker 2003, 3; J. Sandon 1981.
- ⁷ Owen 1998.
- ⁸ Edwards 2020.
- ⁹ e.g. Ramsay, et al 2013 for Limehouse; Jay 2018 for Worcester.
- ¹⁰ Palmer, Nevell & Sissons 2012, 9.
- ¹¹ Loney & Hoan 2021, 2022.
- ¹² Jones 2018; Loney & Hoan 2022.
- ¹³ e.g. Barker 1995, the Biferno Valley.
- ¹⁴ e.g. Barker 1995, Ammerman and Feldman 1978, Riordan 1988; Dunnell 1992.
- ¹⁵ Brooks et al. 2009.
- ¹⁶ King 2004 summarizes the resistance to ploughzone survey by historical archaeologists in the 1970s and 80s, after prehistoric archaeologists had embraced the technique.
- ¹⁷ Cunningham 2011.
- ¹⁸ BHTA <https://www.binghamheritage.org.uk/modern/>.
- ¹⁹ E.g. Patrick & Ratkai 2009; Pearce 2008.
- ²⁰ E.g. The Birth of Industrial Glasgow, Nevell 2016; The Limehouse Porcelain Manufactory, Tyler & Stephenson 2000.
- ²¹ E.g. Rathje & Murphy 2001.
- ²² e.g. Barker 1995, the Biferno Valley.
- ²³ Loney & Hoan 2021.
- ²⁴ Bourn et al. 2008; Thomas 2016.
- ²⁵ Loney & Hoan 2021.
- ²⁶ See Loney & Hoan 2021, 2022 for a full methods and results discussion.
- ²⁷ Hughes & Leech 2014.
- ²⁸ Environment Agency 2011.
- ²⁹ Edwards 2020, 4.
- ³⁰ Edwards 2020, 5.
- ³¹ Edwards 2020, 5.
- ³² cf. Savage & Newman 1985, 227.
- ³³ Edwards 2020; 6; Owen 1998, 63.
- ³⁴ Savage & Newman 1985, 27; Edwards 2020, 6.
- ³⁵ Hurlbutt 1925.
- ³⁶ Barrett 1966.
- ³⁷ Pearce 2008.

