THE ROMANO-BRITISH POTTERY FROM THE KILNS AT LUMB BROOK, HAZELWOOD, DERBYSHIRE

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INTRODUCTION

Excavations of six Romano-British pottery kilns and a feature identified as a lead-roasting hearth were carried out in 1972–3 by W.A. Webster, Peter Baker and the Erewash Archaeological Research Committee at Lumb Brook, Hazelwood, Derbyshire (SK 32944576). An interim report on the excavations appeared in *Derbyshire Archaeological Journal* 108 in 1988 at the initiative of M. Brassington and included a site plan, photographs of the kilns and excellent illustrations of the range of forms present at the site, with notes as to context and colour of the sherds. Sadly since then no definitive report has appeared and, due to the ill health of one of the excavators, the site plans and notebooks are no longer available. It is, therefore, very fortunate that the interim report was published since further excavation data may never be forthcoming.

The present study seeks to augment the interim report by characterising the fabrics produced at the kilns using macroscopic and petrological techniques and to identify any additional forms present. A full archive catalogue of the pottery and various quantifications and analyses were produced, including analyses of the fabrics and forms in each kiln group. This also included the incidence of decorative motifs on forms and fabrics and, within kiln groups, the forms incidence in each fabric group, the rim diameter/form relationships and fabric and form quantifications. In addition, the project sought to examine catalogued and published pottery groups from stratified deposits in Derbyshire for examples of the grey ware products with a view to determining the date range of individual types or fabrics.

The fabric analysis identified a single common quartz-tempered fabric, subdivided on the basis of colour, which is characterised by hardness and, in the oxidised version, by a brick red colour. Some sherds were in buff and orange hues and a small number of sherds were fired rather softer than the normal products. Some of these sherds would be difficult to differentiate from the products of other kilns in the East Midlands but most would be relatively distinctive, especially when combined with some typological characteristics. The Derbyshire ware fabric is also described and some sherds of "pre-Derbyshire ware" were noted. Both these fabric groups included waster and overfired sherds and were probably being made in the kilns. A number of 'imported' wares were present, such as BB1, samian, Nene Valley colour-coated wares and mortaria, but one fine grey fabric, GRA2, may also be an import from the Racecourse kilns, or may be being made at Lumb Brook in the earliest kiln(s).

The form characterisation identified four principal products and highlighted distinctive features that will aid identification on settlement sites. Dating evidence is discussed in

terms of the known site stratigraphy and datable 'imported' ceramics. An overall date range in the mid or late second century to the mid third century is suggested, slightly refining Webster and Brassington's date of "mid-second century. . . with intermittent occupation . . .into the third century" and suggesting a slightly different sequence of kiln construction (Webster and Brassington 1988, 32). The nature of the assemblages from the kilns and the possible range of ceramics made in each kiln are also discussed. It is concluded that kiln 4 was not used exclusively to produce coarse wares but rather fired both Derbyshire ware jars and coarse ware vessels.

THE POTTERY

Fabrics

Hand specimen

The fabrics were examined macroscopically and using an x30 microscope to determine the fabric groups, their characteristics and the extent to which fabrics merged as part of a continuum or were distinct and separate. The fabric descriptions follow Tomber and Dore 1998 and type sherds have been sent to the National Roman Fabric Reference Collection.

The fabric of the pottery was first examined by eye and sorted into fabric groups on the basis of colour, hardness, feel, fracture, inclusions and manufacturing technique.

Colour: narrative description and Munsell colour values (Munsell 1992).

Hardness: after Peacock 1977
- soft - can be scratched by finger nail
- hard - can be scratched with penknife blade
- very hard - cannot be scratched

Feel: tactile qualities
- smooth - no irregularities
- rough - irregularities can be felt
- sandy - grains can be felt across the surface
- leathery - smoothed surface like polished leather
- soapy - smooth feel like soap

Fracture: visual texture of fresh break, after Orton 1980.
- smooth - flat or slightly curved with no visible irregularities
- irregular - medium, fairly widely spaced irregularities
- finely irregular - small, fairly closely spaced irregularities
- laminated - stepped effect
- hackly - large and generally angular irregularities

Inclusions:

Type: after Peacock 1977

Frequency: indicated on a 4 point scale - abundant, moderate, sparse and rare. Where abundant is a break packed with an inclusion, grading through moderate and sparse to rare, which is a break with only one or two of an inclusion.

Sorting: after Orton 1980

Shape: angular - convex shape, sharp corners
- subangular - convex shape, rounded corners
- rounded - convex shape no corners
- platey - flat

Size: subvisible - only just visible at x30 and too small to measure
fine - 0.1–0.25mm
medium - 0.25–0.5
coarse - 0.5–1mm
very coarse - over 1mm

The codes used here are based on the National Roman fabric collection codes given to Derbyshire ware (DER CO), expanded to include the new fabrics.

DER CO: Derbyshire ware. Both reduced and oxidised ware was produced with a very wide range of colours (Tomber and Dore 1998), from grey to orange, buff, maroon and red. Very hard with hackly or conchoidal fracture and rough feel, like "petrified goose-flesh" (Gillam 1939). Common ill-sorted, medium to coarse, subangular quartz, including polycrystalline examples.

DER RE: reduced fabric group, divided macroscopically from DER OX on the grounds of colour and from DBY on the grounds of inclusion size.

DER RE1: grey and greyish brown (N4, 2.5Y5/1–2, 2.5Y4/1) sometimes with red/brown core (2.5YR4/3–4, 5YR5/8, 5YR6/8) and occasionally buff (10YR7/6,10YR7/8) throughout or partially. Very hard with smooth feel and finely irregular fracture, and sometimes the fabric is so hard that the fracture is almost stepped like a fine slate. Moderate, well-sorted, medium/fine, subangular quartz; rare, ill-sorted, coarse, subangular quartz, sparse, ill-sorted, medium to fine, rounded, brown, inclusions. Micaceous.

DER OX: oxidised fabric group, divided from DER RE on the grounds of colour and from DBY on the basis of inclusion size. What may be a single fabric group was divided on the basis of colour.
Some of the examples from the kiln were fairly soft and it was not clear if this was due to underfiring or was deliberate. The softer examples would be extremely difficult to differentiate from the products of other local kilns.

DER OX1: yellowish red (7.5YR7/8, 7.5YR7/6, 5YR5/8, 5YR6/8) with darker reddish orange slip/self-slip (5YR5/8, 5YR5/6) and sometimes a grey core (N4/1). Fairly hard with smooth feel and finely irregular fracture. Moderate, well-sorted, medium/fine, subangular quartz; rare, ill-sorted, coarse, subangular quartz, sparse, ill-sorted, coarse to fine, rounded, brown, inclusions. Rare coarse sandstone. Micaceous.

DER OX2: buff (10YR7/6, 10YR6/6) sometimes with greyish surface (10YR7/2, 10YR6/2). Fairly hard with smooth feel and finely irregular fracture. Moderate, well-sorted, medium/fine, subangular quartz; rare, ill-sorted, coarse, subangular quartz, sparse. ill-sorted, coarse to fine, rounded, brown, inclusions.

DER OX3: reddish brown (5YR5/6, 5YR5/6, 7.5YR6/6) with reddish grey slip (5YR4/1–2) with white paint. Fairly hard with smooth feel and finely irregular fracture. Moderate, well-sorted, medium/fine, subangular quartz; rare, ill-sorted, coarse, subangular quartz, sparse. ill-sorted, coarse to fine, rounded, brown, inclusions. Rare coarse sandstone. Micaceous.

Visual examination of the assemblage confirmed that the two fabric groups RE and OX are likely to be the same fabric other than variations in colour. Joining sherds of RE1 and OX1 were identified where a vessel had clearly fractured in the kiln and the sherds undergone contrasting firing conditions resulting in adjoining sherds of completely different hues. Many sherds were mottled and defied classification. Nonetheless, sufficient sherds occurred in each fabric group to suggest that the above definitions were considered

desirable as a finished product. In addition, examples from the settlement sites suggest that the four fabrics can be recognised there.

GRA2: medium to pale grey, sometimes with light brown core. Often hard, but in some cases soft, with fairly smooth fracture and smooth feel. Sparse, well-sorted, fine, subrounded quartz, rare medium-sized, subrounded quartz, rare, ill-sorted, fine to medium-sized, rounded black/brown iron-rich inclusions.
This fabric contrasts with the other reduced and oxidised wares on the site and closely resembles sherds from the Derby Racecourse kilns. The principal distinguishing features are size of inclusion, colour and hardness.

GRB1: general group for medium, quartz-tempered grey wares which are not distinctive.

BB1: Black-Burnished ware category 1 (Williams 1977). Compares with South-East Dorset burnished ware (Holbrook and Bidwell 1991, 100).

GLZ: single sherd of RE1 with greenish glaze over all surfaces including the break.

MH1: Mancetter-Hartshill mortarium.

NV1: Nene Valley colour coated ware.

TS: samian ware.

OBC1: buff. Fairly soft with rough feel and irregular fracture. Moderate, ill-sorted medium to coarse, subangular quartz and sparse, including some polycrystalline, ill-sorted, fine to coarse, brown-red inclusions and ill-sorted, fine to medium-sized, rounded, soft white inclusions. The white inclusions in this fabric are more like those in the Derbyshire fabric from Hazelwood (see thin-section report).

Thin-section analyses

By R. Firman and Ruth Leary

Thin-section slides of samples from the major fabric groups were prepared by the Centre for Applied Archaeological Analyses (ceramic petrology) at Southampton University and submitted to Ron Firman, University of Nottingham, for identification. The cost of the thin-sections restricted the scope of the study to one or two samples per fabric group, along with samples from Derby Racecourse (fine ware and "pre-Derbyshire" ware) and Hazelwood (Derbyshire ware) included for comparative purposes.

The study confirmed the utilisation of clay sources local to the kilns. The two fabrics studied from the Derby Racecourse kilns indicated the use of quite different clay sources. A fine, oxidised flanged rim bowl was made from clay probably obtained from alluvium deposits derived from weathered Mercia Mudstones in the Derwent Valley in Derby available as little as 1km away and certainly no more than 3km. The "pre-Derbyshire ware" rebated-rim jar, by contrast, is most likely to have been made from clays derived from weathered Waterstones available very near to the kilns' location, within Racecourse Park. The section also revealed unsuspected evidence for extensive modification of the coarser ware in terms of its surface treatment.

The analyses suggest that Derbyshire ware comprises several fabrics local to the kiln making it. The potters working at the Lumb Brook kilns also used raw material readily available on the sides of deeply incised streams near Lumb Gorge. All the fabric groups are consistent with the expected textures and mineralogies of pots made from weathered mudstones from the beds below the Ashover Grit. Although the Derbyshire ware sherd is much coarser than the other coarse wares, it is still consistent with raw material derived from this area. The Derbyshire ware sherd from Hazelwood was unexpectedly quite different from the Lumb Brook sherds and proved difficult to source. Several possible

scenarios were envisaged, all of which, although local, involved considerable preparation of the clay in either adding both calcite granules and sand to local weathered Namurian shales, or in removing inclusions from the local glacial till and then adding the desired size of sand inclusions, or in carrying alluvial muds from the valley bottom uphill for at least 1km. Further study of sherds of Derbyshire ware from the Hazelwood kilns revealed that not all the sherds presented the calcitic fabric seen in thin-section. It may be useful to carry out a more extensive study of the Derbyshire ware fabrics and investigate the characterisation of the fabrics from known kilns.

The analyses of the Lumb Brook coarse wares revealed an encouragingly homogeneous fabric and suggested the same source was used for all the fabric subgroups (DER RE and OX). Indeed the same source was probably also used for the Derbyshire ware (DER CO) made at Lumb Brook, although a coarser fraction was selected.

The Petrofabrics

By R. Firman

Derby Racecourse wares

These two thin-sections are petrologically markedly different, thus confirming the impression gained from visual inspection that the pottery was made from differing materials utilising different methods.

DRC

This sherd came from a flanged hemi-spherical bowl of a type commonly produced in the Derby Racecourse kilns and dating to the Hadrianic–Antonine period (Brassington 1971, fig.7). The fabric is characterised by an abundance of small, fine-grained, dark inclusions which exhibit a considerable range and shape from tiny wisps to relatively large, up to 1mm, ovoids. Many of the smaller inclusions are flattened or 'streaked out' parallel to the edge of the sherd indicative of plastic deformation of cognate inclusions when the pottery was moulded. Some of the larger dark fine-grained inclusions have ragged ends which could result from pulling the clay apart prior to moulding. A few of these larger (*c.* 0.5–1.0mm) are laminated and tend to ovoid; presumably mud clasts formed during the natural weathering or due to man's agency when turning and mixing the clay. Others have the appearance of being tiny wafers of paper-thin sedimentary laminae, similar, though thinner, than those in the larger laminated inclusions.

These numerous fine-grained inclusions (as opposed to the less frequent coarse grained inclusions) of differing shapes and sizes are set in a fine-grained (less than 0.02mm) matrix suffused with tiny angular quartz grains. Though this matrix is strikingly almost black in the core and a pale biscuit colour in the outer 1.5–2.0mm margin of the sherd, there is no significant difference in the mineralogy or texture between the core and margins. A few slightly larger angular quartz grains are present (up to 0.05mm) together with one fragment of polycrystalline quartzose rock, measuring *c.* 0.2 × 0.5mm, which might be the source of the slightly larger quartz grains in the matrix. Mica is apparently rare, only a few grains being large enough to identify positively, though judging from the birefringence of parts of the matrix, there may be some white mica in the finer grained fraction, or possibly calcite or both.

The nature and origin of the pottery clay used is problematic. The very dark, almost black core contrasting with the pale, apparently underburnt margins, indicates that reducing conditions obtained in the core during firing. This suggests that the original sediment was rich in organic material. In the contrasting pale margins this organic material must have been oxidised, the pale colour being indicative of a pottery clay with a high reactively available Ca: Fe ratio, as occurs in some of the Carboniferous calcareous clays and some parts of the Mercia Mudstones. Given the locality, the latter would seem the most likely source, particularly since Bridges (1966) has reported that the B and horizons in the Worcester Series soils, which outcrop west of Derby, are notably calcareous. Many of these soils have developed on the lower parts of the Mercia Mudstones, namely the Radcliffe and overlying Carlton formations. Both of these formations were formerly well exposed in the Derby Brick Pit (334358) where Frost and Smart (1979) recorded detailed stratigraphical sections which included (1979, 156 a & b) some 18 ft of Radcliffe Formation, much of it fine grained and laminated, and *c.* 36 ft of the Carlton formation, much of which was bedded and not laminated. Experience elsewhere (author's unpublished consultant's report for the former Chilwell Brick Company) suggests that the upper part of the Carlton formation might, as at Chilwell, be expected to produce pale yellowish ceramics. The paper-thin tiny wafers which are so characteristic of this microscope slide are, however, most likely to have come from the underlying Radcliffe Formation. Restoration of quarried ground and extensive housing developments preclude any meaningful study of slopes down from the sites of these brick pits, but it is reasonable to infer that in Roman times they would have been mantled with solifluxion deposits derived from the Radcliffe and Carlton formations. Arguably, therefore, clays could have been collected from slopes, no more than 3km from the Racecourse kilns, which, with the modicum of processing to remove the coarsest particles, could have been used for making pottery with a similar texture and mineralogy to the oxidised part of this sherd.

As at other potential source locations west of Derby, these soliflucted Mercia Mudstones are unlikely to have contained sufficient organic matter to produce the very dark almost black core seen in this pottery. Although it might have been deliberately added to facilitate firing, it seems more likely that organic rich sediments were used. If so, muddy alluvium or lacustrine sediments in the valley bottoms of the River Derwent seem the most likely source in those parts of the valley where the bulk of the sediments are derived from weathered parts of the lower Mercia Mudstones. In this connection it is interesting to note that both Mackworth and Markeaton Brooks drain land underlain by the lower part of the Mercia Mudstones and consequently the alluvium in the Derwent Valley in Derby, below its confluence with the Mackworth Brook, is likely to be rich in sediments derived from the Radcliffe and Carlton formations. Alluvium much nearer to the Derby Racecourse is thus, theoretically, a potential source. Unfortunately little is known of the petrography hereabouts or indeed whether alluvial clays were used by either of the two major ceramic industries, Derby porcelain and the Cockpit Hill pottery, established in the mid 18th century. Sampling alluvium for petrographic analysis in this built-up area would be difficult, if not impossible, and though it would be interesting to compare the petrography of early examples of Cockpit Hill pottery with this Roman sherd it would not, even if both had similar petrofabrics, prove that both utilised alluvial muds in their manufacture.

