An early Roman period pottery kiln at Warren Villas Quarry, Upper Caldecote, Bedfordshire

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Introduction

In October and November 1991, during the excavation of an access road, a kiln (Plate 1) and several ditches as well as some pits dating to the Roman period were exposed at Warren Villas Quarry (TL 184472). The kiln excavation was part of a larger project which had been begun in 1989, following the discovery of the waterlogged remains of medieval flax-retting tanks exposed during gravel quarrying. Excavations, undertaken by the Archaeology Service of Bedfordshire County Council, which followed in 1989, 1990, 1991 and 1993, exposed a huge area of landscape features which date from the prehistoric to the early medieval periods (Fig. 1). The period of most intense activity appears to have been during late Iron Age and Roman occupation.

Three thousand, one hundred and ninety nine sherds (46.25kg) of pottery, representing 1605 vessels (total rim diameters 4703) were recovered from the kiln site. Although the kiln forms part of a much wider settlement site, only the pottery from within the kiln and archaeologically associated features is examined here. The rest of the material will be published as part of the report on the settlement at Warren Villas.

Because of the almost intact nature of the pottery it was possible to get a highly accurate vessel number, at least for the substantial vessels within the kiln. The quantification used in this report is, therefore, vessel count. Weight and rim diameters were recorded and may be found in the archive. Table 1 shows quantification by vessel and sherd count.

Seventeen pottery types were recognised, most of which are common types published elsewhere. The four types found in the kiln are fully described below. The illustrated pottery has been chosen to show the range of forms and fabrics found on the kiln site. All variations of form found in the kiln are shown. Illustrations are at 1:4, with filled-in sections to indicate wheel-thrown vessels; hatched sections indicate separately applied parts. The pie-diagram gives an indication of the proportion of the vessel that survives; where all surviving sherds have been drawn in full the pie diagram is omitted. It is expected that the pottery and the archive will be accessioned to Bedford Museum on completion of the full archaeological report.

Topography

The settlement area of the site at Warren Villas is located in a wide gap in the Greensand Ridge eroded since the Late Last Glacial by the River Ivel. Remnant elements of the ridge survive as sandy knolls within the gap but the immediate landscape of the site is flat and low lying. The site occupies a position on the well-drained gravels of the gravel terrace just above and west of the flood plain of the River Ivel.

The settlement and kiln site

Preliminary analysis of the results of excavation show the primary settlement to have been on the gravel terrace beyond the reach of floodwaters which increasingly dominated the floodplain in the 1st century AD and later (Robinson 1992, 203). The settlement at Warren Villas has not been extensively excavated, rather it has been sampled and planned before preservation. The pottery assemblage spot-dating suggests that the settlement continued in occupation throughout the Roman period. The latest coin from the site is one of Valentinian dated AD 383.
The settlement is one of a recognisable type with a series of rectangular enclosures orientated along a common alignment. Within these enclosures habitation areas have been identified along with the fragmentary remains of round houses. Other distinctive features include the presence of a drove way, dispersed burials, both cremations and inhumations, and adjacent fields. Similar examples of this type of site, generally known from cropmarks, include sites in the parishes of Tempsford (HER 1671) and Dean and Shelton (HER 2429). Plough scores in the floodplain gravels, finds of butchered animal bones and environmental evidence make it clear that the primary function of these sites was arable agriculture. In this respect the site at Warren Villas is similar to sites such as Flag Fen (Pryor 1992) where exploitation of a marginal landscape was undertaken at the end of the Iron Age. Small fields with evidence of arable farming were situated on the flood plain whilst larger enclosures occupied the higher gravel terrace (Dawson forthcoming).