- ³⁸ Savage & Newman 1985, 227.
- ³⁹ Sandon 1980, 1; Jones 2018, 97; Binns 1877.
- ⁴⁰ Jones 2018, 97; Sandon 1980.
- ⁴¹ Cushion & Cushion 1992, 201, 247.
- ⁴² Jones 2018, 98-99.
- ⁴³ J. Sandon 1981; H. Sandon 1980.
- ⁴⁴ Sandon 1980, 31.
- ⁴⁵ Deborah Fox and James Dinn, Worcestershire Museums, pers. comm.
- ⁴⁶ Owen 1998, 2003; Jay 2018.
- ⁴⁷ e.g. Anderson 2003; van Laun & Cook 2008 a-d; Wallis & Colls 2006; Bradley 2013; Mundin 2019; Sánchez 2019.
- ⁴⁸ e.g., Vince & Stean 2007, 2008.
- ⁴⁹ Vince & Steane, in Milbank & Mundin 2004, 12.
- ⁵⁰ Milbank & Mundin 2004, 8.
- ⁵¹ Cherrington 2002; WAAS forthcoming.
- ⁵² Pearce 2008
- ⁵³ Pearce et al. 2013
- ⁵⁴ Tyler et al. 2000.
- ⁵⁵ Forbes & Haggarty 2007.
- ⁵⁶ E.g. Jay 2018; Owen 1998, 2003.
- ⁵⁷ Pearce 2008 has reported on several cases of misidentifications in London assemblages.
- ⁵⁸ Maryland Archaeological Conservation Lab 2021; Majewski & O'Brien 1987.
- ⁵⁹ Hurlbutt 1925, 63-64; Owen 2003, 85; Cushion & Cushion 1992, 85.
- ⁶⁰ e.g. Savage and Newman 1974: 311.
- ⁶¹ <https://www.worcestershireceramics.org/>.
- ⁶² Edwards 2020, 7.
- ⁶³ Edwards 2020, 7; see Jay 2018; Owen 1998, 2003.
- ⁶⁴ e.g. Cushion & Cushion 1992.
- ⁶⁵ c.f. Eccles & Rackham 1922, in Edwards 2020, 50.
- ⁶⁶ Sandon 1980.
- ⁶⁷ Owen 2003, 84, see also Edwards 2020, 28.
- ⁶⁸ Jay 2018, 9.
- ⁶⁹ Owen 2003, 86.
- ⁷⁰ Edwards 2020, 7.
- ⁷¹ Godden 1992, 366.
- ⁷² Godden 1992, 367.
- ⁷³ e.g. Owen 2003, 85.
- ⁷⁴ e.g. Pearce 2007; Maryland Archaeological Conservation Lab 2021; Godden 2004, 139.
- ⁷⁵ Edwards 2020, 7; Godden 2004, 139.
- ⁷⁶ Godden 1992, 368.
- ⁷⁷ Godden 2004, 145, see also Sandon & Sandon 1989.
- ⁷⁸ Stringer 1949 in Godden 2004, 145.
- ⁷⁹ Godden 2004, 146.
- ⁸⁰ Edwards 2020, 139; Savage & Newman 1985, 51.
- ⁸¹ Edwards 2020, 138.
- ⁸² Edwards 2020, 139; Jones 2018, 64, Table IX.
- ⁸³ Edwards 2020, 139.
- ⁸⁴ Godden 1982, 75.
- ⁸⁵ Sandon 1980, 61.
- ⁸⁶ Miller (1991) argues that the divisions between cream ware, pearlware and whitewares are not very reliable as time or technological indicators, and that the whole category should be grouped together as 'CC' or Cream Coloured Wares. Current ceramic reports, however, do use this distinction, including the JeffPat guidance. Consequently, we will use the system as we set out, referring to Cream, Pearl and Whitewares. See also Magid 2010, C-20.
- ⁸⁷ Cushion & Cushion 1992, 246.
- ⁸⁸ Collections of the Museum of Royal Worcester, Severn Street, Worcester.
- ⁸⁹ Cushion & Cushion 1992, 247.
- ⁹⁰ Nixon pers comm.
- ⁹¹ Edwards 2020, 62.
- ⁹² Neale 2005.
- ⁹³ Barker 1997.
- ⁹⁴ Vince & Steane 2007, 1-2.
- ⁹⁵ c.f. Brown, Jennings & Mephram 1998.
- ⁹⁶ Cushion & Cushion 1992.
- ⁹⁷ Owen 2003.
- ⁹⁸ Ramsay & Ramsay 2008, 249.
- ⁹⁹ Owen 2003; Jay 2018; Godden 1992; Ramsay & Ramsay 2008.
- ¹⁰⁰ Edwards 2020, 6; Barrett 1966, 36.
- ¹⁰¹ Godden 2004, 146.
- ¹⁰² Godden 2004, 145; Sandon & Sandon 1989.
- ¹⁰³ Barrett 1966, 37-38.
- ¹⁰⁴ Edwards 2020, 4.
- ¹⁰⁵ e.g. Edwards 2020, 4.
- ¹⁰⁶ e.g. Latour 1993; Pinch & Bjiker 1987, 17.
- ¹⁰⁷ Barrett 1966, 37.
- ¹⁰⁸ Godden 1982, 148-149.
- ¹⁰⁹ Godden 1992, 245-247.
- ¹¹⁰ Environment Agency 2011.
- ¹¹¹ Hughes & Leech 2014; Bryant 2011.
- ¹¹² Sandon 1980, 18.
- ¹¹³ Sandon 1980, 15.
- ¹¹⁴ Harry Frost pers. comm.
- ¹¹⁵ Edwards 2020.
- ¹¹⁶ Pearce et al. 2013, 287.
- ¹¹⁷ Pearce et al. 2013, 302.
- ¹¹⁸ Pearce et al. 2013, 287.
- ¹¹⁹ e.g. Sanchez 2019, Wessex 2014.
- ¹²⁰ J. Sandon 1981; H. Sandon 1980.
- ¹²¹ Tyler & Stephenson 2000.
- ¹²² e.g. Bingham 2022; Cunningham 2011.
- ¹²³ c.f. Wooler 2015 for the excavation of a back-to-back in Sheffield, Whitehead & Conlin Casella 2012 for a working-class house.
- ¹²⁴ Crewe et al. 2013, for a Manor House in Sheffield, Malim 2001 for the Fulbourne Manor House, Cambridgeshire.
- ¹²⁵ Pearce 2008; Pearce et al. 2013.
- ¹²⁶ Rakai 2009.
- ¹²⁷ c.f. White, Paynter, & Brown 2022, e.g., Coleman-Smith & Pearson 1988 the Donyatt potteries, Robinson 2005 the Caughtley Sagggar Works, Nevell 2016, 76-104 the Caledonia Pottery, Glasgow.
- ¹²⁸ e.g. Barker 2003, 1, however, see Yearsley Moor Young 2013, the Tamar Valley community project, Cunningham 2011, the Fulbourn Manor Estate survey