K2B

This section was of a sherd from a rebated-rim jar in a coarse oxidised fabric, corresponding to Brassington's "pre-Derbyshire ware" (1971, fig. 11). In most respects this sherd is the antithesis of DRC. It is redder with a much paler dark core and a rougher surface studded with quartz grains up to 2mm in diameter. The thin section confirms the suspected coarser, sandier texture, though surprisingly in view of the rough surfaces, provides evidence of sophisticated techniques designed to produce a smooth surface. Herein lies the main interest in this thin section since not only does it reveal insights into the potter's techniques of moulding and finishing, but also raises the question of whether the potter was unsuccessful or whether the present rough surface is the result of subsequent weathering.

The section cuts through 8mm of sherd consisting of about 5mm of dark core bounded on one side with *c.* 1.5mm of brownish red oxidised zone with the same texture and mineralogy as the dark core, and on the other a slightly thinner, paler zone with layered structure markedly different from the core. Both margins are slightly convex so it is not possible from this particular section to distinguish the outer from the inner sides of the pot on the basis of shape, though an inner, layered surface is logistically unlikely. The unlayered, presumably inner, oxidised margin is slightly streaky in places though otherwise has a comparable structure, texture and mineralogy to the dark core. This consists essentially of plentiful subangular sand grains, ranging in size from 0.2–1.5mm, set in a fine-grained apparently amorphous matrix studded with angular quartz grains ranging from less than 0.02–*c.* 0.2mm. Mica laths up to 0.3mm long are a prominent though minor feature of the matrix. The sand grains are largely quartz with some perthitic K-feldspar and possibly plagioclase. One small micaceous siltstone clast and a few rounded mud clasts (average size *c.* 0.3mm), often armoured with sand grains, occur.

The bi-modal mineralogy, with more abundant and larger white mica laths and abundance of sand grains of various sizes, and mineralogy all suggest a coarser sedimentary source than DRC above. The nearest and most likely sources are the Waterstones (recently assigned to the Sneinton formation) which Frost and Smart (1979, 155c) described from a "degraded pit at the abandoned Derby Racecourse Station (3639 3780)". Here, according to these authors, only the lowest (1ft 10 ins) of Waterstones were present most of which consisted of "mudstone, red sandy, micaceous, interbedded with medium-grained cross-bedded sandstone". Arguably weathering of this particular exposure would produce a slightly coarser clay-silt-sand mix than is observed in this particular sherd, though the coarsest sand might have been precluded by careful selection or levigation or both. No doubt, in Roman times, there were other exposures of Waterstones near to the kilns, which like those elsewhere, may have had finer grained sandstones or alternatively alluvium derived from weathered Waterstones and may have been used. Either way careful selection of the more clayey fractions would have been necessary from what is largely a sandy formation. Whatever the precise source of this pottery clay, it seems likely to have been clay derived, indirectly or directly, from weathered Waterstones near to the kiln. Moreover, though conveniently situated, it was probably not the potters' favourite medium since, because of its excessive sand content, it was difficult to produce smooth surfaces. That the potter attempted to produce such surfaces is shown by the detailed structure of the outer *c.* 1.25mm of one side of the

sherd. Here up to seven layers of alternating micaceous silt and mud have been applied presumably to cover protruding sand grains. In this sherd, this technique appears to have required numerous applications of a fluid 'slip' to achieve a partial improvement. In this section most quartz grains have been covered and even those exposed on this layered surface may result from post-depositional weathering. However this layered margin does contain several grains of quartz and feldspar in comparable size and shape to those in the body of the pot. Whilst some were evidently covered at an early stage, the layers of silt and clay simply being distorted by the protruding grains, others have evidently been prised off and incorporated into the slip as it was applied. These grains have often pierced two or more layers with little or no distortion. The layers (or perhaps more properly laminae) are paper-thin, the mud layers being usually thinner than the silt. Both tend to have limited lateral extension with a maximum thickness of 11mm. The siltier layers tend to be thick and sometimes bifurcated. Petrologically both the mud and silt layers can be matched with the matrix and a clast in the main fabric respectively. They are thus likely to have been obtained from the same source as the pottery.

If the premise that these layers were deliberately added to smooth the surface of the vessel is correct, questions then arise about how it was done. The simplest scenario would be that the potter had either side of the fast wheel thrown pot, containers with muddy slip in one and more silty material in the other. Before the pot was removed from the wheel, whilst it was still spinning, he dipped his hands alternately into first the siltier then the muddy slip applying them to the spinning pot until satisfied. In this pot, this outer layering seems to have hindered the escape of gases, mostly water vapour, since prominent cracks have developed parallel to and within the layered margin.

Undoubtedly this layered structure, providing insights into the probable pottery fabrication techniques, would have been overlooked had it not been for thin-section petrofabric analysis. Because such analyses are still relatively rare in ceramic archaeology there is no way of telling whether this method of pottery fabrication was as rare as reported description of potsherds imply.

The layered margin is the inner surface so presumably this was to enhance the pot's functional attributes rather than appearance. The structure is visible at x30 magnification and traces of layering was found in places within both the inner and the outer margins. Other 'proto-Derbyshire ware' sherds from the Racecourse Kilns were examined for this characteristic and it was found on all the examples. The rebated-rim jar form was also made in fine reduced and oxidised wares (Brassington 1971, nos 204–225) similar to DRC above. It may be that jars in this fabric, being available near the kilns, were cheaper to produce and could be readily improved by adding muddy and silty clay slips during manufacture.

Lumb Brook

DER OX1, OX2 and OX3

The petrofabrics exhibited by these three thin sections differ insignificantly, OX1 being marginally the finer grained variety and OX3 being the coarsest. All three have a fine sandy texture, the majority of the grains being angular quartz with a unimodal distribution (i.e. with a regular gradation in size between the smallest (less than 0.02mm) and the largest (*c.* 0.1mm)) monomineralic grains. All three are micaceous to a greater or

lesser extent; the micas showing a stronger preferred orientation in OX2 than in either OX1 or OX3. In OX1 some of the *c.* 0.1mm quartzose grains are polycrystalline, probably derived from a fine-grained relatively pure sandstone. Other lithic clasts noted in OX1 include dark, fine-grained mud clasts which tend to be spherical or simply merge into the amorphous matrix and whose sizes range from *c.* 2.0–0.5mm. Also included are some pale siltstone clasts, the largest of which is *c.* 2.0 × 1.5mm and one fragment (*c.* 1.5 × 0.5mm) of a medium grained feldspathic sandstone with angular grains (*cf.* 'millstone grit'). Similar assemblages of clasts occur in OX2 and OX3 although OX2 has smaller siltstone clasts and no sandstone whilst OX3, which has a greater sand content and less mica, has a notable partially disrupted sandstone clast with grains matching those found elsewhere in the fabric.

All three petrofabrics are consistent with the expected textures and mineralogies made from weathered grey silty mudstones from the beds below the Ashover Grit, exposed on the side of the deeply incised streams near Lumb Gorge (Frost and Smart 1979, 134b). These are not reportedly micaceous, nor are the interbedded siltstones and fine sandstones reportedly feldspathic. The mica and feldspathic sandstone content, seen in thin section is, therefore, likely to have been derived from the overlying Ashover Grit, probably by the natural mixing process which occurs due to solifluxion on valley sides in periglacial conditions.

DER RE1

This fabric has basically the same texture and mineralogy as DER RE1 with more mica. It is likely, therefore, to have been made from the same source material despite the strikingly different appearance resulting from the core being redder than the grey exterior. This feature probably was caused by fluctuating kiln conditions, initially oxidising and then reducing in the later phases of firing, there being no observable differences in texture or mineralogy between core and margin which could otherwise explain this unusual colour contrast.

Derbyshire ware, kiln 4

Although this section, like many other pottery sherds (e.g. K2B above) has a grey core and reddish brown margin, it differs from most in that the core is paler and more transparent than the almost opaque margin. Indeed the core appears to be underburnt and the margin overburnt probably due to a sudden, presumably uncontrollable rise in kiln temperature. The practical consequence of this is that in the oxidised margin, which occupies two thirds of the section, it is difficult to see anything other than an apparently amorphous matrix with holes which may or may not represent minerals plucked out during thin sectioning and, most unfortunately, a mass of bubbles in the mounting medium: no doubt differences in hardness between the core and the margin made this a difficult material to section. As far as can be ascertained the overburnt margin initially had the same texture and mineralogy as the core, but partial melting and oxidation reactions have led to the formation of haematite, and numerous holes and bubbles which hinder observation and interpretation. As shown mostly in the core, the texture and mineralogy is different and distinct from the other four Lumb Brook sections. The main differences are that there is a distinct gap in the size distribution of the smaller (less than 0.02mm) and the larger (*c.* 0.1–1.0mm) otherwise similar quartz grains. There is also a

lack of either mud or siltstone clasts and some plagioclase was noted, in contrast to the more usual K-feldspar, as well as polycrystalline quartz and a little mica. Such differences suggest that the clay was derived from a different source in which mudstone silt and fine sandstone components were less well mixed, though still consistent with probable solifluxion deposits in the Lumb Brook neighbourhood. Without further research it is impossible to locate such sources precisely.

Hazelwood kiln

The colour of this sample, a yellowish red near to 5YR 5/8 (Munsell 1973), is remarkably uniform throughout, there being no evidence of an outer, redder, more oxidised zone or darker core. Microscopic examination proves that the texture is equally uniform, comprising virtually only three components, each with an unusually restricted range of grain size. Moreover there is no evidence of a gradation of grain size between the three, mineralogically distinct, components comparable to that observed in the majority of natural clastic sediments.

The main component consists of a fine-grained yellowish red, amorphous ground mass with sparsely distributed quartz grains, all of which are less than 0.02mm in diameter. The smaller grains tend to angular and the slightly larger, subangular. This part of the fabric is consistent with sedimentation into a still-water environment of muds containing mostly clays and very little silt, some of which may have been windblown.

The second component consists of an abundance of small elongate, rounded granules of calcite most of which range from *c.* 0.02–0.1mm. Probably most are much eroded fossil shell fragments, though the larger, up to 0.5mm, are recognisable as such. Amongst these are two gastropod sections, one transverse, *c.* 0.25mm, and one longitudinal, *c.* 0.1mm. They are calcitic casts similar to those which occur in both Dinantian limestones and calcareous shale, and are probably similar to those noted by Frost and Smart (1979, 157b) from boulder clay in the bottom of the Ecclesbourne Brook Valley. None of these calcite granules show the sharp edges associated with the broken and crushed shells of shell-gritted pottery although, if formed by natural processes, it must have been in very different environments from those of the main component.

The third component is again quite distinct and indicative of yet another primary source. It consists of angular and irregular sand grains, mostly quartz with some K-feldspar and one fragment of sandstone, the grains ranging in size from *c.* 0.1–0.5mm (i.e. overlapping in size with only a few of the larger calcite grains and showing no sign of being water worn or otherwise rounded).

Although the general impression is of a very uniform texture there are rare dark, presumably cognate small fine-grained inclusions, most of which have been streaked out into wisps of darker material. These and the elongate calcite granules impart a strong preferred orientation to the petrofabric parallel to the edge of the sherds. Presumably this developed during the wheel-thrown moulding process.

Though the components of these sherds could all have been relatively local they seem most likely to have come from a single natural source without considerable modification during processing. The fine grained ground mass is consistent with clay derived from weathering of the Namurian shales which underlie the Ashover Grit and which are exposed in the valley sides of deeply incised streams in the Hazelwood area (Frost and Smart 1979, 134b). These give rise to the distinctive soils, known as the Hazelwood

series, sub soil analyses of which show a greater clay/silt ratio than any other in Derbyshire (Bridges 1966, 40–1, 77–85). Such materials with 65% clay (i.e. particles 2) and 35% silt (2–50) and no sand, would whatever the constitution of the clay minerals, have required an added filler to improve its workability. The sand, and to some extent, the calcite granules served this function. Sand could inadvertently have been incorporated from the overlying Ashover Grit as a result of slumping on the valley sides, though given that the Ashover Grit is usually micaceous and that this petrofabric lacks mica, an alternative source of sand is more likely. This could have been the nearby glacial sands in which mica, if formerly present, has been winnowed out. Subject to further investigation the nearest source of sand seems to have been near Shottlegate (314, 476) as described by Frost and Smart (1979, 157c).

The local mudrocks in the Hazelwood area are all reportedly non-calcareous so if these Namurian shales were the basis of the Hazelwood pottery clays, not only sand but also crushed limestone fossils would have had to be added. The nearest convenient source for this calcitic component lies 10km north-west of Hazelwood in the vicinity of Wirksworth, possibly from former screes now removed by quarrying. If this was the source, the coarser more angular scree fragments would have been removed and the remaining fine grained fraction probably intensively ground to achieve the particle shapes and size range exhibited by the thin sections; always bearing in mind that since calcite functions as a flux as well as a filler, the finest 'dust' fraction will not be represented in thin sections because it will have reacted with other minerals.

A model envisaging the use of local weathered Namurian shales with added sand and calcite granules is not, therefore, without its problems. The alternative, namely the use of local, Hazelwood glacial till (boulder clay) is equally problematic. Frost and Smart (1979, 157b) do not describe the till nearest to the Hazelwood kiln though, given the ice probably moved south eastward from the White Peak towards Hazelwood, the assemblages they record in till in the Ecclesbourne Valley are likely to be comparable to those at Hazelwood. Limestone and sandstone fragments, calcareous nodules with gastropods and east of Iridgehay a more sandstone rich deposit, have all been reported mixed in with locally derived clays. Parts of the till at Hazelwood are, therefore, likely to contain the same constituents as the Hazelwood sherds, but not with the same restricted grain size ranges or the absence of other constituents such as chert and quartzite which occur in the Ecclesbourne tills. Briefly, the local tills are very heterogeneous, both mineralogically and texturally, whereas the clays used for making this kind of pottery at Hazelwood are remarkably homogenous with uniform textures. To convert the local glacial till to pottery clay, comparable to that used in this sherd, would therefore entail the removal of almost all grains and rock fragments greater than 0.5mm. This could certainly have been achieved in settling tanks or ponds from which the finer material was floated or washed off. If this was the procedure then it is surprising that calcite granules larger than 0.1mm are so rare when larger fragments of limestone occur in the glacial till. Possibly only a much finer fraction was used, mostly less than 0.1mm, consisting largely of clay and calcite granules to which the sand was added to achieve the consistency and texture required. Alternatively alluvial muds in the Ecclesbourne Valley bottom, which are themselves derived from the Ecclesbourne glacial till, might have been the starting material. If so, these clays would have to have been carried uphill for at least 1km to the

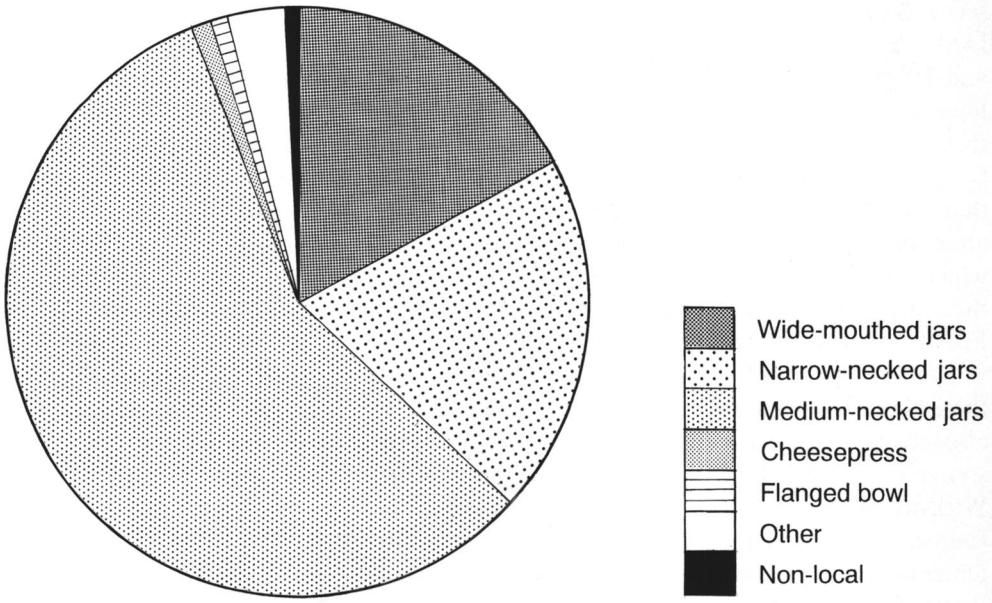

Fig. 1: Lumb Brook: quantification of vessel forms (using rim % values).

kilns; an unlikely scenario given that both the weathered Namurian shales and glacial tills were available close to the kilns.

