

◆ An early Roman pottery production site at Horticultural Research International, Littlehampton

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Investigation of an early Romano-British settlement at Worthing Road, Littlehampton revealed an enclosed working area, probably with beginnings in the Late Iron Age. Pottery was produced on the site for about 100 years between c. AD 43 and AD 150 using simple updraught kilns producing pottery comparable with that produced at Hardham and Wiggonholt and to vessels from Fishbourne and Chichester. Environmental evidence suggests that spelt wheat was processed in the vicinity of the site and the waste from this processing was used as kindling to fire the kilns.

In October to November 1997 Wessex Archaeology undertook an archaeological excavation at the site of the Horticultural Research International (HRI), Worthing Road, Littlehampton (centred on TQ 043034: Fig. 1). The excavation was carried out following an archaeological evaluation (Weaver 1995) as a condition of planning consent prior to redevelopment of the site for housing, office and recreational space. The excavation concentrated on an area of land in the north-east corner of the site which was formerly used for horticultural research.

TOPOGRAPHY AND GEOLOGY

The area slopes gently from c. 6 m OD at the south to c. 4 m OD at the north towards Black Ditch, a watercourse that passes around the east and north side of HRI before flowing into the River Arun. The underlying geology is Brickearth, which was encountered at depths of between 0.40 m and 0.60 m below current ground level. The land-use at the time of excavation was arable.

ARCHAEOLOGICAL BACKGROUND

A desk-based assessment (Weaver 1995) recorded evidence of Late Iron Age and Romano-British deposits within a 400 m radius of the site, largely revealed during the construction of the A259 Rustington By-pass and Watermead Industrial Estate at Toddington. The evidence falls into two categories: settlement features and field systems. At

Toddington (Gilkes & Hammond 1991), c. 700 m to the north-west of the site, a series of 1st- and 2nd-century AD enclosures or field boundaries and the remains of a timber building and waste pits were recorded. Similar deposits were observed along the route of the Rustington By-pass.

Longer periods of settlement around Littlehampton (6th century BC to the late 2nd or 3rd AD) have been identified at the Wickbourne Estate (Gilkes 1993), c. 2 km to the south-west of the site. In close proximity to this was an early Romano-British rectangular ditched enclosure spanning the immediate pre-conquest and early Roman periods into the early 2nd century AD.

To the north-east of the HRI are the remains of Angmering Villa (Fig. 1), a 1st- and 2nd-century complex of buildings on the banks of the Black Ditch (Scott 1993, 181; Gilkes 1993, 11–16). To the north-west of the villa a number of early Romano-British occupation spreads were recorded during a recent evaluation (Hammond 1991). Of particular interest is the discovery of a 2nd-century Roman watermill (Rudling & Gilkes 2000, 18–27), c. 400 m to the north of the HRI site.

An archaeological evaluation (Weaver 1995) of the HRI site revealed evidence of considerable activity, concentrated in two main focal areas in the northern half of the site. The majority of this activity was of Roman date, with a small number of Bronze Age and Iron Age deposits identified towards the north-west of the site.

Evidence of possible Late Iron Age/early Roman settlement surrounded by an enclosure was