Malim 2001, the Bingham Archaeology Project BHTA 2022.

¹²⁹ e.g. Burslem & Hanley; Kelly 1969 in Barker 2003, 2.

¹³⁰ Cunningham 2011; the Fulbourn Manor Estate survey Malim 2001.

¹³¹ Robb 2015, 171.

¹³² c.f. Gell 1992, 1998.

¹³³ Cochran & Beaudry 2006; c.f. the Alderley Sandhills Project, Conlin Casella 2005, 11; the Archaeology of Machinic Consumerism, Roller 2018.

¹³⁴ Whitehead & Conlin Casella 2012; Henry's Mill, Davies 2006; Urban social cohesion, Symonds 2010.

¹³⁵ the Annapolis Project, Leone 1993, 1995; Warner, 1998.

¹³⁶ Robb 2015, 169.

¹³⁷ Digimap 2022.

BIBLIOGRAPHY

Ammerman, A., and M. Feldman. 1978. 'Replicated Collection of Site Surfaces.' *American Antiquity* 43 (4): 734–740. [10.2307/279505](https://doi.org/10.2307/279505)

Anderson, E. 2003. 'Albion Mill, Mill Street Worcestershire: An Archaeological Evaluation Report and Historic Building Assessment.' Unpubl. rep. *Oxford Archaeol* 1254: WCM101088.

Barker, D. 1997. 'Bits and Bobs – The Development of Kiln Furniture in the 18th-Century Staffordshire Pottery Industry.' *English Ceramic Circle Transactions* 16 (1): 308–341.

Barker, D. 2003. 'Ceramic Industries.' *West Midlands Regional Research Framework for Archaeol Seminar* 6, 1–5.

Barker, G. 1995. *The Biferno Valley Survey: The Archaeological and Geomorphological Record*. London: Leicester University Press.

Barker, D., and T. Majewski. 2006. 'Ceramic Studies in Historical Archaeology', in Hicks & Beaudry 2006, 205–232.

Barrett, F. 1966. *Worcester Porcelain and Lund's Bristol*. London: Faber and Faber.

Beaudry, M. & Symonds, J. (eds) 2012. *Interpreting the Early Modern World*. New York: Springer.

Belford, P. 2011. 'The Archaeology of Everything' – Grappling with Post-Medieval, Industrial and Contemporary Archaeology', in Watt 2011, 211–236.

Bingham Heritage Trails Association. 2022. 'The Archaeology of Bingham Parish.' Accessed May 25, 2022. <https://www.binghamheritage.org.uk/archaeology/>.

Binns, R. 1877. *A Century of Potting in the City of Worcester Being the History of the Royal Porcelain Works 1751 to 1851*. London: Bernard Quaritch.

Bijker, W., and T. Hughes. & 1987. *The Social Construction of Technological Systems*. Cambridge, Massachusetts: MIT Press.

Bourn, R., J. Gidman, and H. Heard. 2008. 'Land West of Worcester, Worcestershire. Archaeological Desk Based Assessment', unpubl. rep. CsMg associates.

Bradley, R. 2013. 'Archaeological Evaluation at Royal Worcester Porcelain Works, Worcester', unpubl. rep., Worcestershire Archaeol., Worcestershire Archiv. and Archaeol. Serv. P4139.

British Geological Survey. 2016. 'Geology of Britain. Temple Laugherne, Worcestershire.' Accessed April 19, 2017. <http://mapapps.bgs.ac.uk/geologyof-britain/home.html>.