Despite uncertainties, arising largely from a lack of detailed knowledge of the petrography of locally available raw material, it is evident that the clays were selected and sophistically processed with great care. Whether the starting materials were weathered Namurian shales, glacial tills or possibly alluvium remains unresolved, as does the precise processes by which the clays were modified and refined to produce the pottery clay used for this sherd.

Forms

The predominant forms could be divided into four principal types: medium-necked jars with cupped and hooked rims, wide-necked jars and narrow-necked ovoid jars (Fig. 1). In addition, single examples of other types included a knobbed lid, a flanged bowl and non-local types such as a black-burnished ware jar, a Nene Valley beaker and bowl, and a Mancetter-Hartshill mortarium fragment.

Medium-necked jars

The most common vessel type in the kilns, the medium-necked jars were nearly all of Derbyshire ware with a small number in fabrics RE1 and OBC1 (Fig. 2). Six rim variants were identified (Fig. 3; Fig. 10 nos 1, 9; Fig. 13 nos 34, 48; Fig. 14 no. 54): everted, hooked, bifid hooked and cupped rims, the last further sub-divided into those with a plain cupped rim, a beaded cup rim and a externally grooved or rippled cupped rim. The variants can be paralleled easily at other Derbyshire ware kiln sites (*cf.* Kay 1960, figs 6–9). The distinctive cupped-rim form identified at Holbrook with internal groove was absent. The cupped-rim varieties were the most common group overall and three

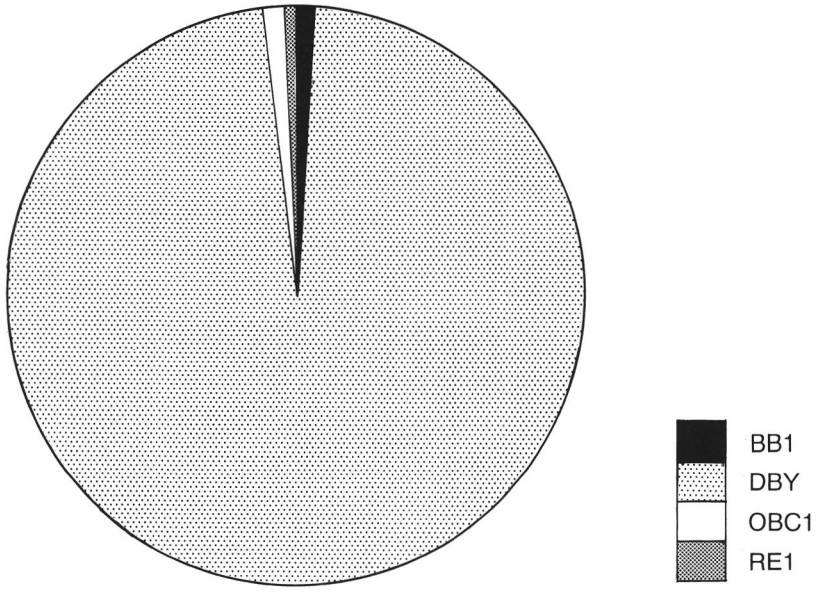

Fig. 2: Lumb Brook: medium-necked jar fabrics (using rim % values).

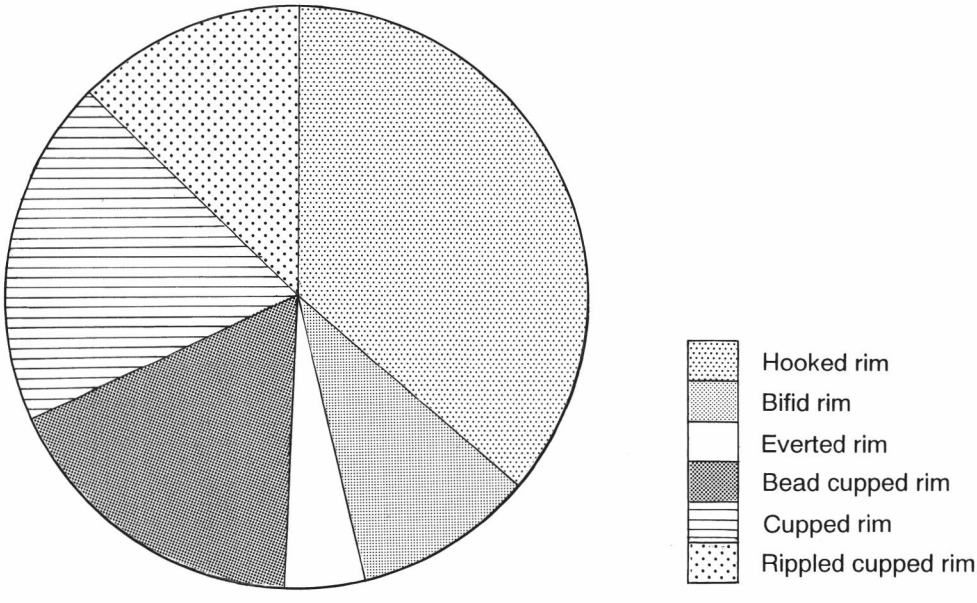

Fig. 3: Lumb Brook: medium-necked jar forms (using rim % values).

examples, two from 5 6 ST/FILL and one without context information, approximated to a rebated-rim form of the type made at the Racecourse kilns (Brassington 1971, nos 204–225). Very few examples bore any surface treatment and then only with a groove around the neck. A badly distorted and vitrified rim and bodysherd of a cupped rim jar

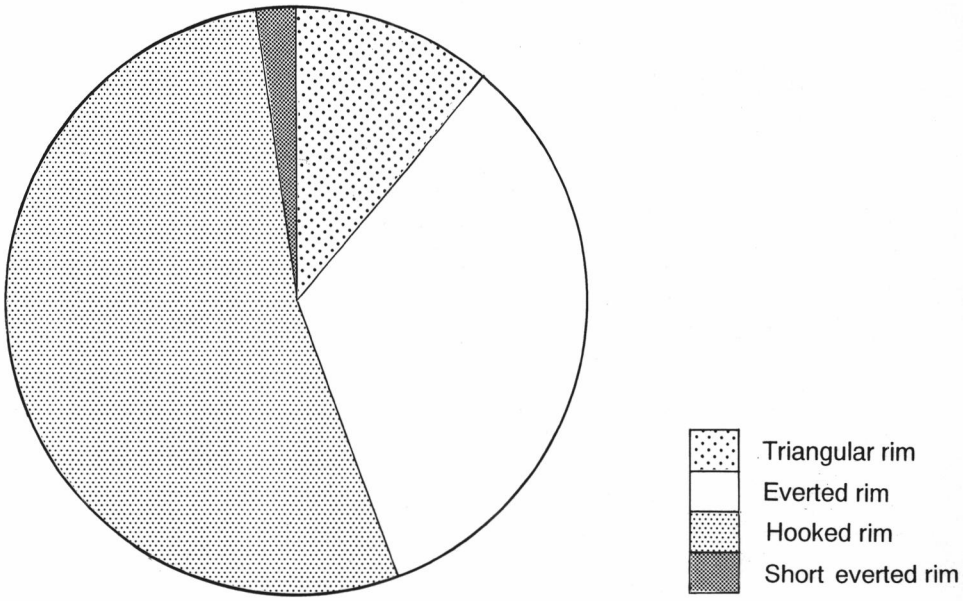

Fig. 4: Lumb Brook: wide-mouthed jar forms (using rim % values).

had collapsed down, accordion-style, upon itself and retained the rim of a hooked-rim Derbyshire ware jar within the cupping of its rim. This latter rim fragment was unaffected by firing conditions and clearly the jar had been placed upside down on top of the cupped rim jar during the firing. A study of the rim diameter ranges of the cupped and hooked rim jars showed that 75% of the hooked rim jars were less than 15cm in diameter whereas 64% of the cupped rim jars were equal to or greater than 15cm in diameter. This suggested that, in addition to any functional requirements, the rim diameters may have been chosen to facilitate maximum utilisation of the kiln space.

Wide-mouthed jars or bowls

The wide-mouthed jar form could be subdivided into four groups on the basis of rim form variation: triangular, thickened everted, hooked and short everted (Fig. 4 nos 17, 25, 27 and 58). Those with triangular rims tended to have outbent necks. The body form is remarkably uniform in outline, being of a slack S-shaped profile with a single cordon around the neck and often a groove or grooves around the upper body. These horizontal grooves and cordons delimit zones of decoration on the neck and upper and lower body, occupied by burnished, combed and rouletted decoration. Burnished decoration was the most common technique on the wide-mouthed jars and curvilinear designs appear to have been most popular. The neck zones frequently bore single and double wavy line burnishing and this was often repeated on the upper or lower body zone. This linear motif sometimes took the form of swag-like loops and some of the bodysherds with lattice decoration may also be part of vessels of this form. The rouletted decoration was present on a wide-mouthed jar with hooked rim and on bodysherds. At least two rouletting wheels could be detected: one with uniformly short straight dashes with little gap between each row and one with single spaced rows of short straight dashes. A

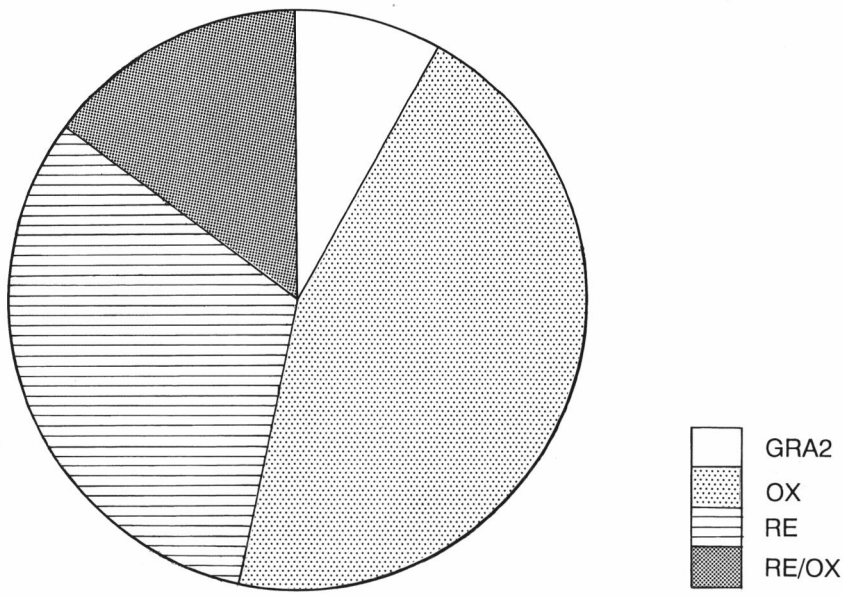

Fig. 5: Lumb Brook: wide-mouthed jar fabrics (using rim % values).

bodysherd of RE1 was identified with the former rouletting technique on the inside of the curved sherd. This was, perhaps, a practice piece. Some of the rouletted fragments may have belonged to narrow-necked jars.

The wide-mouthed jars in these forms were exclusively made in fabrics OX and RE, with rather more oxidised or partially oxidised examples than reduced fabrics (Fig. 5). The evidence from settlement sites (see below) suggests that an oxidised surface was intended in many cases. The GRA2 wide-mouthed jars came from surface deposits only. Their fabric and form compares with material from Derby Racecourse kilns and contrasts with the fabric of the wasters from Lumb Brook.

Narrow-necked jars

The narrow-necked jar group included eight rim forms and two body types (Fig. 6). The body forms differed principally in wall thickness. Only a handful of the thinner-walled examples were identified and all were in reduced wares RE1 or GRA2. The latter compare well with material from the kilns on Derby Racecourse (Brassington 1971, nos 148; 1980, nos 448–54). The rim forms associated with this class comprise simple everted, bead, undercut, out curving, collared, slightly bifid everted and rolled over (nos 7, 50, 59, 29, 3, 2 and 13). The first four and the last rim types were made in fabrics OX and RE with one example of an undercut rim vessel in DBY (Fig. 7). The slightly bifid or grooved rim types were used on DBY vessels only and compare with the rims made on DBY medium-necked forms. The GRA2 vessels had simple everted or bead rims with one elaborate collared rim from kiln 2.

A wider range of decorative motifs and positions were identified on the narrow-necked jars, a fine vessel from kiln 4 being an excellent example of the exuberant decoration lavished on some of these vessels (Fig. 10 no. 13). This vessel displays nearly all the

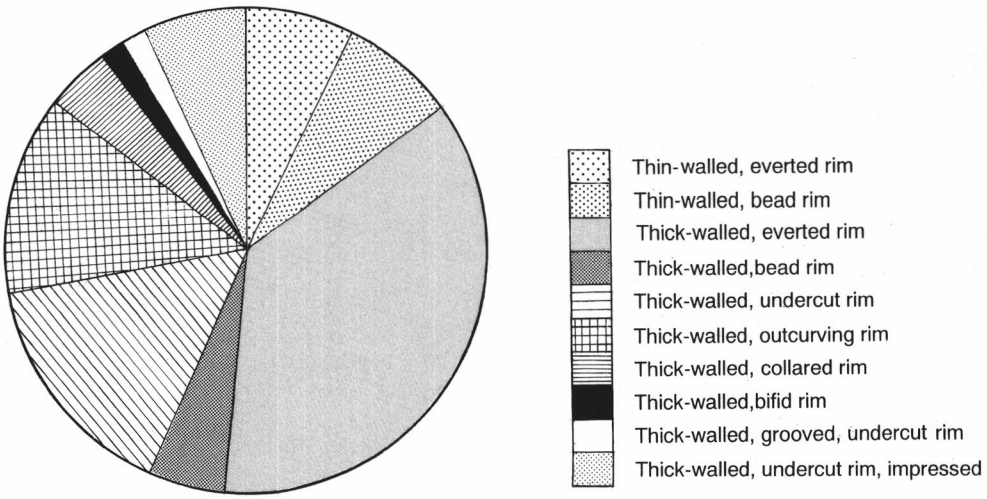

Fig. 6: Lumb Brook: narrow-necked jar forms (using rim % values).