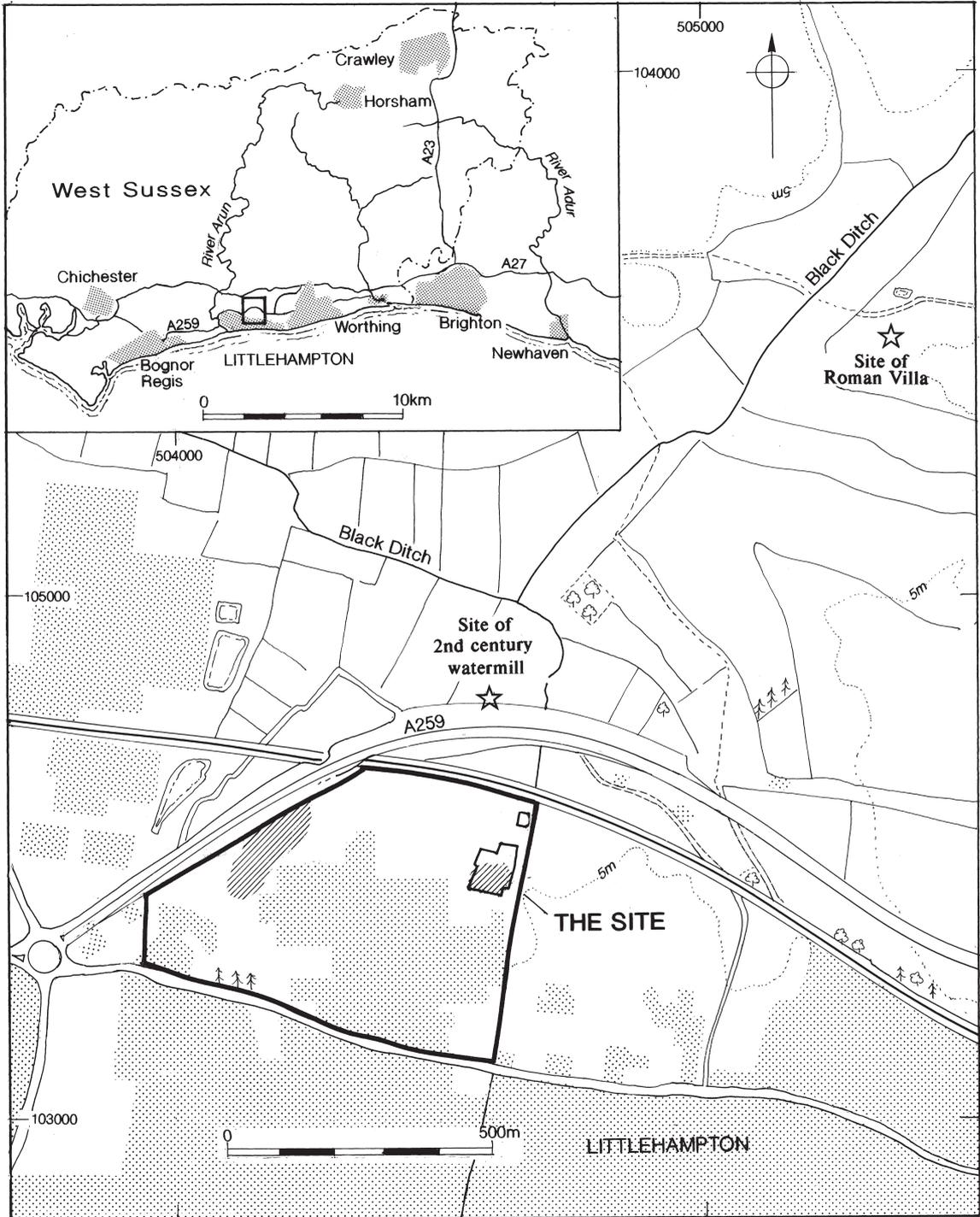


Fig. 1. Location plan.

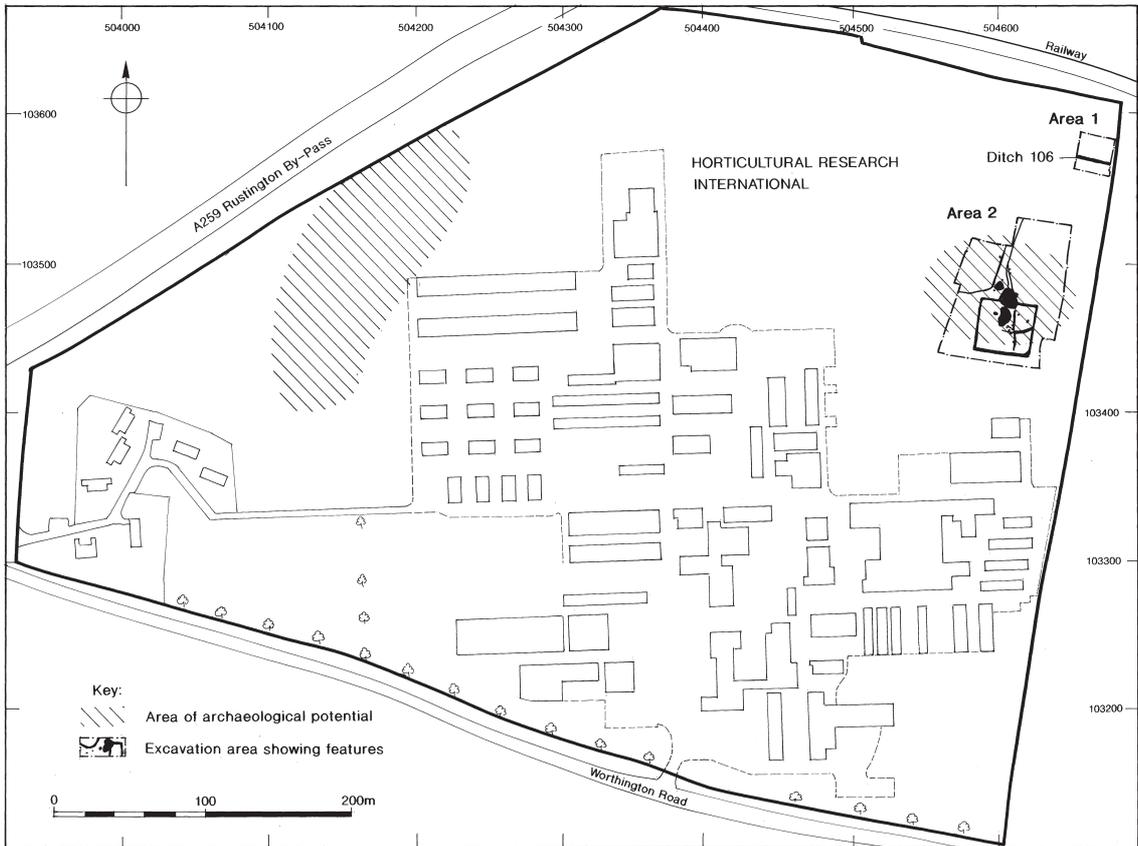


Fig. 2. Positions of areas of known archaeological interest and excavation areas.

identified in the north-west area, in close proximity to the A259. Imported gabbroic and non-local igneous rock-tempered pottery sherds were recovered from the enclosure, suggesting trade links with Brittany or Cornwall. Clusters of unstratified Late Iron Age/early Roman pottery was recovered from both the north-west and north-east focal areas.

Although much of the pottery assemblage was of 1st-century AD date or earlier, a number of unstratified later Roman sherds (3rd or 4th centuries AD) were also recovered, suggesting some later activity on site. Both focal areas had large re-cut ditches, pits, spreads, and stake-holes suggesting a substantial level of occupation.

AIMS AND OBJECTIVES

The principal aim of the project was to preserve by

record a sample of the archaeological remains present that it was not possible to preserve *in situ*.