The kiln location

The recent excavations in the settlement area show the kiln to have been sited west of the main area of occupation on the gravel terrace above the River Ivel floodplain. Firebars discovered in pits further east within the settlement itself were not associated with a second kiln and suggest either some prefabrication of kiln components elsewhere on the site or levelling of the site after the kiln had gone out of use. In the immediate area surrounding the kiln, apart from the field ditches which later damaged the stoke pit (Fig. 2), no structural evidence has been found; the kiln’s proximity to the settlement suggests that whatever storage or shelter was necessary during the firing process was provided in the village itself. A magnetic susceptibility survey of the entire outer area of the settlement failed to discover evidence of any more kilns nor was there evidence of surface firing commensurate with bonfire or clamp firing. Within the settlement area one magnetic anomaly observed during geophysical survey may have resulted from the ploughing out of a shallow kiln or smithing hearth.

The position of the kiln is of interest, in that it is located west of the settlement, but is far from any known substantial source of clay, although the other components of pottery production, sand and water, are present in abundance. Sources of clay, apart from the Oxford clay lying beneath approximately 3m of river gravels, are occasional periglacial deposits or alluvial clays from the Ivel Valley. No evidence of clay pits was recovered from the excavated area. It is most likely, therefore, that clay was either brought in from Sandy, possibly from pockets in the Greensand Ridge known to have been
exploited in the post-medieval period, or use was made of smaller deposits of alluvial clays.

The kiln structure
The kiln at Warren Villas is a single chambered semi-sunken type (Swan 1984 fig. II). It comprises three elements: stoke pit, flue and combustion chamber.

The stoke pit, although damaged by a later ditch cut almost through the centre, was subcircular, 1.40m diameter, surviving to a depth of .25m. Its fill comprised a sandy matrix containing charcoal but reduced in quantity compared to the flue; there were also daub fragments (Fig. 3). On the west side of the stoke pit the combustion chamber was separated by a short flue almost .60m long. The flue was vertically sided and was lined with clay which had then been fired in situ. The clay lining (2074) was insubstantial, .020–.035m thick, serving to retain the friable gravel sides of the structure. The combustion chamber beyond the flue comprised a circular pit approximately 1.50m in diameter which survived to a depth of .25m. In the centre of the chamber was a cylindrical pedestal of fired clay .60m in diameter upon which a floor of kiln bars would have been laid. Two fragments of kiln furniture were found: a piece from a pierced kiln plate (Fig. 4, 1) which would have rested on the kiln bars and a possible
There was no evidence of a permanent superstructure and it must be assumed that, when fired, the kiln was capped using a combination of shards and turf (Swan 1984, fig. 11, iii). The daub fragments from the stoke pit suggest a removable dome may have been used.

**Pottery Type Definitions**

Four pottery types were found within the kiln (R03; R03A; R15–16); other types were found elsewhere on the site. The pottery types have been allocated common names, based on the fabric descriptions, and codes according to the Bedfordshire Type Series. The sandy (R15) and the orange (R16) types found in the kiln are of the same basic fabric type but their different external appearance and the different repertoire of forms suggest that the potter was deliberately manufacturing two different types. They have therefore been allocated two different codes.

**R15** Sandy type: grey surfaces when reduced with occasional orange patches, grey cores with occasional light grey margins. When oxidised surfaces are a bright orange colour with grey patches and an occasional grey core. Fairly hard fired, rough to the touch with some particularly harsh examples. This rough texture may be a result of underfired wasters and should not be regarded as a characteristic of the same type fully fired. Inclusions are frequent subangular quartz 0.16–0.48mm in size and sparse calcareous and black inclusions, possibly iron ore, approx. 0.4mm in size. Decoration was limited to a patchy white slip on some of the vessels.

**R16** Orange type: bright orange in colour with a grey core at the thickest part such as the base angle. Soft fired, occasionally very soft, with a rough texture. Inclusions are frequent subangular quartz, 0.32–0.8mm in size, and occasional calcareous and black inclusions, possibly iron ore, approximately 0.24mm in size. Decoration is limited to horizontal incised lines, either single or in pairs. White slip is occasionally used over part or the whole of the body. One vessel has possible white paint in a lattice design.