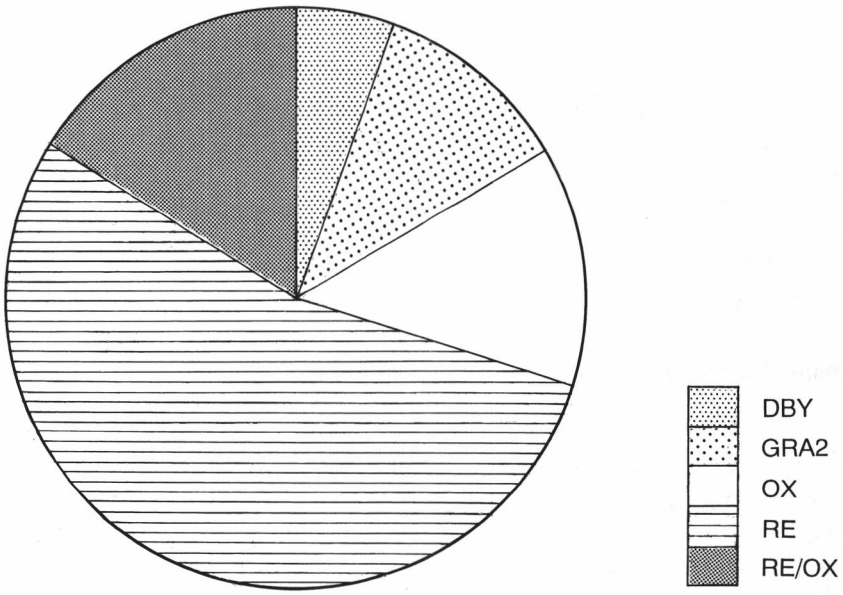

Fig. 7: Lumb Brook: narrow-necked jar fabrics (using rim % values).

decorative techniques present on the site, arranged in zones: burnished zones, burnished loops and wavy lines, combed wavy lines, crescent impressions on the rim and on a neck cordon. This form often bore burnished wavy or zigzag line decoration on the neck, delimited with a shoulder cordon. Breakage just below the neck seems to have been common so there is less evidence for the arrangement of decorative zones on the body. There are examples of burnished wavy and double wavy lines, burnished lattice and a sherd with rows of impressed crescents and a combed or lightly grooved wavy line

decoration. The Derbyshire ware examples had only limited decoration: cordons and grooves. Both the decoration and the rim forms of this vessel type compare well with those associated with the wide-mouthed jars, suggesting these vessels may have formed a 'set'. However, this type contrasts with the wide-mouthed jar group in being made predominantly in reduced wares and including some Derbyshire ware examples.

Miscellaneous types

Several fragments of cheese press in fabrics RE and OX were identified along with a single OX3 flanged bowl with white painted zigzag decoration on the flange. The flanged bowl was found in kiln 4 and was distorted and misfired. There seems no reason to doubt that it was manufactured there. Similarly the cheese press fragments were in the same fabric as other vessels from the kilns and comprised overfired, distorted and splintered fragments. A fragment of a Derbyshire ware knobbed lid was also found.

Non-local types

Brassington and Webster (1988, 30) identified a fragment of burnt samian, form 18/31R from kiln 4 (but this was marked kiln 5), and a fragment of a Mancetter-Hartshill hammerhead mortarium from the bankside (dated by K. Hartley to AD 240–320). To these may be added the GRA2 wares, probably from Derby Racecourse (see above), three unstratified sherds of Nene Valley colour-coated ware, comprising fragments of a beaker with rouletting and underslip barbotine tendrils (*cf.* Howe *et al.* 1980, nos 47–8, late second to third century) and possibly a dish of uncertain date. Lastly a rim sherd of BB1 ware was identified marked ST/FILL. Other material marked thus was of fabric groups RE and OX and is presumed to come from kiln 4 stoke hole fill (see below). The rim was from a medium-necked jar of near cavetto style belonging to the mid or late third century (*cf.* Gillam 1976, no. 8; Holbrook and Bidwell 1991, type 20.1a).

Kiln groups (Figs 8, 9)

The full pottery archive catalogue is on disk in Microsoft Access format. A representative sample of the pottery is catalogued here in kiln groups and difficulties in provenance are highlighted. Much of the pottery had been marked and most of the material could be confidently attributed to a context. However, in some cases the kiln number had been omitted and in other cases the attribution did not agree with that published by Webster and Brassington in 1988. These difficulties are outlined below and solutions suggested. The codes marked on each sherd are listed at the end of each entry. The range of Derbyshire ware rim profiles illustrated by Webster and Brassington was very extensive so only representatives of the types from the kilns are reproduced here.

Kiln 1

Webster and Brassington record Derbyshire ware sherds from the furnace chamber of this kiln but none of the extant material was marked kiln 1. It most probably is included amongst the sherds given numbers but not contexts and would be identifiable if access to the site records was gained.

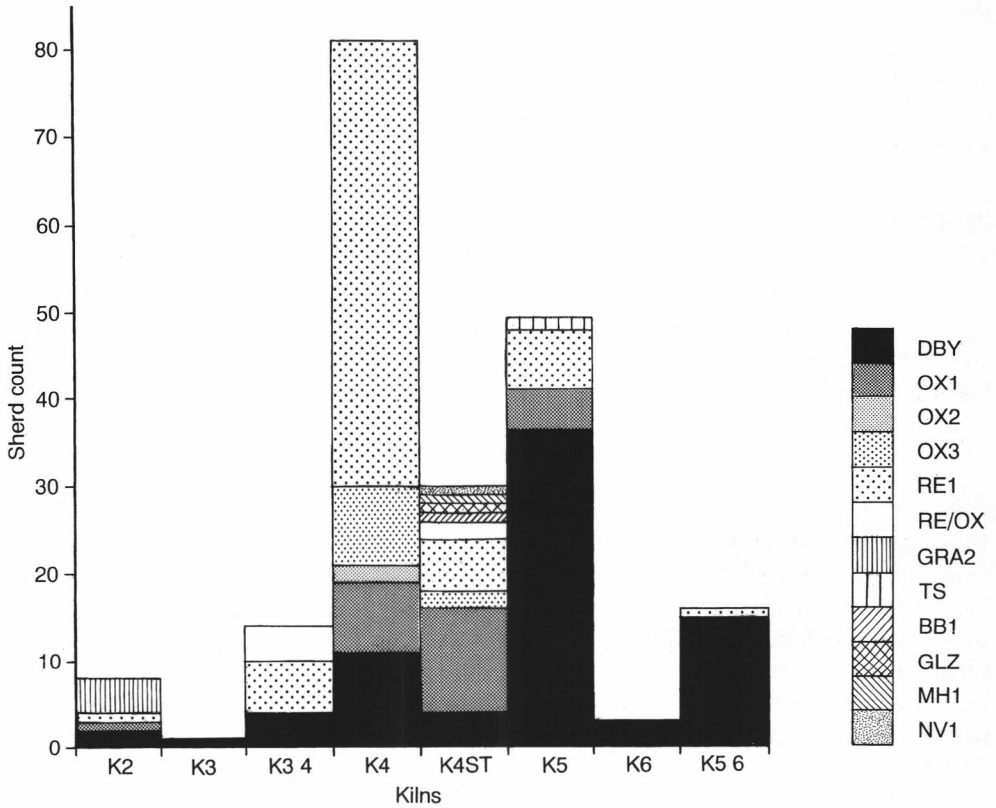

Fig. 8: Lumb Brook: quantification of fabrics by kiln group (using sherd count).

Kiln 2 (Fig. 10)

1: DBY grey cupped-rim jar. About a third of this vessel was intact and the vessel had a distinct slump line about a third of the way from the base. The rim had cracked and been distorted and part of another pot or piece of clay had stuck to the base. KII 1.

2: DBY orange hooked-rim, narrow-necked jar with slightly bifid rim and neck cordon. K2

3: GRA2 fairly soft, light grey ware, collared-rim, narrow-necked jar, very abraded. KII and KII 20.

4: GRA2 hard, medium to dark grey ware, squared, everted-rim narrow-necked jar with cordon at the base of the neck, burnished on the lower neck and shoulder and double, intertwining wavy line burnishing on the neck. The fabric and form are very similar to Derby Racecourse products. KII 15.

5: OX1 bead-rim cheese press dish. KII.

The kiln also contained fragments of an RE1 cheese press base, splintered and distorted (KII 5) and a GRA2 plain base, rather abraded (KII 10 stoke hole area).

Only no. 3 is illustrated by Brassington as from this kiln and its provenance is given as kiln 4 (1988, no. 42). It may be that the marking 'KII' does not equate with K2 but was

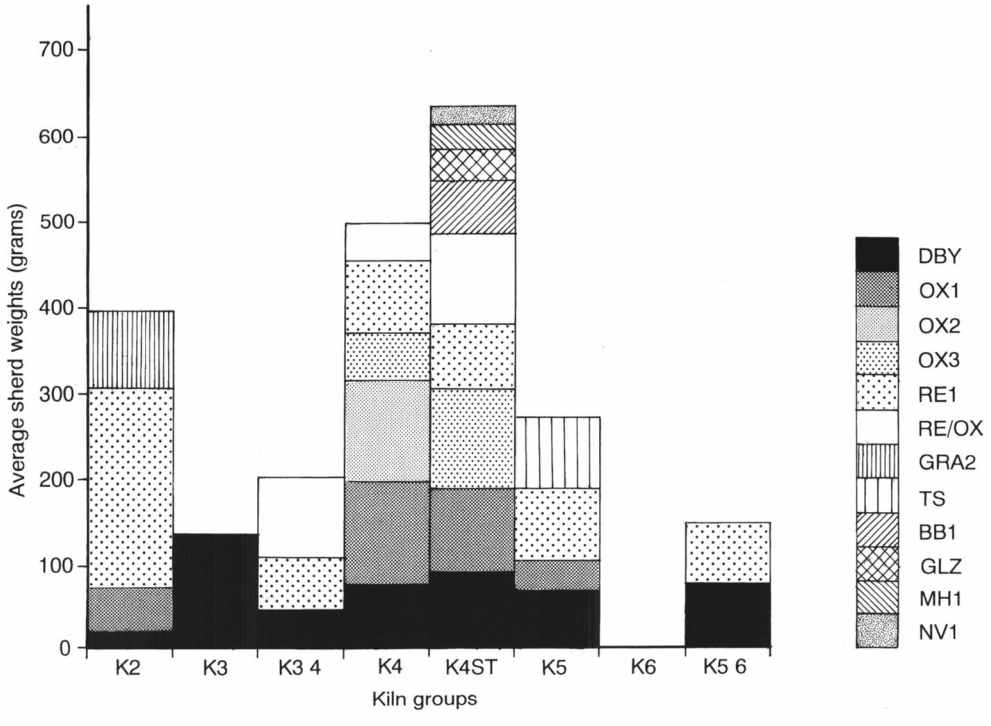

Fig. 9: Lumb Brook: average sherd weight analyses by kiln group.

an earlier code for kiln 4 or it may be that the pottery sherds were not clearly divided into kiln groups when Brassington examined them. No. 1 is one of three extant complete or nearly complete Derbyshire ware jars. Brassington records that three nearly complete DBY jars came from kiln 6 and he illustrated one of them. However, none of the surviving jars correspond to Brassington's drawing as they all lack the distinct rim groove of the published illustration. It would seem, therefore, that there is a complete vessel elsewhere and that the surviving KII vessel above cannot be equated with the vessel published by Brassington.

Kiln 3

Only a DBY jar base was identified as coming from this kiln. Other sherds were marked '3 4' suggesting they came from the stoke hole shared by both kilns.

Kiln 4

The pottery marking allowed kiln 4 material to be isolated, sometimes with additional information such as ST/F or ST/FILL presumably for stoke hole fill. A second group was marked '3 4 ST/F'. These presumably also came from the stoke hole shared by kilns 3 and 4. Another group was identified which was variously marked 'ST/F', 'STHF', 'ST/H/F' and 'ST/FILL'. This last group included Webster and Brassington 1988, no. 43, said to be from kiln 4, and that, together with the description of the contents of the kilns by Webster and Brassington, suggests that these sherds also came from kiln 4. The

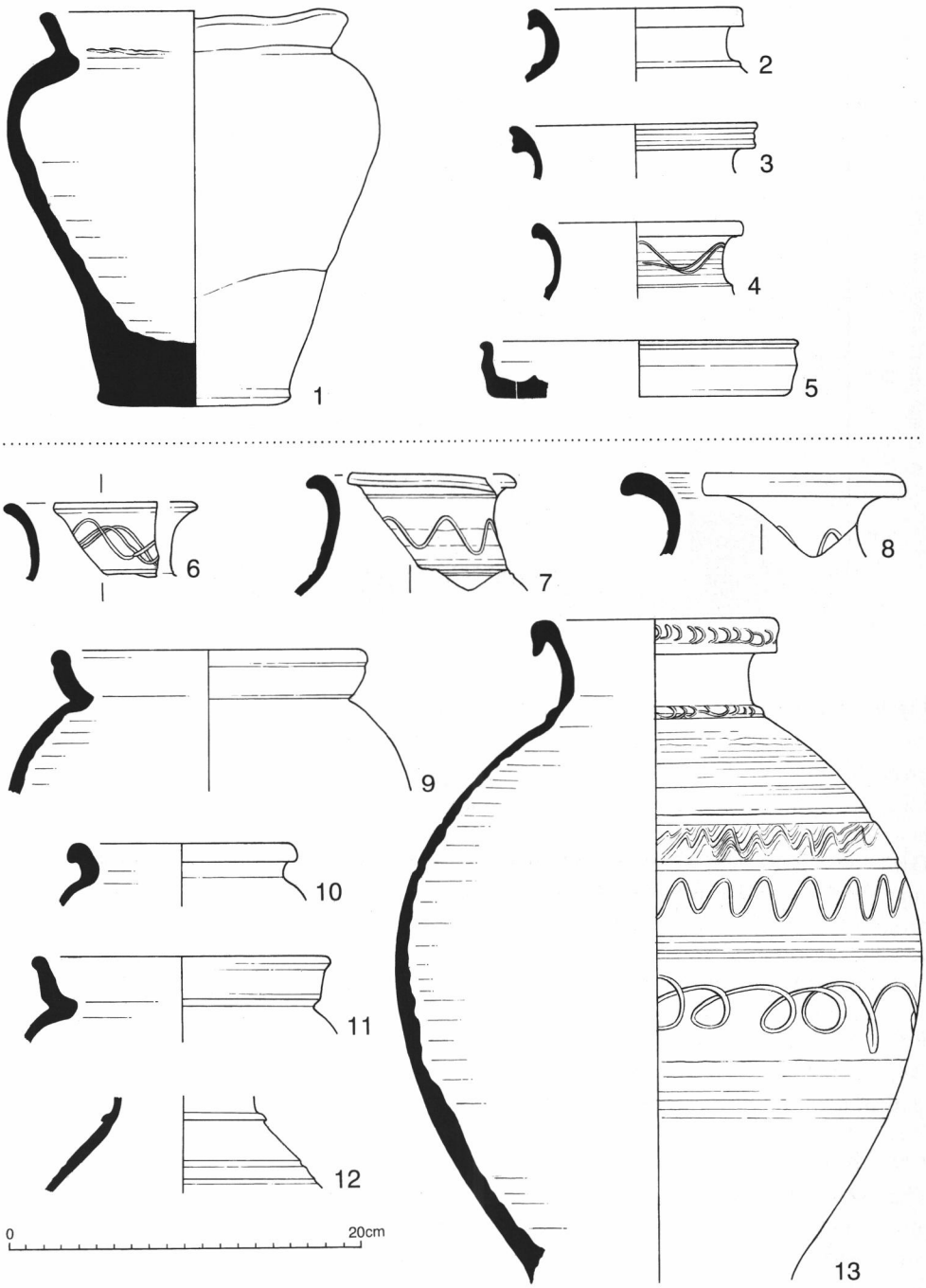

Fig. 10: Lumb Brook: sherds from Kiln 2 nos 1–5; Kilns 3 4 nos 6–8; Kiln 4 nos 9–13.

distinctions between these groups are maintained to facilitate re-interpretation should the field notes and plans become available.

K3 4 (Fig. 10)

6: RE1 narrow-necked jar with smoothly everting rim and triple wavy line decoration. Thin-walled vessel similar to those made at Derby Racecourse.

7: RE1 narrow-necked jar with short everted rim, cordon or double groove on junction of neck and body and centrally placed single wavy line burnish on neck. ST/F.

8: RE1 light grey narrow-necked jar with outcurving rim and burnished wavy line on the neck. ST/FILL.