The objectives were therefore:

- to examine further one of the main focal areas of Romano-British activity identified in the north-east corner of the site during the evaluation, the north-west area being preserved *in situ*;
- to determine the nature and extent of the Romano-British activity in this focal area, in particular the possibility of an enclosed settlement;
- to determine the relationship of an east-west aligned field boundary ditch with the main focal area;
- to determine the presence/absence of later Roman deposits associated with the 3rd- or 4th-century sherds recovered during the evaluation;
- to relate the findings from this site to the historic development of Littlehampton.

METHODS

Two areas of known archaeological potential (Areas 1 & 2; Fig. 2) measuring a total surface area of 6825 m² were selected for examination. These were situated in the north-east of the site where the proposed development would cause the most impact to archaeological remains. The north-west focal area identified during the evaluation was preserved *in situ* and not further investigated. Topsoil and subsoil were removed using a 360° tracked excavator using a toothless ditching bucket, after which the trenches were further cleaned and planned by hand. Sections were excavated and recorded through selected features and all artefacts were retained. With the exception of one undated ditch in Area 1, all other archaeological features were in Area 2.

RESULTS

The excavation revealed four phases of activity beginning in the Middle to Late Bronze Age (phase 1). A number of residual prehistoric worked flints was also recovered.

PHASE 1 (1500–700 BC)

A small quantity of unstratified Middle to Late Bronze Age pottery was recovered from the topsoil across the site and from a number of Romano-British layers as residual material. In addition, the truncated remains of a Middle to Late Bronze Age urned cremation burial (242) (Fig. 3) were found in the west of Area 2 and the base of a Late Bronze Age vessel was found in the north-west of the site during the evaluation. It is probable that these remains come from a Bronze Age settlement or cemetery in the immediate vicinity of the HRI site.

PHASE 2 (MIDDLE TO LATE 1ST CENTURY AD)

A ditched enclosure was constructed in the southern part of Area 2 in the middle to late 1st century AD (Fig. 3). The function of the enclosure was primarily as a working area with an internal north–south division, possibly to segregate different activities. A single pottery kiln and a pit were found towards the centre of the enclosure.

Enclosure 404

Enclosure 404 was a sub-rectangular ditched enclosure measuring 36 m by 39 m (the long axis aligned east to west). Generally, the ditch had moderately steep sides and a flat base, and measured

between 1.31 m and 1.72 m wide, and 0.54 m and 0.73 m deep. Up to three episodes of infilling were recorded with no evidence to indicate on which side, if any, an associated upcast bank may have existed. Finds from the ditch comprised site-produced pottery vessels and other local coarse wares, as well as a single piece of ironworking slag, probably from smithing, and a large quantity of burnt flint. The entrance to the enclosure is thought to have been approximately centrally located on its northern side although this was obscured by a later waste deposit (406).

The enclosure was subdivided by a north–south aligned ditch (363) which terminated before it reached the enclosure ditch at its southern limit, possibly providing access between the west and east segments. The northern extent of ditch 363 was also obscured by waste deposit 406 so that its exact relationship with 404 could not be determined. A range of pottery fabrics, including some from vessels manufactured on site, was present, predominantly types and forms considered to be early within the overall assemblage. While the evidence is not unequivocal, on balance, this ditch seems to belong with the first phase of enclosure 404, rather than later (but *see* below).

Charcoal samples recovered from the ditch included oak sapwood and reed stems. It is probable that the reed stems represent the remains of a wind-break or barrier erected along the edge of the ditch between the segregated areas.

Kiln 359

Throughout the early Romano-British period the site was a focus for pottery production and the remains of a possible kiln (359) were recorded towards the centre of the enclosure. It was circular, c. 1 m in diameter and at least 160 mm deep with vertical sides and a flat base. Although the upper part of the kiln had been removed by later activity, the remains of two deposits of burnt clay were found *in situ*. The base of the kiln was covered by 30 mm of dark grey silty clay. There was no evidence for clay lining within the kiln and, given that the base and sides were heat-affected, it is likely that the kiln was never lined. The absence of a stoke-hole or stoking area is not unusual (Swan 1984, 55) as it might have been sited above the level of the furnace chamber and has since been ploughed away. No pottery was found directly associated with this feature. Also attributable to this phase was a single pit (385) to the north-west of the kiln.

PHASE 3 (LATE 1ST CENTURY AD)

By the late 1st century AD the enclosure had been further subdivided and a droveway constructed.

Internal divisions

During phase 3, enclosure 404 was further subdivided by an east–west aligned ditch (409), forming one large area to the west and two smaller areas to the north-east and south-east. Ditch 409 appeared to have had a drainage function, channelling water into the enclosure ditch.

At some point, probably in this phase, ditch 409 was re-cut (ditch 410) and extended to the west, cutting through the earlier north–south ditch (363), kiln (359) and pit (385) in the process. This may have been an attempt to improve the drainage within the enclosure. Two iron objects were recovered from the ditch: a latch-lifter and a loop-headed object of unknown function.