Brooks, A., H.-D. Bader, S. Lawrence, and J. Lennon. 2009. 'Ploughzone Archaeology on an Australian Historic Site: A Case Study from South Gippsland, Victoria.' *Australian Archaeology* 68 (1): 37–44. DOI: [10.1080/03122417.2009.11681888](https://doi.org/10.1080/03122417.2009.11681888).

Brown, D., S. Jennings, and L. Mephram. 1998. *A Guide to the Classification of Medieval Ceramic Forms*. Medieval Pottery Res. Group Occas. Pap. 1. London: Medieval Pottery Research Group.

Bryant, V. 2011. 'The Mystery of the Missing Miskins: Rubbish Disposal and Dispersal in a Medieval Urban Context.' *Medieval Ceram* 32: 1–8.

Cherrington, R. 2002. 'An Archaeological Evaluation at Lowesmoor Trading Estate, Worcester, 2002', unpubl. rep.

Cochran, M., and M. Beaudry. 2006. 'Material culture studies and historical archaeology', in Hicks & Beaudry 2006, 191–204.

Coleman-Smith, R., and T. Pearson. 1988. *Excavations in the Donyatt Potteries*. Bognor Regis: Phillimore & Co., Ltd.

Conlin Casella, E., and J. Symonds. (eds). 2005. *Industrial Archaeology Future Directions*. London: Springer.

Coote, J. & Shelton, A. (eds) 1992. *Anthropology, Art and Aesthetics*. Oxford: Blackwell.

Crewe, V., P. Tipton, R. Maxwell, T. Grey, and D. Higgins. 2013. 'Ancient Luxury and Modern Filth: New Insights into 19th Century Life at Sheffield Manor Lodge.' *Post-Medieval Archaeology* 46 (2): 333–366. [10.1179/0079423612Z.00000000016](https://doi.org/10.1179/0079423612Z.00000000016)

Cunningham, P. 2011. 'Fieldwalking Training Event Clampits, Metherell, Cornwall (SX 2411 6879), Unpubl. rep. Tamar Valley Area of Outstanding Natural Beauty, Cornwall: Calstock Parish Heritage Project.'

Cushion, J., and M. Cushion. 1994. *A Collector's History of British Porcelain*. Woodbridge: Antique Collector's Club, Ltd.

Davies, P. 2006. *Henry's Mill the Historical Archaeology of a Forest Community: Life around a Timber Mill in South-West Australia, Victoria, Australia, in the Early Twentieth Century*, BAR International Series 1558, *Studies in Contemporary and Historical Archaeology* 2. Oxford: BAR Publishing. [10.30861/9781841719887](https://doi.org/10.30861/9781841719887).