This group also included two DBY jars, one with a hooked rim and one with a bead rim grooved on the outer face of the rim, two OX/RE wide-mouthed jars, one with an outbent everted rim, thickened at the tip. This may have been a beaded tip but the degree of distortion precludes certainty. There are slight traces of linear burnishing on the outbent neck. The second vessel had a beaded, undercut rim and straight neck. A single cordon lies on the junction of neck and body. The rim has cracked slightly. There were also two more RE1 narrow-necked jars. One had a short everted rim, and the other had an outcurving rim, thickened towards the tip and burnished wavy line decoration on the neck. A RE1 bodysherd with lattice decoration was also recovered.

K4 (Figs 10, 11)

9: DBY grey-streaky, orange cupped-rim jar with groove outside rim tip. ST/F.

10: DBY grey. Bead-rim jar. ST/F. A further four DBY jars of this type were marked K4.

11: DBY grey cupped-rim jar with slight groove outside rim tip and unusual distinct groove at neck forming collar effect. ST/F.

12: DBY grey-orange sherd from narrow-necked jar with cordon around upper body and horizontal grooves. SURR.

13: RE1 pale grey with light orange core narrow-necked jar with burnished and combed decoration. 1.

14: RE1 medium grey wide-mouthed jar with outbent neck and hooked rim. Grooved at the junction of neck and body and at the shoulder and burnished over rim. K4 9.

15: RE1 medium grey wide-mouthed jar with outbent neck and hooked rim. Cordoned at junction of neck and body with linear burnished facets around upper body and burnished inside rim. K4 0.

16: OX3 buff wide-mouthed jar with outcurving neck and rim. The rim is thickened at the tip and there is a single cordon on the junction of the body and neck. K4 8.

17: OX1 red/orange with grey streaks, wide-mouthed jar with rather upright neck and squared, slightly triangular rim. Burnished over rim with burnished wavy line on neck. Stoke hole fill.

18: OX1 orange with pale orange core, wide-mouthed jar with outbent neck and thickened everted rim. There is curvilinear burnishing on the neck, a cordon on the junction between the neck and body, a groove demarcating the shoulder zone and a burnished swag on the middle body zone. ST/FILL.

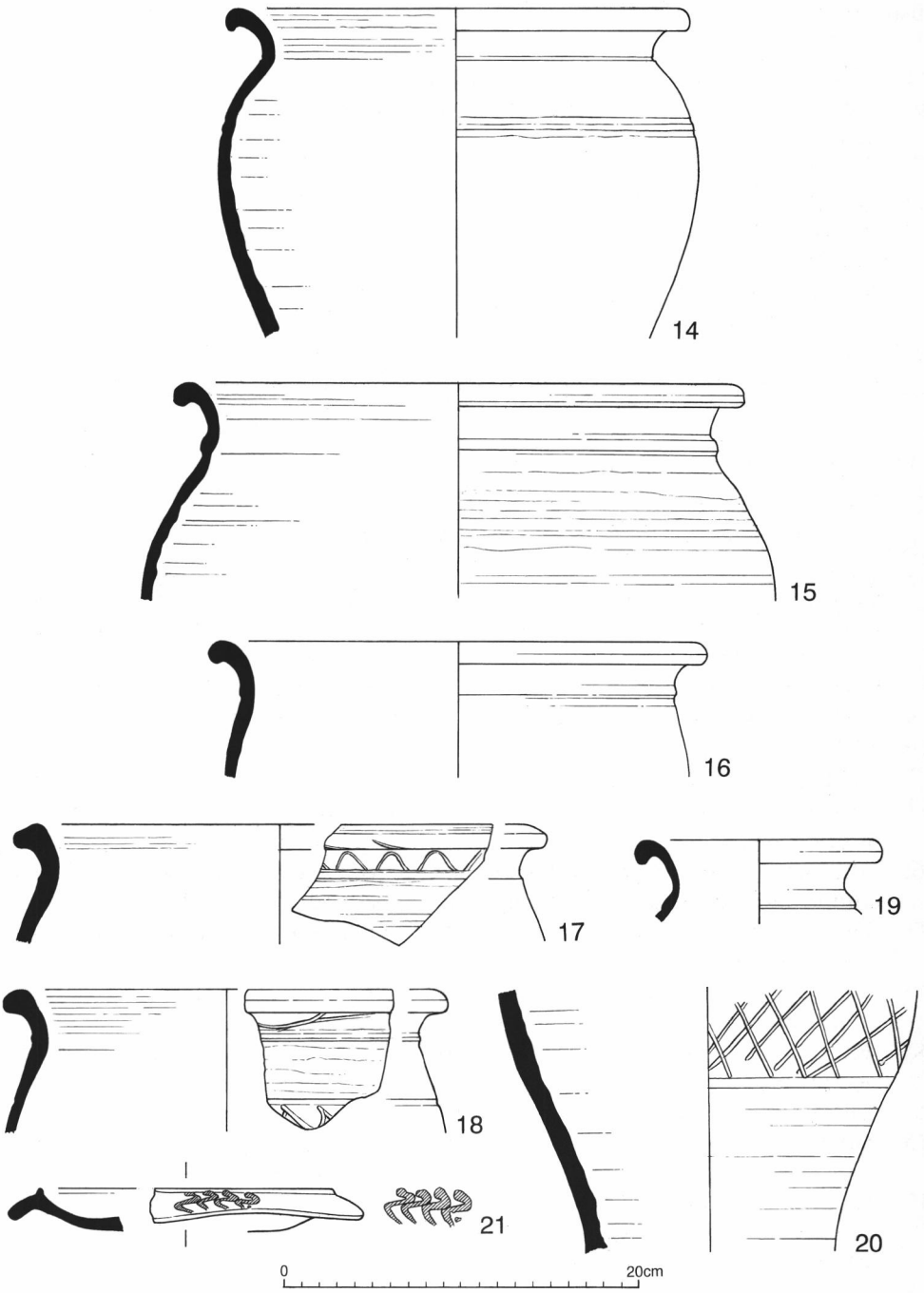

Fig. 11: Lumb Brook: sherds from Kiln 4 nos 12–21.

19: RE1/OX buff/grey narrow-necked jar with outcurving rim and cordoned neck. K4/2.
20: OX1 brick red, very hard lower body sherd probably from ovoid jar. The sherd comes from near the base and is decorated with a zone of burnished acute lattice decoration. ST/FILL
21: OX3 orange with mottled grey, misfired and distorted flanged hemispherical bowl with groups of 4 white painted zigzags on the flange. 4.7.

Four DBY jars with bifid rims as no.55 were also marked K4. Four additional wide-mouthed jars (one in fabric OX2 and RE1 and two OX3) in the form of nos 14 and 15 and one in the form of no. 16 (in fabric OX/RE) were present. A second example of no. 19 was also identified. A number of bodysherds with wavy line burnishing, dash rouletting, multiple horizontally spaced grooves (*c.* 1cm apart), and cordons were also present in fabrics OX1 and RE1 and came from both wide-mouthed and narrow-necked vessels.

ST/F, ST/FILL etc., probably K4 (Fig. 12)

22: OX1 soft and abraded ware wide-mouthed jar with thickened everted rim, cordoned neck with single groove demarcating upper zone and wavy line burnish outside girth zone. 1.
23: OX1 hard red ware with orange core. Wide-mouthed jar with outbent neck and rather triangular rim, burnished curvilinear decoration on neck and wavy line on girth zone with upper body zone demarcated with grooves. STHF 3.
24: OX1 very hard orange, mottled grey ware wide-mouthed jar with outcurving, thickened and slightly hooked rim with wavy line burnished and cordon on the neck. ST/FILL 42 and 5.
25: OX/RE very hard grey/orange wide-mouthed jar with outbent rim and everted, thickened rim, wavy line burnished and cordons on neck and upper body zone demarcated by a double groove. S/F 58.
26: OX3 orange mottled grey wide-mouthed jar with everted, hooked rim, shoulder cordon and zone of dash rouletting outside upper body. ST/H/F 17.
27: RE1 wide-mouthed hooked rim jar with shoulder cordon. Thinner walled than usual. S/FILL.
28: OX3 orange mottled grey, narrow-necked jar with everted rim, thickened and blunt, and neck cordon. ST/FILL.
29: RE1 grey narrow-necked jar with outcurving rim and burnished zigzag decoration on neck. STH/F 25.
30: RE1 grey narrow-necked jar with upright neck and grooved, bead rim. Decorated with wavy line burnishing on neck and cordon on neck/body junction. S/FILL 6.
31: OX1 ovoid jar bodysherd decorated with zones of impressed semi-circles and light wavy line combing. ST/H/F.
32: RE1 hooked-rim medium necked jar. S/F 60.
33: BB1 cooking pot with cavetto rim. ST/FILL 44.

This group also included two cupped and one hooked-rim Derbyshire ware jars, two more OX1 wide-mouthed jars as no. 24, one OX/RE mottled wide-mouthed jar like no. 25 and RE1 bodysherds with combed wavy line decoration from an ovoid jar. Three other bodysherds were marked ST/H/F, namely a bodysherd from a Mancetter-Hartshill

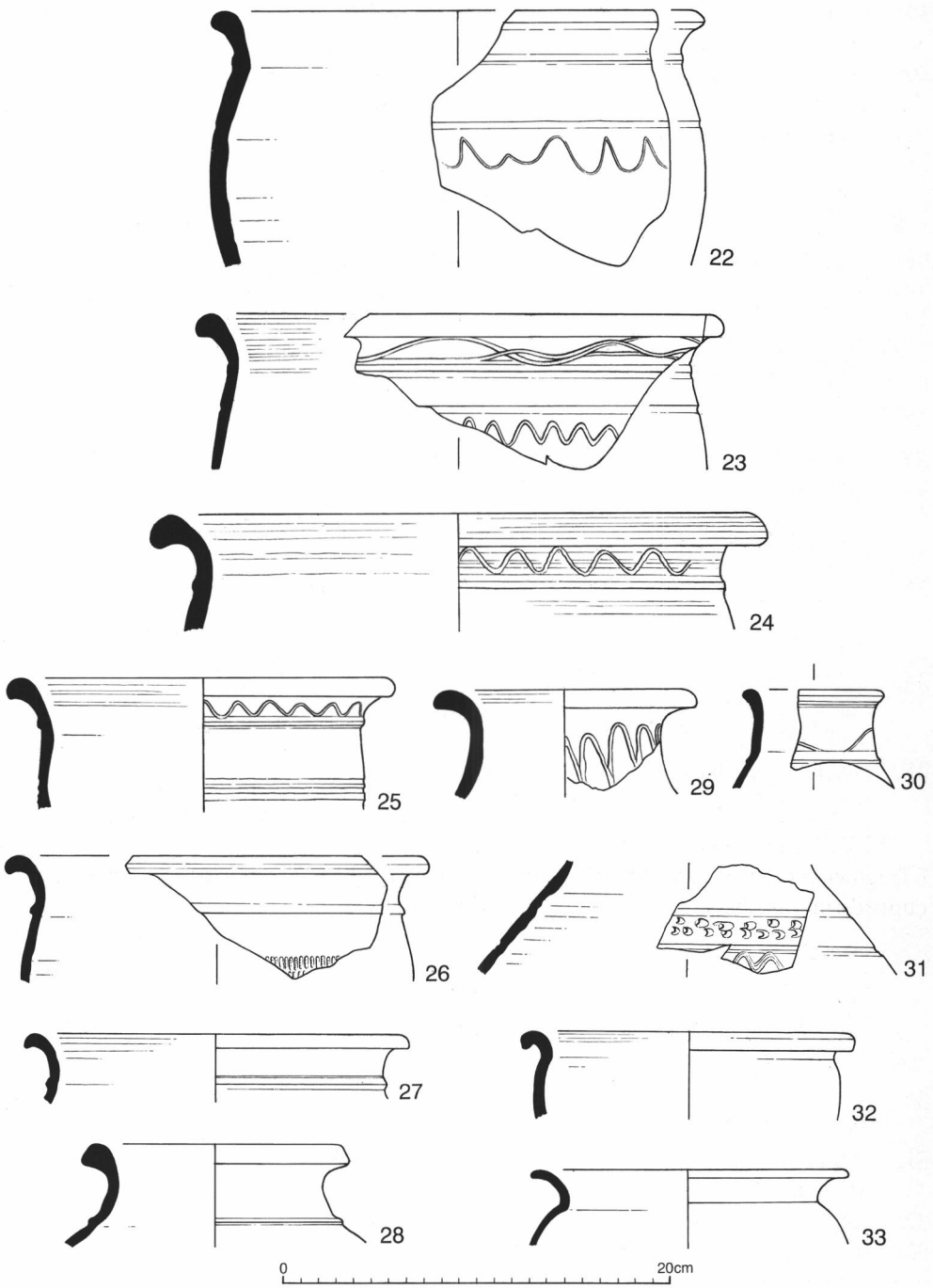

Fig. 12: Lumb Brook: sherds marked ST/F, ST/FILL etc. probably from Kiln 4 nos 22–23.

mortarium dating to at least AD 130/40, a very abraded white sherd with brown colour coat from a bowl or possibly the body of a flagon and a grey sherd of Romano-British type covered in green glaze, including the break. The colour-coated vessel is likely to be third or fourth century in date since the bulk of the Nene Valley colour-coated jars/flagons and curved-wall bowls are of this date.

Kiln 5 (Fig. 13)

34: DBY grey cupped-rim jar with slightly rippled effect on rim. ST/FILL.
35: DBY grey cupped-rim jar with distinct groove at neck. ST/FILL.
36: DBY grey cupped-rim jar with grooves below tip of rim and at neck. ST/FILL.
37: DBY dark grey rebated-rim jar with very small diameter.
38: DBY grey hooked-rim jar with bifid tip. ST/FILL.
39: DBY grey everted-rim jar with thickened tip. ST/F.
40: OX1 orange with grey streaks and core, wide-mouthed jar with upright neck and everted, rounded rim. There is burnished wavy line decoration on the neck and a single cordon at the base of the neck. ST/FILL.
41: RE1 light grey ware, softer than usual. Wide-mouthed jar with hooked rim and cordoned neck. ST/FILL.
42: RE1 medium grey narrow-necked jar with outcurving rim, burnished on top of the rim. ST/FILL.
43: OX1 orange with grey core narrow-necked jar with slim, outcurving rim and burnished wavy line and cordon on the neck. Distorted. ST/FILL K5–6.
44: RE1/DBY very hard greyish brown fabric, like fine Derbyshire ware. Narrow-necked jar with bead rim and traces of wavy line decoration on the neck. ST/FILL K5–6.
45: RE1 mottled grey and orange ware bodysherd from narrow-necked jar with burnished acute lattice decoration and neck cordon. Distorted. ST/FILL.

This kiln contained many additional fragments of Derbyshire ware and these included 8 fragments of everted and hooked-rim (as no. 39), 5 beaded, cupped-rim (as no. 36), 5 cupped-rim (as nos 35 and 37), 5 cupped-rim with rippled effect on outer face of rim (as no. 34), and four bifid-rim jars (as no. 38), one of which may have been a narrow, rather than a medium-necked jar. In total six RE1 and five OX1 sherds were also found and, in addition to the illustrated examples, there were three further RE1 narrow-necked vessels with everted rims. The samian sherd recorded by Webster and Brassington as from kiln 4 was marked K5 ST/FILL.

Lead smelting hearth (Fig. 13)

46: DBY grey cupped-rim jar, much spalling. Under hearth.
47: DBY orange cupped-rim jar. Under hearth.
48: DBY grey-brown hooked-rim jar, distorted. Hearth.
49: RE1 grey ware. Wide-mouthed jar with outbent neck, everted rim and neck cordon. Beneath hearth.
50: GRA2 bead-rim, narrow-necked jar with burnished wavy line decoration.

Three additional Derbyshire ware sherds are marked under the hearth: two hooked-rim and one cupped-rim jar.