The droveway

A ditch-lined droveway (comprising ditches 405 and 408; Fig. 3) was constructed to the north of the enclosure. It appeared to turn at the presumed entrance of the enclosure to continue in a westerly direction, possibly to link up with other elements of the main settlement area. Although the dating evidence for the infilling of the droveway ditches suggests that the droveway went out of use during phase 3, it could have been constructed at the same time as the enclosure. The remains of several pottery vessels (Fig. 4) were recovered from the western droveway ditch (405). These included a cup-necked flagon (Fig. 9:21) and three jars, one of which contained broad beans. These vessels (none of them wasters from on-site

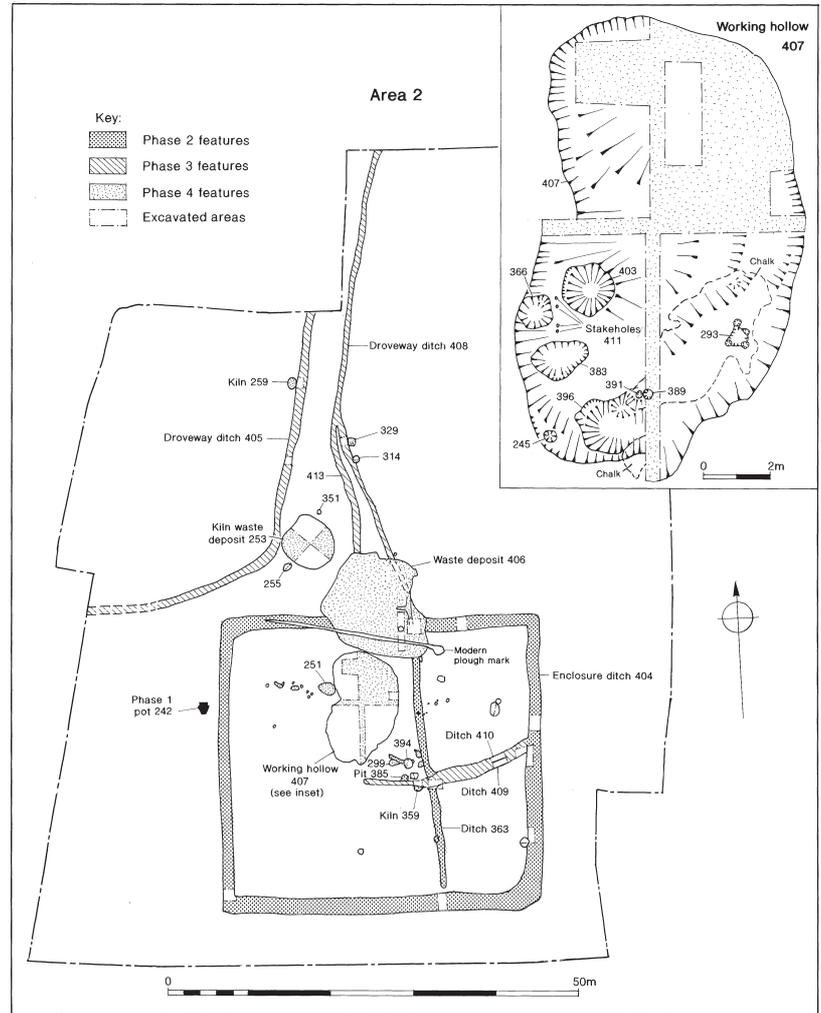


Fig. 3. Phase plan, area 2 with detailed plan of working hollow 407.

production) are sufficiently complete to suggest deliberate deposition in this context.

The eastern side of the droveway divided into two ditches (ditches 408 & 413) as it approached the enclosure, possibly forming an area for corralling livestock. The droveway ditches in general were c. 0.5–0.90 m wide and 0.5 m deep with slightly concave sides and flat bases. The ditches may have bracketed the entrance to the enclosure, but no relationship could be observed beneath the dump of waste material (406). There is no evidence that the line of 413 was continued within the enclosure,



Fig. 4. Pottery vessels *in situ* in droveway ditch 405.



Fig. 5. Large necked storage jar *in situ* in ditch 408.

though it is possible that ditch 363 is a continuation of ditch 408. A necked storage jar (Figs 5 & 8:7) was recovered from ditch 408.

To the north, within Area 1 was a single 'V'-shaped ditch aligned east-west (106; Fig. 2) with a single recut. Although unphased, this ditch is thought to have been part of a field system contemporaneous with the droveway and early Romano-British features to which it may have been physically linked.

PHASE 4 (LATE 1ST TO MID-2ND CENTURY AD)

By phase 4 the enclosure itself had been largely abandoned as a working area and waste deposits (406 & 407) covered large areas. The remains of a badly disturbed cremation burial, probably originally

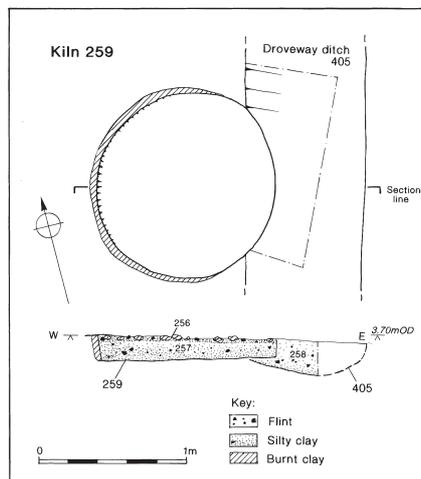


Fig. 6. Plan and section of kiln 259.

urned, were recovered from the junction of ditch 410 and ditch 363. This was most likely the final episode before abandonment of the enclosure.

Pottery was still being produced (kiln 259) and much of the waste created by this activity was found in the waste deposits. These deposits cover parts of the enclosure and droveway ditches, indicating that they had gone out of use by this time.

Kiln 259

Kiln 259 was situated on the western edge of droveway ditch 405 (Figs 3, 6 & 7), into which it had been cut. This was similar in size and nature to the earlier kiln within the enclosure. The upper part of the kiln had been removed by ploughing and only 150 mm of the base survived. Two burnt layers were identified within the kiln, the upper deposit comprising 50 mm of dark grey silty clay containing frequent fragments of burnt clay. The primary deposit appeared to be more heat-affected than the upper fill and the 100 mm of silty clay was red and black in colour. Charred plant remains and charcoal were recovered from both deposits comprising oak, maple and blackthorn, as well as chaff, grains and weed seeds, and a mixture of small twigs or stems, possibly used as kindling. As with the earlier kiln no evidence of a stoke-hole was recorded, although in this instance its close proximity to a ditch suggests that the ditch

may have served as a ready-made stoking area (Swan 1984, 55). Only a small amount of pottery (nine sherds) was directly associated with this feature.