- DIGIMAP. 2022. 1:25 000 Scale Colour Raster [TIFF geospatial data], Scale 1:25000, copyright symbol Crown copyright and database rights 2022 Ordnance survey Educational service provider licence number.
- Dunnell, R. 1992. 'The Notion Site.' In *Space Time and Archaeological Landscapes*, edited by Rossignol, J. and Wandsnider, L., 21–41. New York: Springer Science + Business Media.
- Edwards, H. 2020. *18th and 19th Century Porcelain Analysis: A Forensic Provenancing Assessment*. Cham, Switzerland: Springer e-book.
- Environment Agency. 2021. 'Historic Landfill Sites.' Accessed September 7, 2021. <https://data.gov.uk/dataset/17edf94f-6de3-4034-b66b-004ebd0dd010/historic-landfill-sites>.
- Forbes, S., and G. Haggarty. 2007. 'The Musselburgh Pottery.' *The North. Ceram. Soc. J* 23: 159–165.
- Gell, A. 1992. 'The Technology of Enchantment and the Enchantment of Technology', in Coote & Shelton 1992, 40–67.
- Gell, A. 1998. *Art and Agency: An Anthropological Theory*. Oxford: Clarendon.
- Godden, G. 1982. *Chamberlain-Worcester Porcelain 1788–1852*. London: Barrie & Jenkins.
- Godden, G. 1992. *An Illustrated Encyclopaedia of British Pottery and Porcelain*. Wigston: Magna Books.
- Godden, G. 2004. *Godden's New Guide to English Porcelain*. London: Miller's.
- Hicks, D., and M. Beaudry. 2006. *The Cambridge Companion to Historical Archaeology*. Cambridge: Cambridge University Press.
- Hughes, P., and A. Leech. 2014. *The Story of Worcester*. Little Logaston: Logaston Press.
- Hurlbutt, F. 1926. *Old Derby Porcelain and Its Artist-Workmen*. London: T. Werner Laurie, Ltd.
- Jay, W. 2018. 'Worcester Porcelain Sherds, Pre-1760: A Study in Composition Using Raman Spectroscopy and Electron Microscopy.' *Jones R*, 1:9–46.
- Jefferson Patterson Maryland State Museum's Diagnostic Artefacts in Maryland Archaeological Conservation Lab. <https://apps.jefpat.maryland.gov/diagnostic/>.
- Jones, R. 2018. *The Origins of Worcester Porcelain Local Ingenuity and the Pathways from Staffordshire, Stourbridge, Bow, Limehouse & Bristol*. Worcester: Parkbarn.
- King, J. 2004. 'The Importance of Plow Zone Archaeology', from *A Review and Assessment of Archaeological Investigations at 44RD183, Warsaw, Virginia*, Council of Virginia Archaeologists. <http://www.chesapeakearchaeology.org/Reports/S09%20King.pdf>.
- Latour, B. 1993. *We Have Never Been Modern*, translated by Porter, C. Cambridge, MA: Harvard University Press.
- Leone, M. 1995. 'A Historical Archaeology of Capitalism.' *American Anthropologist* 97 (2): 251–268. [10.1525/aa.1995.97.2.02a00050](https://doi.org/10.1525/aa.1995.97.2.02a00050)
- Leone, M., and B. Little. 1993. *Artifacts as Expressions of Society and Culture: Memory and Subversive Genealogy*, in Lubar, S. & Kingery, D., 160–181. Washington, D.C.: Smithsonian Institution Press.
- Loney, H., and A. Hoan. 2021. *Final Report on the Excavations, Field Walking and Level 1 Finds Assessment at Oldbury Farm*. Worcester.
- Loney, H., and A. Hoan. 2022. '50,000 Years in a Field. Report on Fieldwalking and Test Pits at Olbury Farm 2016–2017.' *Trans. of the Worcestershire Archaeol. Soc* 3: 205–218.
- Lubar, S., and D. Kingery. 1993. *History from Things*. Washington: Smithsonian Institution Press.
- Magid, B. 2010. *Alexandria Archaeology Laboratory Reference Book*, revised, June 2010. <https://www.alexandriava.gov/uploadedFiles/historic/info/archaeology/LabReferenceBook2010.pdf>
- Majewski, T., and M. O'Brien. 1987. 'The Use and Mis-Use of Nineteenth-Century English and American Ceramics in Archaeological Analysis.' *Advances in Archaeol. Method and Theory* 11: 97–209.
- Malim, T. 2001. 'Fulbourn Manor Estate: An Archaeological Survey', unpubl. rep. Archaeological Field Unit, Fulbourn Community Centre Site, Haggis Gap, Fulbourn, Cambridge, 193. Cambridge: Cambridge County Council Archaeological Field Unit.
- Maryland Archaeological Conservation Lab. 2021. 'Porcelain, Diagnostic Artefacts in Maryland', <https://apps.jefpat.maryland.gov/diagnostic/Porcelain/Index-Porcelain.html>, accessed 07/10/2021.
- Miller, G. 1991. 'A Revised Set of CC Index Values for Classification and Economic Scaling of English Ceramics from 1787 to.' *Historical Archaeology* 25 (1): 1–25. [10.1007/BF03373502](https://doi.org/10.1007/BF03373502)
- Millibank, D. & Mundin, A. (eds) 2007. *Severn Street and King Street, Royal Worcester Porcelain, Worcester: An Archaeological Watching Brief*, unpubl. rep., Thames Valley Archaeological Services Ltd., RWP04/65f.
- Mundin, A. 2019. 'Museum Car Park, Royal Worcester Porcelain Factory, Kings Street, Worcester: An Archaeological Watching Brief.' Unpubl. rep. Thames Valley Archaeological Services Ltd. RWP17/226.
- Neale, G. 2005. *Encyclopedia of British Transfer-Printed Pottery Patterns 1790–1930*. London: Miller's, Octopus Publishing Group, Ltd.
- Neville, M. 2016. *The Birth of Industrial Glasgow: The Archaeology of the M74*. Edinburgh: Soc. of Antiq. of Scotland.
- Owen, J. 1998. 'On the Earliest Products (ca. 1751–1752) of the Worcester Porcelain Manufactory: Evidence from Sherds from the Warmstry House Site, England.' *Historical Archaeology* 32 (4): 63–75. [10.1007/BF03374272](https://doi.org/10.1007/BF03374272)