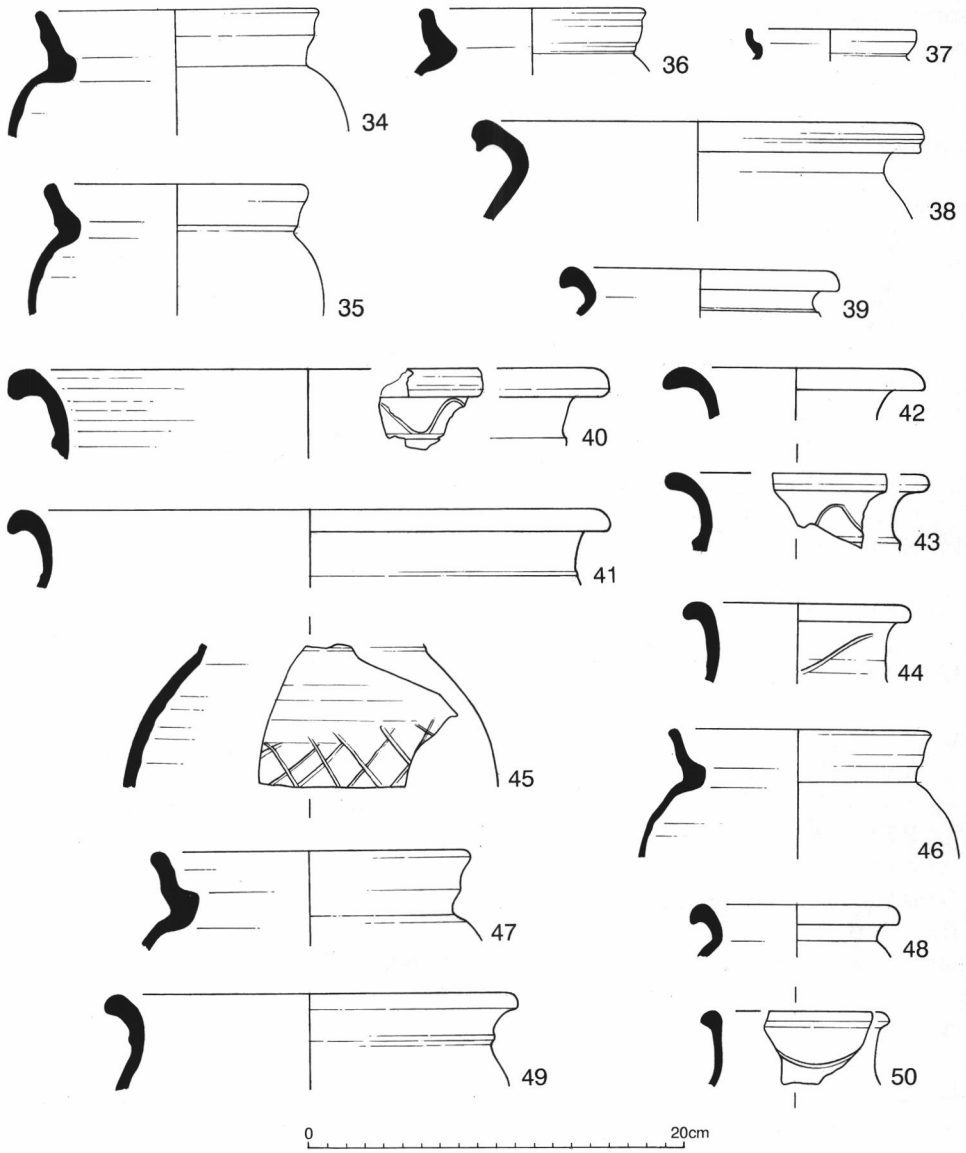

Fig. 13: Lumb Brook: sherds from Kiln 5 nos 34–45; Lead smelting hearth nos 46–50.

Kiln 6 (Fig. 14)

51: DBY orange cupped-rim jar.

Webster and Brassington record three complete jars from this kiln with many potsherds. The second of these was in the same form as no. 51. A third example was not present in the collection but is illustrated by Webster and Brassington 1988, fig. 4 no. 1. It is similar to the other two but has a grooved rim tip. The remaining potsherds mentioned by Webster and Brassington are possibly those marked K 5 6.

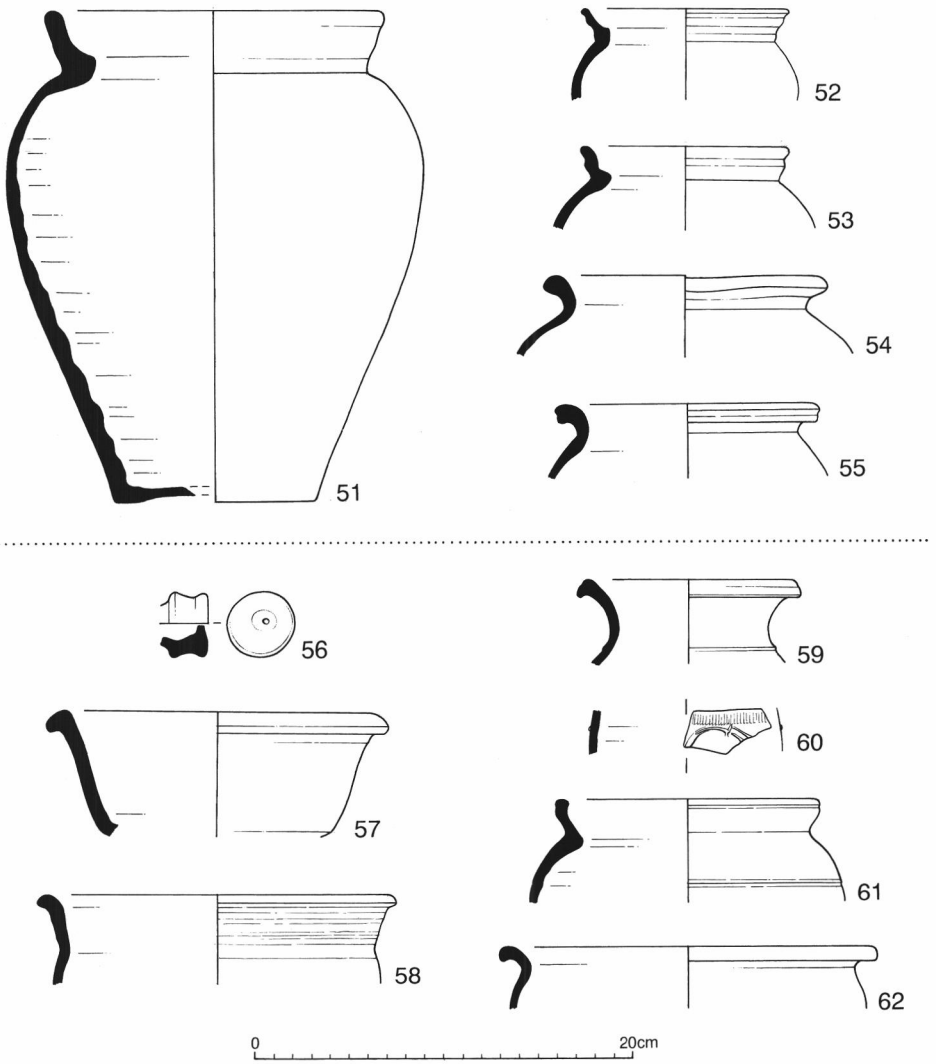

Fig. 14: Lumb Brook: sherd from Kiln 6 no. 51; Kilns 5/6 nos 52–55; miscellaneous examples of vessel types nos 56–62.

Kiln 5 6 (Fig. 14)

52: DBY grey/orange ware, small cupped-rim jar, grooved tip. ST/F.
53: DBY grey ware cupped-rim jar, grooved tip. ST/F
54: DBY orange, everted-rim jar. ST/FILL.
55: DBY orange-grey bifid, everted-rim jar. ST/F 50.

A further two everted-rim (as no. 54), four rippled or grooved, cupped-rim (as nos 52 and 53), one hooked-rim (as no. 10), two beaded, cupped-rim (as no. 36) and one cupped-rim jars (as no. 35) were found. No. 44 (Fig. 13) could, perhaps, be attributed to this context.

Miscellaneous examples of vessel types

56: OX2? handle with small perforation in rather soft ware. 48.
57: GRB1 triangular-rim dish. Unmarked.
58: RE1 wide-mouthed, necked jar with short, everted rim. The rim is burnished and there are burnished linear facets on the neck. Marked numeral II.
59: DBY orange narrow-necked jar with hooked rim and shoulder cordon.
60: Nene Valley colour-coated sherd with dash rouletting and underslip, barbotine tendrils.
61: OBC1 buff, coarse, soft ware, cupped-rim jar with double groove on shoulder. Misfired.
62: OBC1 buff/orange, coarse, soft ware, hooked-rim jar.

Kiln sequence and date

Stratigraphic sequence

Webster and Brassington suggest the kilns were used in the order: 6, 1, 5, 3, 4, and 2. This sequence is based on the stratigraphic sequence and the depth of the kilns below ground surface. Kiln 6 was covered by debris from kilns 3 to 5 so may be assumed to be early. In addition its form, with clay firebars and pedestal also suggests a relationship with the Racecourse kilns and an early date. Kiln 1 was overlain by kiln 2 but was not otherwise related to the other kilns so its place in the overall sequence is not secure. Kiln 3 was cut away by kiln 4. Thus two stratigraphic sequences can be attested: that between kilns 1 and 2, and that between kilns 3 to 6. Kiln 6 must be earlier than kilns 3 to 5 and kiln 3 is earlier than kiln 4 but there seems no certain recorded evidence for the relationship between kiln 5 and kilns 3 and 4, other than their relative depth. Kiln 2 contained a stone baluster lying on the ash and a second baluster was found incorporated in the lead smelting hearth that overlay kiln 5. Webster and Brassington suggest this is evidence that kiln 2 and the hearth were contemporary. This is not unreasonable but the possibility that the baluster incorporated in the hearth was obtained from debris deposited at a much earlier date in the area of kiln 2 must not be ruled out.

Ceramic dating evidence for kilns

The pottery recovered from the kilns sheds light on their date in several respects. The earliest kiln identified by Webster and Booth was kiln 6 and this contained three complete cupped-rim Derbyshire ware jars and Derbyshire ware potsherds. The complete jars are of classic type and cannot be closely dated but the other material includes two cupped-rim jars of small size with rather short cupped rims, very similar to the rebated-rim jars from Derby Racecourse. It also includes some jars with simple, everted rims (Fig. 14 no. 54) not found in the other kilns. These may be insignificant in terms of chronology since similar types are present at both Holbrook and Hazelwood (Kay 1962, fig. 10 nos B52–3 and fig. 11 no. B56) or may relate to the everted-rim jar form which gained popularity elsewhere in the East Midlands during the second and third centuries (Buckland *et al.* 1980, type Ea). A narrow-necked jar of simple form (Fig. 13 no. 44) like those made at the Racecourse and in a fabric halfway between Derbyshire ware and RE1 may also indicate an early date when the earlier forms were still being copied and the RE/OX fabric range had not developed its distinctive hard but fine character. Brassington and

Webster suggested that the structural characteristics of this kiln, particularly the clay central pedestal with firebar, may suggest this kiln was an intermediate type between the Racecourse kilns and the Derbyshire ware kilns. These factors are persuasive evidence of a date early in the production of Derbyshire ware, perhaps the earliest so far excavated.

Nothing further can be added to the dating evidence for kiln 1 since no material was identified from there. Webster and Brassington considered that kiln 2 was the latest kiln on account of a stone baluster resting on the ash deposit within it and a similar baluster incorporated in the construction of the late lead-smelting hearth above kiln 5. They record only sherds of Derbyshire ware from this kiln. A hooked-rim sherd from a Derbyshire ware narrow-necked jar is marked K2. Material marked K. II includes pottery closely comparable to Racecourse products in fabric and form, a nearly complete, cupped-rim Derbyshire ware pot and a sherd from a cheese press. If these are from kiln 2, they suggest a rather early date for that group. Only the cupped-rim jar is substantial in size and it is clearly a waster, as is an RE1 cheese press base. The collared-rim jar is very abraded so could well be redeposited and considerably older than the kiln. The delicate everted-rim jar (Fig. 10 no. 4) is unabraded and its similarity to the Racecourse products supports a date in the second century for the infilling of this kiln. The lack of waster debris compared with that from kilns 4 and 5 suggests activity may have moved away during the time the kiln was infilled. This supports an early date well before operations began at kilns 4 and 5. The gritstone baluster in kiln 2 must have been deposited within a relatively short space of time since it lay on the ash of the stoke hole, and it is possible that both balusters were discarded in the mid to late second or early third century, but one was reused when the lead roasting hearth was constructed.

Kiln 3 yielded a single Derbyshire ware base only so little can be determined of its chronology. Kiln 4 contained a large group of material. A further group was marked 3 4 ST/F coming from the stoke hole belonging to kiln 4 but cutting away kiln 3. A final group of material of similar type marked ST/FILL, ST/F/H and ST/F is also included in the kiln 4 analysis here (see above). Webster and Brassington observed the kiln was littered with reduced and oxidised ware bowls and jars, "the result of a mis-firing". Detailed examination of this group disclosed some Derbyshire ware, including several distorted and spalled hooked-rim Derbyshire ware jars, but the overwhelming numbers of mis-fired, distorted and discoloured coarse RE1 and OX1 vessels suggest the last load was predominantly of this type (Fig. 8). Approximately twice as many sherds of hooked-rim to cupped-rim Derbyshire ware jars were recovered from deposits associated with kiln 4. Non-kiln products within kiln 4 comprise a BB1 jar rim sherd of third century type (Fig. 12 no. 33), perhaps mid or late third century (*cf.* Gillam 1976, no. 8; Holbrook and Bidwell 1991, type 20.1a), a bodysherd of Mancetter-Hartshill mortarium dating after AD 130/40 and an extremely abraded sherd of colour-coated ware, probably from a Nene Valley ware bowl, possibly of late second century date but more probably third or even fourth century. The second century samian base identified by Webster and Brassington as from kiln 4 is marked Kiln 5 ST/FILL. A date in the mid or late third century for this kiln group would fit rather well with the typological links of the products (see below), the non-local sherds in the fill and its stratigraphic position.

Material identified from kiln 5 is largely made up of Derbyshire ware jars with approximately equal quantities of cupped-rim to hooked or everted-rim jar sherds and none of the narrow-necked jar form (Fig. 10 no. 12) present in kiln 4. All the Derbyshire

ware rim forms were present but some of the variants such as the small cupped or rebated-rim jar and everted-rim forms (Fig. 13 nos 37 and 39) were not represented. In addition to the Derbyshire ware over 20% of the kiln 5 group was in OX and RE fabrics (Fig. 8). These comprised narrow-necked and wide-mouthed jars of types paralleled in kiln 4 and no significant typological differences were detected. The major motifs of rouletting, burnished wavy line and lattice, burnished rims, the use of cordons and the preferred positioning of different motifs on particular decorative zones defined by grooves and cordons can be identified in both kiln 4 and 5. Although kiln 4 has additional decorative treatments such as burnished loops, zigzags and arcs, double wavy lines, multiple spaced grooves, white paint, combing and impressed decoration. A burnt samian sherd of the second century is the only datable non-local sherd from the kiln.

While it is possible to suggest a date range for the groups recovered from the kilns, clearly this may not date the kiln usage. The debris left in kilns could be derived from activity carried out in neighbouring kilns so care must be taken not to be too hasty in making deductions from what may be a mixed deposit. The material from kiln 4 struck the excavator as having the characteristics of a mis-firing and certainly the large sherds, some severely distorted and cracked but conjoining, would support that interpretation. The material from kiln 5 was slightly more fragmented, particularly the OX1 wares, suggesting some redeposition, in the form of raking out, and later rubbish disposal on a derelict kiln.