The construction of the kiln, partly into the fill of ditch 405, suggests that the driveway ditch had become completely infilled by phase 4.

Waste deposits and working hollow 407

The largest area of waste deposits (406) was situated towards the middle of the site, masking the southern part of the driveway ditches and the northern side of the enclosure. Two slots were excavated through the south-eastern part of this deposit, which was c. 50 mm deep. These investigations revealed four intercutting features, the earliest of which was the enclosure ditch. The remaining features (probably pits) were stratigraphically later than the enclosure and could not be phased in detail. There was no clear evidence for the relationship between ditches 408, 404 and 363.

To the south of deposit 406 and within the main enclosure was a large, irregular working hollow aligned north–south (407) and measuring c. 14 m by 8 m. At the base of the hollow were at least four small pits, several post-holes and stake-holes, and an approximately square feature (293), measuring c. 0.6 m by 0.6 m with post-holes at each corner. The southern edge of the working hollow appeared to respect a natural outcrop of degraded chalk. This hollow and the features at its base were filled with several discrete waste deposits (238, 239, 302, 352 & 374). Fragments of charcoal from within the working hollow comprised a number of different woodland species including elder, ash, oak (sapwood and heartwood), maple, blackthorn and hawthorn. The waste deposits comprised both kiln waste and the refuse from other activities such as milling carried out in the vicinity of the site. Fragments of Greensand and quartz conglomerate rotary querns were also recovered. Other finds included fragments of bottle and window glass and a moderate quantity of fired clay.

Two further waste deposits (329 & 314), both less than 1 m in diameter and between 70 mm and 140 mm deep, were recorded to the eastern edge of driveway ditch 408. These were similar in nature to the other waste deposits encountered on the site.



Fig. 7. Kiln 259 after excavation.

Pits and Post-holes

Eleven early Romano-British pits and 12 post-holes were investigated within the enclosure. These were generally clustered to the east and west of the working hollow (407) and contained small quantities of fired clay. The pits were either circular or sub-circular, c. 1 m in diameter and generally less than 160 mm deep, although pit 299 was slightly deeper at 430 mm. Pit 394 was distinctive, as it was at least 0.81 m deep (time constraints prevented full excavation), and may therefore have performed a different function to the remainder of the pits in the area.

The pits and post-holes within the working hollow clearly predate the deposition of the upper layers of waste during phase 4, although the finds suggest that at least one pit (383) was still open at the beginning of this phase. A variety of finds was recovered from these features. Fragments of ceramic building material (including *tegula* fragments), a whetstone fragment and some possible quern fragments were recovered from pit 396 as well as charred plant remains including weed seeds, some cereal grains and glume bases. A copper-alloy perforated disc of unknown function was recovered from pit 403.

Immediately to the west of working hollow 407 was a large sub-circular pit 251. Although this feature was not fully excavated, a fragment of an early Roman glass vessel came from the surface (*see below*).

A smaller waste deposit comprising predominantly kiln waste (253) was identified to the north-west of waste deposit 406 and to the south of kiln 259. The deposit was heavily burnt and organic in nature,

filling a sub-circular shallow depression *c.* 6.4 m in diameter and up to 0.50 m deep. An oval pit (255) and a post-hole (351) were situated to the south-west and north-east of this deposit respectively. A significant quantity of fired clay was recovered from the post-hole and waste deposit. Small quantities of ceramic building material and quartz conglomerate quern fragments were also recovered. Several species of tree were identified from charcoal fragments

recovered from the waste deposit. These included elder, ash, oak (sapwood and heartwood) as well as the charred remains of grain sprouts, chaff and weed seeds.

The site appeared to have been abandoned in the middle of the 2nd century AD although a number of unstratified later sherds of pottery dating from up to the 3rd or 4th century were recovered during the evaluation, suggesting some later activity occurring in the vicinity of the site.

THE FINDS

POTTERY by M. Laidlaw with a contribution by M.A.B. Lyne
The pottery assemblage consists of 3189 sherds (34,151 g), dating predominantly to the early Roman period (1st/2nd century AD), with a very small proportion of prehistoric material. The Romano-British assemblage is dominated by coarse-ware vessels in a restricted range of forms which represent on-site pottery production. Much of this material has the appearance of being over- or underfired and consequently is in relatively poor condition, with abraded surfaces and rolled edges.

Methods

The pottery was analyzed using the standard Wessex Archaeology pottery recording system (Morris 1994). On the basis of the dominant inclusion type the assemblage was divided into four fabric groups: Group F (flint-tempered), Group G (grog-tempered), Group Q (sandy) and Group E ('established' wares of known type or source). Using a binocular microscope ($\times 20$), these were then subdivided into a range of fabric types dependent on the frequency and size of the inclusions.

The pottery has been recorded by fabric type within each context, noting details of surface treatments, decoration and evidence of use such as surviving residues. A type series was created for all diagnostic rim sherds. The data gathered were entered on to a spreadsheet (Microsoft Excel) and full records exist in the archive.

Terms describing the frequency of inclusions in the following fabric descriptions are defined as follows: rare (1–3%), sparse (3–10%), moderate (10–20%), common (20–30%) and abundant (40–50%). Pottery totals by fabric are listed in Table 1.