**R03A** Hackly type: buff-white in colour throughout. Fairly hard fired with a rough texture and occasionally harsh surfaces. Inclusions are abundant, subrounded-subangular milky quartz, 0.08–0.48mm, causing a hackly fracture which is very
distinctive of this type, and sparse black inclusions, possibly iron ore. This type made up a small proportion of the pottery found in the kiln and is not likely to be a product of the kiln; possibly from the Verulamium region.

Fig. 4. Kiln furniture (Scale 1:4)

R03 White type: white throughout, but with a buff exterior surface. Hard fired and fairly smooth to the touch. Inclusions are abundant subrounded-subangular, milky quartz, 0.16–0.24mm in size, and black inclusions, possibly iron ore, 0.08–0.4mm in size. Only two flagons were found in this type, and are unlikely to be kiln products. This type may be a finer version of R03A above.

The other fabric types found on the site are: R01 samian; R02 mica gilded ware; R05 orange sandy ware; R06 greyware; R07 sandy black ware; R09 pink ware; R13 shelly ware; R14 burnished ware; F06 grog tempered ware. Single examples of amphora and a Nene Valley mortarium were found. These types will be fully discussed in the report on the settlement site.

Discussion

Dating of the kiln and its products
No independent dating evidence was found; what survived of the kiln structure, the pedestal, was unsuitable for archaeomagnetic dating. The pottery itself, however, suggests an early Roman date, possibly in the early to mid 2nd century. Some of the vessels echo 1st century forms. The carinated jar, Fig. 8, 19, and the wide mouthed jar, often cordoned, Fig. 8, 20–26, are found in the Gallo-Belgic repertoire (Thompson 1982, 149, 489). No late Roman types were found among the non-kiln products found in neighbouring features. Although shelly fabrics continued in use in Bedfordshire throughout the Roman period, flourishing particularly in the 4th century with the products of the Harrold kilns, the shelly forms found at Warren Villas are all shallow channel-rimmed jars, common in the 2nd century (Brown 1994, 59). The sandy narrow based jars, Fig. 7, 10–12, are similar to the tall double-ended vessels from Rushden (Woods and Hastings 1984, 86). The Warren Villas jars are undecorated except for the cordons and are single vessels unlike the Rushden jars which are decorated and are formed from two vessels luted together at the base, to form an enigmatic pedestal vase. The Rushden jars are said to be a unique form, with an unknown function; they are dated to the late 1st century.

The date of the kiln at Warren Villas is of interest insofar as the form of the pottery and the firing technology owes much to Roman methods. Prior to the Conquest, kiln technology was relatively simple in the form of bonfire clamp kilns and their semisunken derivatives. A developed kiln technology was introduced during the Conquest period. Circular kilns with non-portable pedestals attached to the kiln floor were particularly common in the Flavian/Trajanic periods, but continued to be used by the major industries of the southern midlands. The pedestals were sometimes made from the surrounding soils, if suitably clayey. The pedestal of the Warren Villas kiln is non-portable and was fired in situ. However it is not attached to the kiln floor and is cylindrical in shape.

The products of the kiln are fully Romanised in their use of a sand tempered fabric, in their manufacture on a wheel and in their inclusion of new forms such as the flagon and the poppyhead jar. The fully-fledged Romanised flagons brought in from Verulamium might not only have been used by the potter, but copied by him. This would, then, appear to be a fully Romanised pottery industry of the early 2nd century but harking back, in its use of archaic elements, to an earlier potting tradition. Early Roman occupation is attested at the small town site of Sandy where two coins of Cunobelinus (classic A M207, M251) were recovered stratified in the lower horizons of the excavations. Dr Haselgrove has suggested that they may indicate the presence of the army in the mid 1st century. A possible model therefore for the transference of Roman forms and pottery techniques is through the early exploitation of the opportunities offered by the development of Roman Sandy.