- Owen, J. 2003. 'The Geochemistry of Worcester Porcelain from Dr Wall to Royal Worcester: 150 Years of Innovation.' *Historical Archaeology* 37 (4): 84–96. [10.1007/BF03376625](https://doi.org/10.1007/BF03376625)
- Palmer, M., M. Nevell, and M. Sissons. 2012. *Industrial Archaeology: A Handbook, CBA Practical Handbook No. 21, St Mary's House*. York: Council for British Archaeology.
- Patrick, C., and S. Ratkai. 2009. *The Bull Ring Uncovered: Excavations at Edgbaston Street, Moor Street, Park Street and the Row, Birmingham 1997–2001*. Oxford: Oxbow Books.
- Pearce, J. 2008. 'English Porcelain of the 18th Century in Archaeologically Excavated Assemblages from London.' *Engl. Ceram. Circ. Trans* 20 (2): 273–314.
- Pearce, J., R. Taylor, I. M. Betts, A. Pipe, B. Richardson, and K. Stewart. 2013. 'The Stock-in-Trade of a Parish Scavenger: An 18th-Century Community Reflected in Refuse from Excavations at 9 and 11 Duke Street, London.' *Post-Medieval Archaeol* 47 (2): 281–322.
- Pinch, T., and W. Bijker. 1987. 'The Social Construction of Facts and Artifacts', in Bijker, Hughes & Pinch 1987, 17–50.
- Ramsay, W., and E. Ramsay. 2008. 'A Case for the Production of the Earliest Commercial Hard-Paste Porcelains in the English-Speaking World by Edward Heylyn and Thomas Frye in about 1743.' *Proceedings of the Royal Society of Victoria* 120 (1): 236–256.
- Rathje, W., and C. Murphy. 2001. *Rubbish! The Archaeology of Garbage*. New York: Tucson: University of Arizona Press.
- Ratkai, S. 2009. 'The Pottery', in Patrick & Ratkai 2009, 92–171.
- Riordan, T. 1988. 'The Interpretation of 17th Century Sites through Plow Zone Surface Collections: Examples from St. Mary's City, Maryland.' *Historical Archaeology* 22 (2): 2–16. [10.1007/BF03374085](https://doi.org/10.1007/BF03374085)
- 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 (1): 166–180. [10.1111/apaa.12069](https://doi.org/10.1111/apaa.12069)
- Robinson, C. 2005. 'The Saggur Works at Caughley Excavation of the Works', The Wolverhampton Archaeology Group, project no. 13.
- Roller, M. 2019. 'The Archaeology of Machinic Consumerism: The Logistics of the Factory Floor in Everyday Life.' *Historical Archaeology* 53 (1): 3–24. [10.1007/s41636-018-0149-0](https://doi.org/10.1007/s41636-018-0149-0)
- Rosignol, J., and L. Wandsnider. 1992. *Space, Time and Archaeological Landscapes*. New York: Plenum Press.
- Sánchez, D. 2019. 'Area B, Royal Worcester Site, King Street, Worcester an Archaeological Excavation and Watching Brief.' unpubl. rep., Thames Valley Archaeological Services Ltd., Reading. RWP17/223.
- Sandon, H. 1980. *Worcester Porcelain 1751–1793*, 3rd ed. London: Barrie & Jenkins.
- Sandon, J. 1981. 'Recent Excavations at Worcester 1977–1979.' *English Certificate Circular* 11: 2–11.
- Sandon, H., and J. Sandon. 1989. *Grainger's Worcester Porcelain*, London: Barrie & Jenkins.
- Savage, G., and H. Newman. 1985. *An Illustrated Dictionary of Ceramics*. London: Thames & Hudson, Ltd.
- Shackel, P., P. Mullins, and M. Warner. 1998. *Annapolis Past: Historical Archaeology in Annapolis, Maryland*. Knoxville: University of Tennessee Press.
- Symond, J. 2010. 'Historical Archaeology and the Recent Urban Past.' *Internal Journal of Heritage Studies* 10 (1): 33–48.
- Thomas, N. 2016. *Archaeological Desk-Based Assessment*. Worcester: University Court, unpubl. rep. CGMS ref: CP/NT/22084.
- Tyler, R., R. Stephenson, J. Owen, and C. Phillpotts. 2000. *The Limehouse Porcelain Manufactory: excavations at 108–116 Narrow Street*. London: Molas Monogr. Ser. 6.
- van Laun, J., and W. Cook. 2008a. *Royal Worcester Porcelain Works, Historical and Industrial Research of the Group Composed of Buildings K1, K2 and K3 Extension*, unpubl. rep. John van Laun Associates & Archenfield Archaeology Ltd., Caplor Farm, Herefordshire, Archenfi2-53062_9.
- van Laun, J., and W. Cook. 2008b. *Royal Worcester Porcelain Works, Historical and Industrial Research of Building J*, unpubl. rep. John van Laun Associates & Archenfield Archaeology Ltd., Caplor Farm, Herefordshire, Archenfi2-53062_7.
- van Laun, J., and W. Cook. 2008c. *Appendix Royal Worcester Porcelain Works, Historical and Industrial Research of the Group Composed of Buildings E and G*, unpubl. rep. John van Laun Associates & Archenfield Archaeology Ltd., Caplor Farm, Herefordshire, Archenfi2-53062_4.
- van Laun, J., and W. Cook. 2008d. 'Appendix Royal Worcester Porcelain Works, Historical and Industrial Research of the Group Composed of Buildings A, B, C, C1, F, H and I', unpubl. rep. John van Laun Associates & Archenfield Archaeology Ltd., Caplor Farm, Herefordshire, Archenfi2-53062_2.
- Vince, A., and K. Steane. 2007. 'Assessment of Pottery and Kiln Furniture from the Royal Worcester Porcelain Factory, Worcester', unpubl. rep. The Alan Vince Archaeology Consultancy, RWP04/65.
- Vince, A., and K. Steane. 2007. 'Finds', in Millibank & Muddin 2007, 12.
- Vince, A., and K. Steane. 2008. 'Assessment of Additional Pottery and Kiln Furniture from the Royal Worcester Porcelain Factory, Worcester', unpubl. rep., The Alan Vince Archaeology Consultancy, RWP04/65.