Prehistoric pottery

A small quantity of flint-tempered pottery was attributed broadly to the Middle to Late Bronze Age mainly on the basis of fabric type. All three fabrics are likely to have been produced locally as both clays and temper would have been easily accessible.

F1 Hard, moderately fine fabric with moderate, moderately-sorted, angular flint <6 mm. Generally pale orange surfaces and grey core.

F3 Hard, moderately coarse fabric with moderate, moderately-sorted, angular flint <3 mm (mainly 0.5 mm); sparse, sub-rounded quartz 0.25 mm. Variable firing.

F4 Hard, coarse fabric with common, well-sorted, angular flint <3 mm. Dark grey.

Most of the prehistoric sherds are derived from the base of a

Table 1. Summary quantification of pottery fabric groups (percentages are by weight).

FABRIC	No. sherds	Wt (g)	% of total
PREHISTORIC			
Flint tempered			
F1	136	487	1.4
F3	10	27	0.1
F4	11	69	0.2
<i>sub-total</i>	157	583	1.7
Rock tempered			
R1	5	21	
R2	1	6	
<i>sub-total</i>	6	27	0.1
ROMANO-BRITISH			
Site-produced wares			
Q100	2047	24,236	71
Q101	244	2397	7
<i>sub-total</i>	2291	26,633	78
Other greywares			
Q102	72	419	1.2
Q104	72	899	2.6
Q106	27	293	0.9
Q109	30	386	1.1
Q110	24	202	0.6
Q113	30	182	0.5
Q114	85	1067	3.1
Q116	2	28	0.1
Q117	15	166	0.5
Q119	58	627	1.8
Q120	5	265	0.8
Q121	20	159	1.6
<i>sub-total</i>	440	4693	14.8
Flint tempered			
F100	9	35	0.1
Grog tempered			
G100	43	350	1
G101	2	8	0.02
G103	15	115	0.3
<i>sub-total</i>	60	473	1.32
British fine wares			
Q103	92	605	1.8
Q107	40	190	0.6
Q108	22	165	0.5
Q111	21	92	0.3
Q115	22	267	0.8
<i>sub-total</i>	197	1319	4
Imported fine ware			
Samian	29	388	1.1
TOTAL	3189	34,151	

single vessel recovered from a damaged cremation burial (242). It should be noted that although 127 sherds were recovered, the majority are tiny and attributed to fabric type F1 on the basis of associated larger sherds.

One small flat-topped rim and one body sherd in the coarse-tempered fabric F1 were recovered from subsoil deposit 200 (Fig. 8:1). The remainder of the sherds were dispersed, often as single sherds, in a number of features assigned to the Romano-British period.

Two further fabrics were tentatively attributed to the Late Iron Age, both containing rock inclusions.

R1 Hard, moderately fine fabric with moderate, poorly-sorted, subangular rock (sandstone) <3 mm, mainly 1 mm; sparse iron oxide. Greyish.

R2 Hard, coarse fabric with common, moderately-sorted, subangular rock (quartz-like) <5 mm; sparse micaceous rock. Dark grey.

Five of the sherds attributed to R1 are non-diagnostic body sherds and are likely to be residual within Romano-British waste deposits 238 and 352. Possible sources for the sandstone in fabric R1 are the Hythe Beds outcrops of the Pulborough Ridge. The single sherd in fabric R2 was unstratified and owing to the presence of igneous inclusions, a source in the south-west of England or the Continent is likely; Iron Age igneous rock-tempered fabrics were identified on the Rustington By-pass (Timby, in Weaver 1995).

Romano-British pottery

On the basis of vessel forms and fabrics the bulk of the pottery may be attributed to the early Roman period (1st–2nd centuries AD). The assemblage is discussed here within six broad fabric groups:

- Coarse sandy fabrics which are considered to derive from on-site pottery production;
- Other coarse grey wares;
- Coarse flint-tempered wares;
- Coarse grog-tempered wares;
- Imported fine wares;
- British fine wares.

Coarse sandy fabrics deriving from on-site pottery production

Two very similar fabric types were identified as probably

representing on-site production; these account for 78% of the total assemblage by weight. These two fabrics are visually homogeneous and only differ slightly in the degree of coarseness, due to the size and abundance of the quartz grains. Each fabric type covers a broad range of variation in terms of frequency and size of inclusions. It was sometimes difficult to distinguish between these sandy fabrics and those grouped as other sandy grey wares.

Q100 Hard, coarse fabric with common, well-sorted, rounded quartz <1.5 mm. Covers a large variation in frequency and size of quartz grains and firing conditions.

Q101 Hard, moderately coarse fabric with moderate, well-sorted, rounded quartz <1 mm (mainly 0.5 mm). Mainly grey.

Fabric Q100 is by far the most commonly occurring and alone makes up 71% by weight of the total assemblage. This fabric is mainly oxidized, but a significant proportion of sherds are unoxidized and are likely to represent similar coarse grey wares being produced in the area. Initially the distinction was made between oxidized and unoxidized sherds in order to detect any correlation between forms, fabrics and distribution, but this was found to be a fairly subjective exercise and was abandoned, although the impression was gained that no such distinctions were apparent.

Forms

Diagnostic rim sherds were assigned to the ten vessel forms described below, which are correlated with forms from Fishbourne (Cunliffe 1971) and Wiggonholt (Evans 1974) where appropriate. The occurrence of vessel forms in fabrics Q100 and Q101 is given in Table 2.