The Kiln Products
The pottery produced in the kiln can be divided into two distinct types. Although the fabric is the same, two different types as defined by colour and forms were deliberately produced by the potter. Table 2 shows the forms required in the two types, R15
(sandy) and R16 (orange). Although some forms, such as the cordoned jar, the plain jar and the reeded rim bowl, were produced in both types, certain forms, notably the platter, the flagon and the poppy head jar, were invariably produced in one type only. There appears to have been a deliberate attempt at producing red flagons and grey jars.

There is a slight dominance in quantity of type R15 over type R16 (Table 3), probably reflecting the greater use to which jars were put, and therefore their higher breakage incidence in use. The demand for jars would be correspondingly higher. The variety of forms produced indicates the wide repertoire of a skilled craftsman, who did not specialise in only one type of pot. The vessels are all competently produced with no flaws in their construction; what flaws there were caused by the firing alone. The potter's skill is particularly clear when the narrow based jars, Fig. 7, 10–12, are examined closely. This elaborate jar could be thrown in one attempt, with only the lower cordon added to give strengthening and balance to the narrow base. Number 1 (Fig. 6) shows the rim added to the body, possibly because of the narrowness of the neck. Other forms show separately applied rims such as the narrow necked jars, Fig. 6, 1, 4–5, 7, and the flagons, Fig. 9, 51–53. Although this causes a weak spot in the vessel, only two, 51 and 52, appear to have broken off at this point; all the other necks were securely attached.
The small quantities of hackly (RO3A) and white (RO3) fabric types, together with their position in the top fill of the kiln and their fully fired appearance, suggest that these were not products of the kiln. The fabrics are markedly different and probably originated in the Verulamium region. They were used rather than made by the potter.

The final firing?
The extrapolation of ratios of forms and fabrics from the wasters of any kiln assemblage can be misleading (Bosworth 1982, 47–8). Skilled potters knew how to protect their most delicate and prized vessels from accidents in the kiln. The vessels were thrown competently and stacked successfully. Although there is no evidence of scars to show how they were stacked, the commonest method, both from ethnographic evidence and experimental firings, was upside down with the vessels overlapping to allow circulation of oxygen (Fig. 5) (Bryant 1971, 17). Wasters only give an idea of the potter’s failures, not of his successes, which he duly sold and are not representative of his whole repertoire. The soft and crumbly nature of the pottery indicates an incomplete firing. The complete nature of the vessels indicates that those that survived were too poor in quality to be sold even as seconds. Any that may have been of use would have been picked out for sale. It is therefore uncertain whether we are dealing with the potter’s full repertoire, although the variety of forms and the evidence of an incomplete firing suggest that this is likely.

Two fills were found within the combustion chamber. The lower fill (2073) was a brown black silty material close to clay, containing much charcoal. The wasters within it, although of the same types as the rest of the kiln products, were in a fragmentary condition, with more vessels being represented by single sherd s and a lower weight (113 vessels weighing 2960g). The upper fill (2017) had a similarly silty matrix but contained little charcoal. Most of the complete vessels came from this fill (1271 vessels weighing 37,936g). The fragmentary nature of the vessels in the lower fill suggests at least one other previous firing. There is no evidence of heavy burning on the walls of the combustion chamber, neither are there any signs of repair and relining of the flue. This suggests that the kiln was fired infrequently before its final abandonment. Any previous firing was relatively successful, with fragments of wasters being deposited on the floor of the kiln, or falling through

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Table 4. Illustrated pottery
Fig. 6. Pottery from the kiln (Scale 1:4)
Fig. 7. Pottery from the kiln (Scale 1:4)
Fig. 8. Pottery from the kiln (Scale 1:4)
Fig. 9. Pottery from the kiln (Scale 1:4)
the kiln bars into the base of the chamber. The substantially complete vessels of the upper fill may represent in part the failure of the final firing. They may also be evidence of wasters from subsequent firings elsewhere by the same potter. The position of the vessels in the base of the kiln, and the absence of kiln bars, may also suggest that they were expendable pots placed around the pedestal as a base for the kiln load. This method of firing is known from the suffolk and SW Essex regions, as well as Monmouthshire (Swan 1984, 115-116).