A study of sherd fragmentation between kilns and fabrics was carried out to see if significant differences could be detected which might identify final kiln loads and mixed infill groups (Fig. 9). This suggested that most of the sherds were not excessively trampled and redeposited. The average sherd weight for Derbyshire ware and coarse wares (*c.* 70g) was at least three times that typical of settlement sites such as Roystone Grange, Derbyshire, and Barton-under-Needwood, Staffordshire (less than 20g). Webster and Brassington suggest that kiln 4 was used to fire coarse ware rather than Derbyshire ware and that the other kilns were used for Derbyshire ware jar production. Certainly kiln 3 contained only Derbyshire ware and one might expect to find sherds of other wares in the kilns were they made there. The three jars from kiln 6 are likely to be a final mis-firing which had not been removed, and the Derbyshire ware and RE1 sherds marked 5 6 ST/FILL were large enough (some 80g) to suggest they also were waster sherds, possibly from previous firings in kiln 6. In the case of kiln 4, although coarse wares predominate, wasters of Derbyshire ware occur in sufficient numbers and sherd size to suggest the kiln was used for the production of both ware groups. Both ware groups contrast markedly with the non-local wares in average weight. The material from kiln 5, dominated by Derbyshire ware, comprised sherds of similar size and weight to kiln 4 except for fabric group OX1. As suggested above this group may, in fact, include waster debris from kiln 4. The small number of sherds from kiln 2 precludes certainty regarding its products but distorted sherds of a Derbyshire ware jar and an RE1 cheese press were identified and imply production of both ceramic groups either in this kiln or a neighbouring one.

The very high average sherd weights of fabrics DBY, OX1, 2 and 3 and RE1, along with the numbers of distorted vessels in these fabrics, confirm on-site production of all these wares. The lower average sherd weight for RE/OX is most probably a result of the misfired nature of this group. These are, by definition, sherds that are mottled in colour

and frequently such sherds have shattered and cracked in the kiln firing. Known non-local wares tended to be more fragmented, as one would expect, and softer fabrics such as OBC1 were also relatively small. This may imply that this latter fabric was not made in these kilns, an hypothesis also suggested by its similarity to the Derbyshire ware petrofabric from Hazelwood (see above). The other curious fact highlighted by the study of the fragmentation rate is that the soft grey ware, GRA2, comparable to Derby Racecourse products in fabric and forms, occurs in relatively high sherd weights. This, together with the presence of several GRA2 sherds in kiln 2, may suggest the potters included this finer ware initially in their repertoire. This is not certain since some of the known traded wares such as BB1 and samian ware also have a relatively high average sherd weight. The status of the GRB1 sherd, a triangular-rim dish (Fig. 14 no. 57), is difficult to determine but as both the fabric and the form is unusual, it seems best to consider this a traded ware.

The hearth is stratigraphically later than kilns 3 to 6 and specific sherds, labelled under hearth, are illustrated above. These were, in effect, from kiln 5 infill and the demonstrated sequence implies a third century date. Brassington also records a fragment of roofing tile from below the hearth and this, together with the stone baluster, suggests a substantial, and elaborate building nearby in the late second or early third century.

Thus the stratified sequence and artefacts suggest production may have started in the mid to late second century. Kiln 6 seems to be the earliest kiln type and probably produced Derbyshire ware in classic Derbyshire ware forms, with some types developing from the Racecourse rebated and everted-rim jars, and an RE1 fabric similar to a fine Derbyshire ware. The kiln itself seems transitional in type from the Racecourse kiln types to the Derbyshire ware kiln types. Kilns 1 and 2 may also belong to this period and the date of kiln 3 is uncertain. The pottery types from kilns 4 and 5 are closely comparable, although in each a different fabric group predominates. The reason for their difference was revealed by a study of sherd fragmentation and distortion patterns. The material from kiln 4 seems to be a last misfiring while that from kiln 5 may be an admixture of debris from kiln 5 and, perhaps, kiln 4. Kiln 5 may have started its life in the second century and been infilled in the third century when kiln 4 was in use. Such dating evidence as there is suggests little activity beyond the third century but continuing study of assemblages from settlements may extend this date range.

The stylistic affinities of the vessel forms and implications for dating

A consideration of the stylistic affinities of the vessel forms is given to supplement the evidence of the site stratigraphy and associated datable finds.

Medium-necked jars

The medium-necked jars were all in types common at the Derbyshire ware kiln sites, although the two variants identified by Kay at Holbrook, namely the internal bead and the flat grooved band on some of the cupped rims (1962, 32), were not represented. Very little has been demonstrated regarding the origin of the Derbyshire war jar forms. Swan points out the similarity in form and fabric between the cupped-rim jars and the Mayen ware lid-seated jars from Germany (1984, 126; Fulford and Bird 1975, fig. 1). These are much later, belonging to the third and fourth centuries, and are quite different in details of the rim form. Todd also cited examples of the lid-seated jar form in the Lower Rhine

and northern Gaul (1968, 204). Swan has further traced an origin in Gallia Narbonensis for a lid-seated jar made at York in the late second to third centuries which she considers a proto-type of the Dales ware lid-seated jar (1992, 8–9). The contemporaneity of the Dales and Derbyshire ware industry is well documented and a Continental origin for both types would be an attractive explanation for their apparently sudden rise to popularity.

However, before pursuing Continental parallels, it is instructive to assemble the evidence for a local development. Pre-cursors can be cited for both the form and the fabric at the Derby Racecourse kilns in Brassington's "pre-Derbyshire" ware (1971, 59; 1980, 33). This 'ware' was a coarse, quartz-tempered fabric fired to an orange to buff colour and used to make rebated-rim jars in a form also made in the finer oxidised and reduced wares made at the kilns (1971, nos 204–25). The fabric is very similar to Derbyshire ware, except in respect to the hardness of firing, and is present at Lumb Brook in the form of OBC1. The author identified the ware at Brough-on-Noe where it was possible to observe its use in the early Antonine period through to the late second to early third centuries (Leary 1993) in rebated and cupped-rim forms. It has also been identified by the author at Roystone Grange in both rolled and cupped-rim forms (The relevant sherds come from contexts dated by the author to the second to fourth centuries and the harder Derbyshire ware seems to gradually supercede the softer ware during the third and fourth centuries. Leary in prep.). Softer "Derbyshire" ware is also recorded at Staden, Derbyshire in the second century (Makepeace, Beswick and Bishop 1989, 25–9). Examination of material from Hazelwood and Holbrook suggests that, although the 'petrified gooseflesh' characteristic of Derbyshire ware is typical, it is by no means universal even at the kiln sites. Kay mentions "many. . . pale, buff. . .underfired" sherds (1962, 31), which he assumes, were not likely to be "serviceable". The evidence from Brough-on-Noe and Roystone suggests this softer fired version was in fact perfectly acceptable to both the military and civilian markets, but may have been superceded in the third and fourth centuries, perhaps when very hard fired jars became desirable to the extent that they were imported to Britain from Mayen.

This overlap of fabric usage between the Racecourse and Derbyshire ware kilns, along with the obvious typological relationship between the rebated and cupped-rim forms, and the instances of both cupped and hooked-rim forms in the softer fabrics, demonstrate strong ancestral links between the two potteries. It is, in fact, the hooked-rim form, not the cupped-rim form, that lacks an antecedent in the Racecourse repertoire. The antecedent for that type must be sought in other Midland industries. Hooked and bead-rim jars are by no means common in the second and third century kiln groups of the Trent Valley where everted-rim jars, copying black burnished ware jars, are found (*cf.* at Lea and Newton-on-Trent, Field and Palmer-Brown 1991, figs 15–17). Nor do they occur in the second century Lincoln kilns such as North Hykeham where everted-rim rusticated ware jars proliferate (Thompson 1958). Moreover, in the South Yorkshire kilns, where copies of Derbyshire cupped-rim jars can be found in the second century, the everted-rim jar form again is favoured in grey and black burnished ware (Buckland *et al.* 1980, type Ea). Looking further afield to the South Midlands, hooked-rim, coarse ware jars of the later second century can be cited in the Nene Valley in both grey and calcite gritted wares (Perrin 1999, fig. 57 nos 50–4 in grey ware, dated from the late second century, and fig. 40 nos 431–443, in shell-tempered wares dated mid second to

late third century). It may be significant that by the end of the second century the shell-tempered wares of the Nene Valley and South Midlands tended to be oxidised rather than reduced (Perrin 1999, 118). The Derbyshire ware jars also include a large number of orange/dark, red/buff vessels as well as greyish examples. Of interest in this connection is the occurrence of Nene Valley grey ware jars of this type in the Trent Valley (identified by the author in field walked collections from the Fosse Way and in an excavated group at Hoveringham, Nottinghamshire, in prep.) and of similar shell-tempered jars from Brough-on-Noe, Derbyshire (Leary 1993, fig. 5.8 no. 13, in late second to early third century phase) and Carsington (Ling *et al.* 1990, nos 36–8) in third and fourth century contexts, suggesting possible contact between these areas. It may be that just as the cupped-rim form was an equivalent of the Dales ware jars common to the east so the hooked rim form was an equivalent of the shell-tempered everted and hooked-rim jars which became so popular in the South Midlands in the third and fourth centuries.

Thus the cupped-rim form could be a local development of the rebated-rim jars made at Derby whereas the hooked-rim form may well be following typological trends outside the East Midlands. The development of these forms seems to have been part of a widespread growth in the popularity of lidded jars and jars with hooked or outcurved rims, around which a cloth could, perhaps, be securely tied. Significantly the potteries associated with Derby through mortaria stamps, namely Rossington Bridge, South Yorkshire and Mancetter Hartshill, Warwickshire, have also produced evidence for the production of cupped-rim jars in a fabric similar to Derbyshire ware (Buckland *et al.* 1980, 158, and author's identification of Mancetter Hartshill coarse ware products), thus strengthening the link between the Derbyshire ware kilns and the earlier pottery industry at Derby. The contemporary emergence of a grey ware, lid-seated jar industry in the East Midlands alongside the Dales ware industry suggests that the growing need for these jars was so widespread that no single typological progenitor need be sought in the way that Swan has done for a distinctive suite of ceramic types in a military context (1992). Rather groups of potters adopted new types or developed existing forms in different ways, perhaps within a tribal or economic zone, to meet the same requirement. This might be compared with the situation in Yorkshire where Evans demonstrates the existence of pottery zones and suggests social constraints surviving from the Iron Age as one possible explanation (*cf.* Evans 1988, 329) for their exclusive distribution there.

Three everted-rim Derbyshire ware jars were also identified, all from kiln 6. These may be part of the hooked-rim group and the potters may simply have not rolled the rims, or they may be a development of the everted-rim jars made at Derby Racecourse in the early to mid second century or an attempt to copy of the grey ware copies of BB1 jars being made at other East Midlands kilns in the second and early third century (*cf.* Brassington 1971, nos 162 and 165; Buckland *et al.* 1980, type Ea).

Wide-mouthed jars

The wide-mouthed jar form was also identified at Holbrook, Holbrook II, Hazelwood and Milford (Kay 1962, figs. 12–13 nos 1–3, 21–3; Brassington 1980, fig. 23, no. 582; Brassington 1969, fig. 1 no. 5). The neck cordon was repeated on examples from these sites, as was the burnished wavy line decoration with the addition of burnished loops at Hazelwood. The form may be a development of the wide-mouthed jar form made at Derby Racecourse (Brassington 1971, nos 26–36; 1980, nos 318–25, 378 and 538–9).

The earlier type was thinner-walled and usually burnished all over the outer surface with no linear decoration, but both types bore a cordon on the neck and some Racecourse examples have an additional groove demarcating the lower body zone (Brassington 1971, nos 34–5; 1980, no. 378). Jars from Derby Racecourse kilns 4 and 5 bore "lattice decoration on the shoulder" (*ibid.* 1980, nos 318–20 and 380) and, in addition, the jar from kiln 5 had a rather triangular rim similar to those from Lumb Brook (Fig. 12 no. 23). Some of the other rim forms are also closely comparable (*cf.* Brassington 1971, no. 35 with nos 22 and 49; *ibid.* 1980, no. 320 with nos 15 and 20), although most of the Racecourse types had lighter rims with a rounded or slightly beaded tip.

This form falls into a general class of vessel that became very popular in the Midlands in the third and fourth centuries. It was recognised by Todd in the Midlands (1968, types 1 and 2), by Buckland *et al.* in South Yorkshire (1980, type Hb) and in Lincolnshire kilns such as Little London (Oswald 1937, no. 127) and Swanpool (Webster and Booth 1947, C16–17 and the heavier jars, D37–43). Differences in particulars of body form and rim treatment should allow different traditions or kiln groups to be identified. Todd identified two wide-mouthed jar forms within his East Midlands burnished ware, identified by him in Nottinghamshire, Lincolnshire, Leicestershire and Rutland: a large, necked jar with bead rim, usually undercut and an S-shaped bowl with stubby everted rim. The former type is much heavier and larger than those from Lumb Brook. It also tends to be decorated on the upper to middle body rather than the neck and shoulder. The S-shaped bowl is similar to those made in the South Yorkshire kilns. The South Yorkshire type, however, has a wider mouth and is virtually neckless in contrast to the Lumb Brook jars. The decoration again tends to occur on the middle body zone and the rims are burnished. It relates more closely to the everted-rim cooking jars of the late second and third centuries (*cf.* Webster and Booth 1947, comments on C16–31; Buckland *et al.* 1980, type Hb). In the South Yorkshire kiln groups, the place of the heavy wide-mouthed jar is taken by the bead-rim bucket shaped vessels. This vessel form is also found in north Nottinghamshire and north Lincolnshire (unpublished pottery from the Brickwork plan field systems, Stead 1976, fig. 83 no. 87; May 1996, 520 and fig. 20.4 no. 809). The Lincolnshire examples derive from Iron Age vessels of a similar type (May 1996, 520; Stead 1976, fig. 74 no. 9 and fig. 76 no. 38). Thus to the east, south and north, related vessels were current but it should be possible to distinguish these from the wide-mouthed jars from the Derbyshire kiln group.

To the west, the forts of Brough-on-Noe, Melandra and Manchester seem to have obtained their wide-mouthed jars from a variety of sources. The material from the late second century at Brough-on-Noe included wide-mouthed jars similar to those from the South Yorkshire kilns (Leary 1993, 81) but the only late published group from there did not include any vessels of this type (Jones and Wild 1968, fig. 2). At Melandra the bulk of the published material is of the second century and is too early for comparison. However the rise in BB1 ware in the *mansio* deposit (Webster 1971, 108) suggests a different response to the ceramic needs to that found further east. It is significant that Derbyshire ware jars were represented in this deposit (*ibid.* fig. 16 no. 181) but wide-mouthed Derbyshire jar forms are virtually absent. At Manchester a similar flood of BB1 ware is noted but there it is augmented by Severn Valley and Cheshire Plain material, which included a wide-mouthed jar form (Jones 1974, 93–4, nos 57–8, 69, 171, 206 and 246). This vessel type belongs to the same class as the Lumb Brook jars but again,

significant differences can be identified. The Severn Valley jars lack a true neck. Instead a thickened, rather long, triangular rim is everted at the top of the shoulder. The jar has no linear burnished decoration and has grooves on the shoulder and upper body rather than the neck cordon common on the Lumb Brook jars. Thus although sharing the market for wide-mouthed vessels, the Lumb Brook potters put a distinct interpretation on the vessel and incorporate some of the features familiar to them, or their predecessors, at the Derby Racecourse potteries, just as they did with other forms.

Narrow-necked jars

This form may have developed from the narrow-necked jar form at Derby Racecourse. A GRA2 example from kiln 2 (Fig. 10 no. 3) is similar in fabric to Derby Racecourse products but the reeded collared rim form is unknown there. An example of the type is known from Roystone Grange and this was made in a grey fabric very like fabric RE, linking this form with both fabric groups. Otherwise, the two kiln sites share only the general shape and simple rim forms. The Racecourse vessels tend to be thinner walled and have very simple rim forms and little burnishing or burnished lattice decoration (Brassington 1971, nos 145–50; 1980 nos 448–57; Dool *et al.* 1985, fig. 39 no. 12). Stratified groups from Derby include heavier vessels, appearing in Antonine deposits (Dool *et al* 1985, fig. 80 no. 124, fig. 82 no. 219), with zones of vertical and oblique burnished linear decoration on the upper body. These may represent a transitional form between those identified at the Racecourse kilns and those made at Lumb Brook. The straight, linear decoration of the first and second century vessels complements the similar decoration observed on the wide-mouthed jars from Derby Racecourse kilns 4 and 5, for which a second century date is suggested by Brassington (1980, 17). The move to more elaborate and curvilinear decoration may have developed simultaneously on both vessel types during the late second century. A sherd of an ovoid jar with burnished curvilinear decoration was found in a mid to late Antonine coal layer at Derby in a brick orange ware and can now be identified as a product of one of the Derbyshire ware kilns such as Lumb Brook in fabric OX. The form is represented at Hazelwood and Holbrook II by rim sherds (Kay 1962, fig. 12 nos 4 and 6; Brassington 1980 fig. 23 nos 580–81) and at Shottle Hall by a large ovoid jar with cordoned neck and elaborate burnished curvilinear decoration.