Jars

Form 1a: Necked jars with high rounded shoulders, rims rounded or beaded (Fig. 8:2–5, 7; Fishbourne types 161–81, fig. 101; Wiggonholt fig. 11:36–7, fig. 14:90);

Form 1b: Necked jars similar to form 1a but thicker walled (Fig. 8:8);

Form 2: Jars with short everted rims, some with slightly carinated shoulder (Fig. 8:9, 10; Fishbourne types 313–14, fig. 114);

Form 4: Globular jars with simple rounded or beaded rims

Table 2. Correlation between vessel form types and fabrics.

FORMS	Site produced wares			Other greywares							Total			
	Q100	Q101	Q102	Q104	Q108	Q109	Q110	Q113	Q114	Q117		Q119	Q120	Q121
Jars														
Form 1a	24	4						1	1				1	31
Form 1b	7													7
Form 2	39	3	2	10			1		1		1			57
Form 4	5	1												6
Form 5			1			1			1			1		4
Bowls & Dishes														
Form 6	11	2		1								2		16
Form 7						1			1					2
Flagons														
Form 8	1				1					1				3
Lids														
Form 9	17	3	1								3			24
Carinated Forms														
Form 10								1	1		1			3
TOTAL	104	13	4	11	1	2	1	2	5	1	7	1	1	153

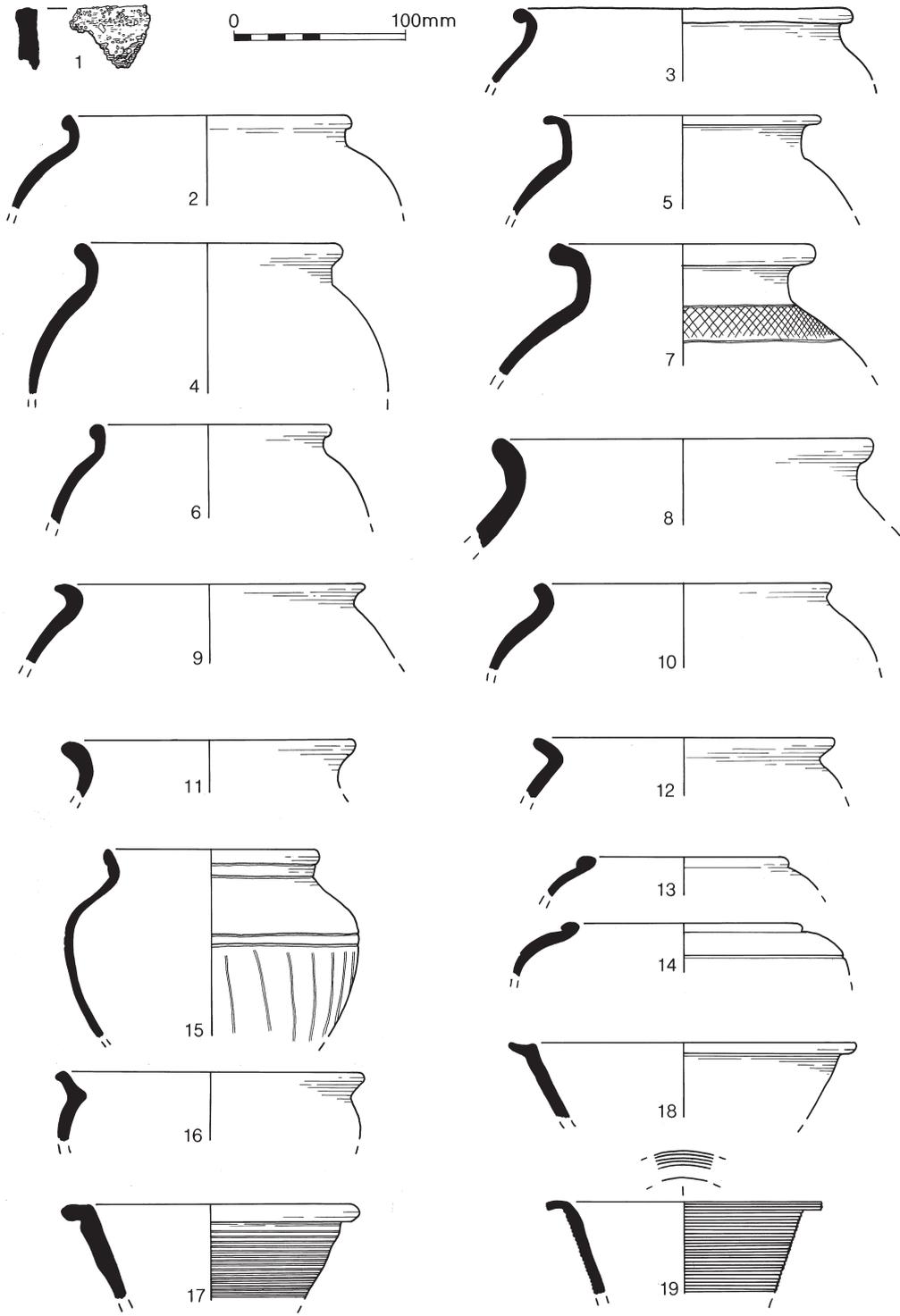


Fig. 8. Prehistoric (No. 1) and Romano-British pottery. Scale 1:4.

(Fig. 8:13, 14; Fishbourne type 166, fig. 102; Wiggonholt fig. 11:48).

Bowls and dishes

- Form 6a: Lid-seated, convex-sided (?carinated) bowls (Fig. 8:16; Fishbourne type 210, fig. 102);
- Form 6b: Flared bowls with straight sides, with flat or triangular-section rims (Fig. 8:17–19; Fishbourne types 219–20, fig. 107; Wiggonholt fig. 12:7–74);
- Form 7: Straight-sided dishes with plain rims (Fig. 9:20; Fishbourne type 200/202, fig. 103).