Fragments of kiln bars were found in a hearth some 30m away from the kiln and geophysical evidence points to another possible kiln location elsewhere on site. Either more than one kiln was in production or the one potter moved his kiln to another position after the disastrous firing of the kiln under discussion. Kiln bars do not travel far from their site of use and they are likely to be made by the potter who used them rather than as a specialised product made elsewhere.

The products of this potter have not as yet been recognised outside the kiln site. The neighbouring settlement at Warren Villas is a likely market as is the Roman small town of Sandy, 1.5 km away (Dawson forthcoming). The distribution of the pottery is not likely to be widespread and the small-scale manufacture would have produced only enough to supply local needs. There is widespread evidence for pottery manufacture in the eastern part of the county, but only at Warren Villas has a kiln, dating to the early Roman period, been excavated. The prevalence of kilns on rural sites of this type in the Ouse valley is difficult to estimate as little excavation has taken place. It is clear, however, that despite favourable conditions pottery manufacture did not take place on all rural settlements as no evidence for this type of activity was found at either of the nearby sites at Wyboston (Tebbutt 1957) and Little Paxton, Cambridgeshire (Jones and Ferris 1993).

Bedfordshire is a county rich in good potting clays. Kilns are known from the Iron Age to the post-medieval period. Shell tempered pottery was manufactured in the north-east of the county, notably at Slagden in the 1st century (BCCAS in prep), and at Harrold throughout the Roman period, but particularly in the 4th century (Brown 1994). The west of the county, with the Greensand Ridge running through it, is suitable for sand tempered pottery manufacture. Oxford clays outcrop along the ridge, if not immediately in the vicinity of the Warren Villas kiln, and there are abundant springs. There is evidence of a tree covered landscape (Robinson 1992). All these raw materials for potting materials...
are present within easy reach of the kiln site. The remains of a kiln of late medieval date have been uncovered at Everton, 5km away, which utilised these same resources (Slowikowski 1992, 70). Other medieval kiln sites are known further south along the ridge at Flitwick (Mynard et al. 1983).

The Warren Villas kiln, however, is the first to be found in this area dating to the Roman period. The only other possible evidence of pottery manufacture in this area of east Bedfordshire is from Tempshford where pits filled with soot and ash, and wasters have been recorded (Simco 1984, 41), though no evidence of actual kilns or kiln furniture has been reported. Evidence based on wasters alone can be misleading as seconds may have been bought as much at markets as at the kiln sites. Kiln bars are a more reliable source of evidence as they are less likely to travel far from the kiln site. Other sand-tempered greywares were manufactured at kilns uncovered in central Bedfordshire (Eastcotts, Cardington and Mile Road) and there is evidence in the form of kiln bars from sites in the south of the county, near Luton, and further south along the Greensand Ridge at Toddington (Simco 1984, 126).

The single kiln uncovered at Warren Villas suggests one workshop producing a variety of forms. The decoration on the pottery supports this view. The appearance of all the wavy line decoration, Fig. 6, 1–3, 7; Fig. 7, 9, suggests that it was made with the left hand, probably by the same potter. This would fit well with Peacock’s third mode of production: the individual workshop run by a potter and perhaps an assistant or other members of the potter’s family (Peacock 1982, 9). No individual finger prints were found that might indicate more than one person working on the pots. No structures could be identified as the integral parts of the workshop complex itself; there was no evidence for levigation tanks, drying sheds, fuel store nor for the workshop itself. All these would have been necessary and they may be identified at a later date when the analysis of the settlement area has been undertaken.

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