- Wallis, S., and D. Colls. 2006. *Portland Works, Royal Worcester Porcelain, Portland Walk, Diglis, Worcester*, unpubl. rep., Thames Valley Archaeological Services, Ltd., Reading.
- Warner, M. 1998. 'The Best There Is of Us': Ceramics and Status in African American Annapolis.' In Shackel, P., Mullins, P. & Warner, M. 1998.
- Watt, S. 2011. *The Archaeology of the West Midlands: A Framework for Research*. Oxford: University of Birmingham, Oxbow Books.
- Wessex Archaeology Ltd. 2014. 'Severn Street, Worcester, Worcestershire Archaeological Evaluation and Watching Brief Report', unpubl. rep. WCM102031_EVAL.
- White, H., S. Paynter, and D. Brown. 2015. *Archaeological and Historical Production Sites Guidelines for Best Practice*. Swindon: Historic England.
- Whitehead, S., and E. Conlin Casella. 2012. Mrs. Perrin's 'Tracklements': Community Life and Class Distinction in (Post)industrial-era Cheshire', in Beaudry and Symonds 2012, 177–196.
- Wooler, F. 2015. 'The Excavation of 19th-Century Back-to-Back Housing and Courts and the Kenyon Cutlery Works at the Site of the Stephenon Blake-Type Foundry, Upper Allen Street, Kenyon Alley and Edward Street, Sheffield.' *Post-Medieval Archaeology* 49 (2): 313–333. [10.1080/00794236.2015.1124198](https://doi.org/10.1080/00794236.2015.1124198)
- Worcester County Council. 2022. 'Worcestershire Ceramics Database.' Accessed May 29, 2022. <https://www.worcestershireceramics.org/>.
- Young, J. 2013. 'A Report on the Pottery from Yearsley Moor, North Yorkshire.' In *Lime & Ice Project (2008–2013)*. Swindon: English Heritage.