The development of the decorative techniques, motifs and zoning is, however, a widespread phenomenon and can be observed in the other kiln groups of the East Midlands. The form and treatment is identified in the repertoires of East Midland burnished ware and Severn Valley ware, and of the South Yorkshire and Lincolnshire industries (*cf.* Todd 1968, type 7 and 8; Buckland *et al.* 1980, type Gb; Webster and Booth 1947, C40–8; Webster 1977, type A). The Severn Valley ware vessels do not bear a close resemblance to the Lumb Brook types in form or decorative treatment but examples from the East Midlands burnished ware repertoire share the taste for burnished curvilinear decoration on the neck and body (Todd 1968, fig. 2 no. 6; *cf.* Oswald 1952, plate 10 nos 1–3, third century well group). This vessel type is less common in South Yorkshire but examples with curvilinear burnished decoration on the neck are known (*cf.* Buckland and Dolby 1980, no. 143). The Lincolnshire kilns also produce a similar form with decorative zones from the third century (*cf.* at Little London, Oswald 1937, nos 11, 18, 19 and 20, and at Swanpool, Webster and Booth 1947, C41). The impressed

rim decoration on the kiln 4 vessel can be compared with that on a rim sherd from Holbrook II (Brassington 1980, fig. 23 no. 581) and it also appears on a vessel from Derby Little Chester (Dool *et al.* 1985, 105 no. 189, unstratified). The decorative effect might be compared with notched decorative techniques at Swanpool (Webster and Booth 1947, C 45). Thus, although the development of this form parallels that of the wide-mouthed jars and mirrors general developments in the surrounding counties, the profusion of decoration and the relative importance of the form is best paralleled in the industries represented by Todd's East Midlands burnished ware.

Miscellaneous

Three other types were identified in the local fabric: cheesepresses, a flanged bowl and a knobbed lid. The production of all three types can be paralleled at Holbrook II and the flanged bowls are illustrated from Hazelwood (Brassington 1980, fig. 23 nos 583, 585–93 and 599–600; Kay 1962, fig. 13 nos 13–18). Flanged bowls, cheesepresses and lids are all represented in the Derby Racecourse repertoire (Brassington 1971, nos 37–114, 198–203, 270; Brassington 1980, nos 326–332, 354, 363–5, 367–8, 400–44, 446, 517–9, 533–6, 557–9). In style and decorative treatment only the flanged bowl is sufficiently distinctive for comparisons to be significant. The form found at the Derbyshire ware kilns is identical to that found at Derby Racecourse and both industries favour white painted decoration on the flange in the form of zigzags, stripes and occasionally circles, dots and swastikas. The fabric difference is in many cases the only distinguishing feature, although the Derbyshire ware potters seem to favour groups of three painted ziz zags while the Racecourse potters seem to favour groups of three or four painted lines. The abundance of flanged and shallow bowls at Hazelwood probably indicates that the small numbers at Lumb Brook are an accident of survival.

This type of flanged bowl is rare in the East Midlands kiln groups. In the South Yorkshire kiln group, a small number of examples are noted at Rossington Bridge and rather more at Cantley (Buckland *et al.* 1980, type Cd; Samuels 1983, fig. 125 no. 25–6, fig. 141 nos 4–8) but most of the flanged bowls are of later types either copying samian form 38 or have a bead rim with a downbent flange (Buckland and Magilton 1986, 177 no. 195 at Cantley 33/4, 37/8/9; Buckland 1976, nos 29–31 at Branton). This latter form differs from those at Lumb Brook in the rim and flange treatment and, although sometimes painted, it usually has a white triangular motif, sometimes with a red lattice on top (*cf.* Buckland and Magilton 1986, fig. 342 no. 350). The flanged bowl form is absent from the East Midlands burnished ware repertoire, although this may only reflect a difference in date, and also from the earlier, second century kilns at Newton-on-Trent and Lea (Field and Palmer-Brown 1991). The form does not occur in the second century Lincolnshire kilns but may be found at Leicester and also in the Nene Valley in the fine and cream ware respectively similar to the Racecourse products (Kenyon 1948, fig. 22 nos 1–4, dated late first to second century; Perrin 1999, 111, dated later second to mid third century). To the west, the form occurs in the Severn Valley ware repertoire (Webster 1977, type J, dated to the second century). It is absent in the published material from Manchester but rare examples are published from Melandra (Webster 1971, no. 244). The examples from Brough-on-Noe are Derby Racecourse products (Leary 1993, fig. 5.9 no. 43 and fig. 6.10 no. 18). So this form firmly connects the potters with those working

at Derby Racecourse and through them to the Doncaster kilns and kiln groups to the south.

Parallels for the form give a wide date range in the second to mid third century. As it has been argued that this form in the RE/OX fabrics is a kiln product, vessels in both the fabric and form can be dated from the mid second century, when production seems to have begun at the Derbyshire ware kilns, to perhaps the mid third century. The date at which this form ceased to be made is uncertain. A flanged bowl with painted ziz zag decoration from Roystone Grange farm 2 came from a layer with third to fourth century material (Leary in prep.). Unfortunately much of the contextual data for farm 2 was lost and the layer from which this sherd came included second century material. The bowl could, therefore, be part of this redeposited element of the group and an earlier date is possible. Although occupation at farm 2 seems to be principally of late third century date, there was a scatter of earlier second century features. At farm 1, a large but abraded sherd from a flanged bowl in an OX fabric was recovered from the levelling layer over the post-hole building. This layer included third and early fourth century material such as a Nene Valley colour coated, pentice-moulded beaker, to hammerhead mortaria and a late shell-tempered ware jar, some very abraded and some unabraded, and seems to represent material which had accumulated in the third to early fourth centuries. These instances, together with the numbers of flanged bowls from the mid third century kiln at Hazelwood, suggest the type continued at least as late as the mid third century and possibly into the late third century.

CONCLUSION

The study of the coarse wares, other than Derbyshire ware, made at Lumb Brook kilns, near Hazelwood has successfully characterised them both in the hand specimen and as a petrofabric. The wares proved to be a single petrofabric divisible into four further fabrics on the basis of colour. Study of both the kiln products and material from the kilns on domestic sites, suggests that at least two and probably all four of these fabric divisions were intentional and merit the divisions given. The study disclosed that local clay sources were utilised and that fabrics could be readily distinguished from the Derby Racecourse products. Study of fabric samples from Derby Racecourse and Hazelwood revealed that a variety of local clay sources were utilised there. The potters at the Racecourse kilns utilised a range of clay sources in the locality and invested considerable effort even in the manufacture of the more mundane storage jars. It may be that the "pre-Derbyshire ware" rebated jars were cheaper to produce than the finer ware rebated-rim jars also made on the site. This careful manufacturing technique was mirrored at Hazelwood where there is evidence for the elaborate preparation or selection of clays in some cases. This incidental discovery of such details of the preparation and modification of the pottery clays opens up fresh avenues of study and challenges our preconception regarding the time and effort invested in the manufacture of coarse wares.

The stratigraphic sequence on the site and the associated non-local wares suggested production from the mid to late second century to the late third century. The study of the forms made at Lumb Brook revealed a stong ancestral link with the forms made at the Derby Racecourse. The development of the vessel forms also conformed to general trends observed at the other ceramic industries in the East Midlands but specific and

characteristic typological traits demonstrate a local interpretation of the fashion of the day which can, additionally, be used to identify the Lumb Brook products on settlement sites.

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REFERENCES

Anderson, A.C. (1981) Other Pottery. In R. Ling and T. Courtney, 'Excavations at Carsington, 1979–80, 78–80'. *DAJ* 101: 58–87.

Branigan, K. and Housley, J. and C. (1986) Two Roman Lead Pigs from Carsington. *DAJ* 106: 5–17.

Brassington, M. (1969) A possible kiln near Milford. *DAJ* 89: 119–104.

Brassington, M. (1971) A Trajanic kiln complex near Little Chester, Derby, 1968. *Antiquaries Journal* Vol. 51: 36–69.

Brassington, M. (1980) Derby Racecourse kiln excavations 1972–3. *Antiquaries Journal* Vol 60: 8–47.

Brassington, M. (1982) Exploratory excavations at Little Chester, Derby. *DAJ* 102: 74–83.

Brassington, M. and Webster, W.A. (1988) The Lumb Brook Pottery Kilns, Hazelwood: an Interim Report. *DAJ* 108: 21–33.

Bridges, E.M (1966) The soils and land use of the district North of Derby (Sheet 125) *Memoirs of the Soil Survey of Great Britain.*

Buckland, P.C. (1976) A Romano-British kiln site at Branton near Doncaster. *Yorkshire Archaeological Journal* 48: 69–82.

Buckland, P.C. and Dolby, M.J. (1980) *A Roman pottery kiln site at Blaxton Quarry, near Doncaster*. The Archaeology of Doncaster. The Roman Pottery Industry 4/1.

Buckland, P.C., Magilton, J.R. and Dolby, M.J. (1980) The Roman Pottery Industries of South Yorkshire: a review. *Britannia* 11: 145–64.

Cameron, H. and Lucas, J. (1969) Tripontium: first interim report. *Transactions Birmingham Archaeological Society* 83 (for 1966 and 1967): 130–79.

Dearne, M. J. (1993) *Navio The fort and vicus at Brough-on-Noe, Derbyshire*. British Archaeological Report British Series 234.

Dearne, M.J., Anderson, S. and Branigan, K. (1995) Excavations at Brough Field, Carsington, 1980. *DAJ* 115: 37–75.

Dool, J., Wheeler, H., *et alia.* (1985) Roman Derby: Excavations 1968–1983. *DAJ* 105.

Evans, J. (1988) All Yorkshire is divided into three parts: social aspects of later pottery disrtibution in Yorkshire. In J. Price and P.R. Wilson (eds) *Recent Research in Roman Yorkshire*. British Archaeological Reports British Series 193, Oxford: 323–337.

Field, F.N. and Palmer-Brown, C.P.H. (1991) New evidence for a Romano-British greyware pottery industry in the Trent Valley. *Lincolnshire History and Archaeology* 26: 40–56.

Frost, D.V. and Smart, J.G.O. (1979) Geology of the country north of Derby. *Memoirs of the Geological survey of Great Britain.* Sheet 125.

Fulford, M. and Bird, J. (1975) Imported pottery from Germany in Late Roman Britain. *Britannia* 6: 171–181.

Gillam, J.P. (1939) Romano-British Derbyshire ware. *Antiquaries Journal* 19: 429–37.

Gillam, J.P. (1970) *Types of Roman coarse pottery vessels in Northern Britain.* Newcastle-upon-Tyne. Oriel Press.

Gillam, J.P. (1976) *Coarse fumed ware in North Britain and beyond.*

Hodges, R. and Wildgoose, M. (1981) Roman or native in the White Peak: the Roystone Grange project and its regional implications. *DAJ* 101: 42–57.

Jones, G.D.B. (1974) *Roman Manchester.* Manchester Excavation Committee. Altringham. John Sherratt and Son Ltd.

Jones, G.D.B. and Wild, J.P. (1968) Excavations at Brough-on-Noe (*Navio*) 1968. *DAJ* 88: 89–96.

Jones, G.D.B. and Webster, P.V. (1970) Derbyshire ware — a reappraisal. *DAJ* 89: 18–24.

Kay, S. O. (1962) The Romano-British pottery kilns at Hazelwood and Holbrook, Derbyshire. *DAJ* 82: 21–42.

Kenyon, K.M. (1948) *Excavations at the Jewry Wall Site, Leicester.* Report of the Research Committee of the Society of Antiquaries of London15. Oxford.

Lomas, J. (1960) A Romano-British Site at Owslow Farm, Carsington., *DAJ* 80: 109–116.

Leary, R.S. (1993) Romano-British coarse pottery. In Dearne 1993: 77–84 and 116–121.

Leary, R.S. (1995) Romano-British Pottery. In A. Jones 'Bolsover Sherwood Lodge, archaeological investigations 1992–3'. *DAJ* 115: 96–99.

Leary R.S. (1996) Roman Coarse Pottery. In A. S. Esmonde Cleary and I. M. Ferris, *Excavations at the New Cemetery, Rocester, Staffordshire, 1985–1987*: 40–60. Staffordshire Archaeological and Historical Society Transactions vol. 35.

Leary in prep. The Romano-British pottery from Roystone Grange.

Ling, R., Hunt, C.O., Manning, W.H., Wild, F. and Wild, J.P. (1990) Excavations at Carsington, 1983–84. *DAJ* 110: 30–55.

Makepeace, G.A., Beswick, P. and Bishop, M. (1989) The Romano-British settlement at Staden near Buxton: the 1983 excavations. *DAJ* 109: 24–34.

J. May (1996) *Dragonby. Report on Excavations at an Iron Age and Romano-British Settlement in North Lincolnshire*: 587–90. Exeter. Oxbow Monograph 61.

Munsell (1992) *Munsell soil charts.* New York.

Orton, C.R. (1980) Introduction to the pottery reports. In D.M. Jones 'Excavations at Billingsgate Buildings 'Triangle', Lower Thames Street 1974'. *Transactions London and Middlesex Archaeological Society Special Paper 4.*

Oswald, A. (1937) *The Roman Pottery Kiln at Little London, Torksey, Lincolnshire.* Nottingham. Privately Printed.

Oswald, F. (1952) *Excavations of a Traverse of Margidunum.* Nottingham. Nottingham University Press.

Peacock, D.P.S. (1977) *Pottery and early commerce.* London. Seminar Press.

Perrin, J.R. (1999) Roman Pottery from Excavations at and near the Roman Small Town of Durobrivae, Water Newton, Cambridgeshire, 1956–58. *Journal of Roman Pottery Studies* 8.

Samuels, J. (1983) *The production of Roman pottery in the East Midlands.* Unpublished PhD Thesis. University of Nottingham.

Stead, I.M. (1976) *Excavations at Winterton Roman Villa and Other Roman Sites in North Lincolnshire.* London. Department of the Environment Archaeological Report 9.

Swan, V.G. (1984) *The Pottery Kilns of Roman Britain.* London. HMSO.

Swan, V.G. (1992) Legio VI and its' men: African legionaries in Britain. *Journal of Roman Pottery Studies* 5: 1–33.

Swan, V.G. (1996) The Pottery kilns at Dragonby: Kiln 5. In J. May *Dragonby*: 574–79. Exeter. The Short Run Press.

Todd, M. (1968) The Commoner Late Roman coarse wares of the East Midlands. *Antiquaries Journal* 48: 192–209.

Todd, M. (1969) Margidunum: Excavations 1966–8. *Transaction of Thoroton Society Nottinghamshire*: 7–50.

Tomber, R. and Dore, J. (1998) *The National Roman Fabric Reference Collection. A Handbook*. MoLAS Monograph 2. London.

Webster, P.V. (1971) Melandra Castle Roman fort: excavations in the civil settlement 1966–69. *DAJ* 91: 58–117.

Webster, P.V. (1977) Severn Valley Ware: a preliminary study. *Transactions Bristol and Gloucestershire Archaeological Society* 94: 18–46.

Webster, G. and Booth, N. (1947). The excavation of a Romano-British pottery kiln at Swanpool, Lincoln. *Antiquaries Journal* 27: 61–79.

Williams, D.F. (1977) The Romano-British black-burnished industry: an essay in characterisation by heavy mineral analysis. In D.P.S. Peacock (ed.), *Pottery and early commerce*: 163–220. London. Seminar Press.

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