SUMMARY IN FRENCH, GERMAN, ITALIAN AND SPANISH

FRENCH

REBUTS DE PORCELAINE ET PRODUCTION DE PORCELAINE À WORCESTER : LE TÉMOIGNAGE PAYSAGER DE LA PROSPECTION PÉDESTRE

RÉSUMÉ : La prospection au sol a fourni un échantillon longitudinal de la production de céramique des manufactures de porcelaine qui ont fonctionné dans la ville de Worcester de 1751 à 2009. Jusqu'au XX e siècle, les déchets domestiques et industriels de la ville étaient utilisés comme fumier ou comme remblais dans les champs du comté. Des rebuts de cuisson et des déchets de biscuits datant des premières phases de la production jusqu'aux produits fabriqués à la fin du XIX e -XX e siècle ont été découverts, ainsi que des déchets domestiques contemporains. Cet assemblage livre une série d'instantanés de la production de porcelaine et de semi-porcelaine qui permettent d'identifier les tendances en matière de pâtes, de formes, de fabrication et de consommation.

GERMAN

PORZELLANABFÄLLE UND PORZELLANPRODUKTION IN WORCESTER: DER LANDSCHAFTSBEWEIS DURCH FELDBEGEHUNG

ZUSAMMENFASSUNG: Die Feldstudie liefert uns ein Muster im Längsschnitt der Zeitachse, welches Aufschluss gibt über die Keramikproduktion durch Porzellanfabriken, die in der Stadt Worcester von 1751 bis 2009 betrieben wurde. Bis zum 20. Jahrhundert wurden Haushalts- und Industrieabfälle

genutzt als Dünger und Schotterunterfütterung auf den Feldern und umliegenden Ländereien. Wir haben Abfälle aus Brennöfen und Biskuitabfälle aus den frühen Phasen der Produktion bis hin zu Waren aus dem späten 19./20. Jahrhundert gefunden, zusammen mit zeitgenössischem Hausmüll. Diese Sammlung bietet eine Reihe von Momentaufnahmen der Porzellan- und Halbporzellanproduktion, die uns ermöglichen, Entwicklungen bezüglich Material, Form, Herstellung und Konsumverhalten zu identifizieren.

ITALIAN

SCARTI DI PRODUZIONE E MANIFATTURA DI PORCELLANA A WORCESTER: TESTIMONIANZE NEL PAESAGGIO DALLA RICOGNIZIONE ARCHEOLOGICA

RIASSUNTO: La ricerca di superficie può fornire una testimonianza diacronica della produzione di porcellana nelle fabbriche attive nella cittadina di Worcester dal 1751 al 2009. Fino al XX secolo, gli scarti domestici e quelli di produzione provenienti dalla città furono impiegati come concime/riempimento nei campi di tutta la regione. Sono stati trovati scarti di fornace di prodotti finiti e di biscotti riconducibili alle prime fasi di produzione, così come prodotti realizzati nel tardo XIX e nel XX secolo, unitamente a scarti domestici coevi. Questo nucleo fornisce una serie di spaccati sulla produzione di porcellana e semi-porzellana, permettendoci di identificare le tendenze relativamente ai tipi di impasto, alle forme, al processo produttivo e all'impiego degli oggetti finiti.

SPANISH

*PRODUCCIÓN Y DESECHOS DE
PORCELANA EN WORCESTER: DATOS DE
PROSPECCIÓN EN EL PAISAJE*

RESUMEN: La prospección arqueológica puede producir una muestra longitudinal de la producción de cerámica de las fábricas de porcelana que operaron en la ciudad de Worcester desde 1751 hasta 2009, ya que los desechos domésticos e industriales

de la ciudad se utilizaron hasta el siglo XX como estiércol en los campos de la zona. Durante las prospecciones hemos encontrado restos de hornos y desechos de las primeras fases de producción hasta finales del siglo XIX y XX, junto con desechos domésticos contemporáneos. El conjunto nos ofrece datos sobre la producción de porcelana y semiporcelana que nos permiten identificar tendencias en los tipos de pastas, formas, fabricación y consumo de la época.

Helen L Loney, University of Worcester, 6 Martley Road, Worcester, WR2 6HG [h.loney@mac.com]

*Andrew Hoaen, University of Worcester, 6 Martley Road, Worcester, WR2 6HG
[awhoaen1@mac.com]*