Flagons

- Form 8a: Flagons with internally cupped lips (Fig. 9:21; Fishbourne 107, fig. 94);
- Form 8b: Flagons with screw neck (Fig. 9:23; Fishbourne type 109, fig. 94).

Lids

- Form 9: Miscellaneous lid forms (Fig. 9:24–27; Fishbourne fig. 104; Wiggonholt fig. 14, 101–7)

The range of vessel forms represented is relatively restricted and occurs predominantly in fabric Q100. The most common forms are necked jars, particularly form type 1a and the shorter necked jars of form type 2 (Fig. 8:2–5, 7, 9, 10). Within form 1, the jars vary slightly in the length of the neck and the roundness of the rim. The necked jars of form 1b are very similar to form 1a but have been differentiated on the basis of wall thickness, and tend to be slightly larger in size (average rim diameter 160 mm as opposed to 130 mm for form 1). A difference in jar size is also visible between forms 1 and 2; jars of form 2 are generally smaller with an average rim diameter of only 90 mm. The rims of jars attributed to form type 2 vary from short and straight from the body to more necked and either curved or everted. Bowls and lids are also moderately common. The lids vary from straight-sided (Fig. 9:26, 27) to convex (Fig. 9:25) with a variety of rim forms (flat, rounded and grooved). In a small number of cases it was difficult to know whether to attribute the flattened rims to lids or dishes, although it is likely that some forms were intended to be used as either. Other forms present, although more rarely represented, consist of globular jars (Form 4; Fig. 8:13, 14), two flagon rims (Fig. 9:21, 23), and one carinated cup (Fig. 9:29). Although these forms are attributed to fabrics possibly produced on site, owing to the difficulties in distinguishing between other coarse fabrics, it is possible that these less common forms may not have actually been produced on the site.

Decoration

Considering the large quantities of sherds recovered, decoration is scarce for the coarse sandy fabrics Q100 and Q101. The most common form of decoration is shallow incised lines or grooves including concentric horizontal grooves and bands of wavy lines on necked jars (Fig. 9:36). A small number of jars have necked cordons, while horizontal rilling appears to be restricted to bowls (Fig. 8:17, 18); two small body sherds are rouletted.

Distribution

Very little of the pottery in fabrics Q100 and Q101 actually derived from the two kiln features 359 (phase 2) and 259 (phase

4). Most was concentrated in phase-4 contexts, in spreads of waster material around kilns 259 (e.g. 253: 443 sherds; 238: 432 sherds), and from deposits of similar material within the fills of features within the enclosure (e.g. working hollow 407 and associated features: 495 sherds). The dearth of material which can be directly related to the phase-2 kiln 359 is noticeable, but the material within the phase-4 waste deposits does include a significant proportion of 1st-century vessel forms and which presumably relate to the earlier phase of on-site production.

Other coarse grey wares

The remaining coarse sandy fabrics have been divided into 11 fabric types ranging from moderately coarse to fine and micaceous and which altogether account for 15% by weight of the total assemblage. At least three relatively local sources are likely to be represented here: Hardham, Wiggonholt and Rowlands Castle, and much of this group consists of fabrics in the general Hardham/Wiggonholt coarse-ware tradition.

- Q102 Hard, fine fabric with sparse, moderately-sorted, rounded quartz <1 mm; sparse mica flecks.
- Q104 Hard, moderately coarse fabric with common, well-sorted, sub-rounded quartz <0.5 mm; sparse iron oxide. Generally pale grey with speckled appearance. Rowlands Castle type.
- Q106 Very hard, moderately fine fabric with sparse, well-sorted, sub-rounded quartz <0.5 mm; rare iron oxide. Hardham type?
- Q109 Hard, coarse fabric with common, moderately-sorted, sub-rounded quartz <2 mm. Generally thicker walled and very dark grey/black.
- Q110 Hard, coarse fabric with common, well-sorted, sub-rounded quartz <1 mm (mainly 0.5 mm); sparse moderately-sorted, subangular calcined flint <4 mm; rare sub-rounded quartz 5 mm. Generally dark grey surfaces, grey core and orange margins.
- Q113 Very hard, moderately coarse fabric with moderate, moderately-sorted, rounded quartz <3 mm (mainly 0.5 mm). Distinctive blue grey colour. Hardham type?
- Q114 Hard, moderately fine fabric with moderate, moderately-sorted, rounded quartz <1 mm (mainly 0.5 mm). Distinctive orange core and dark grey surfaces. Hardham type.
- Q116 Hard, moderately coarse fabric with common, well-sorted, rounded quartz 0.5 mm; sparse, moderately-sorted, angular flint <7 mm. Generally dark grey.
- Q117 Hard, moderately coarse fabric with common, well-sorted, rounded quartz 0.5 mm. Mainly oxidized buff to pale orange. Wiggonholt type?
- Q119 Hard, moderately coarse fabric with moderate, well-sorted, sub-rounded quartz 1 mm. Dark grey.
- Q120 Moderately hard, moderately fine fabric with moderate, moderately-sorted, sub-rounded quartz <1 mm; sparse, moderately-sorted grog <1.5 mm. Greyish brown.
- Q121 Hard, coarse fabric with moderate, well-sorted, sub-rounded quartz <1 mm. Dark grey.

The most common fabric in this group is the moderately fine Hardham type fabric Q114, distinguished by its orange core and very dark grey surfaces; this includes at least two bowls in micaceous 'London ware'. The carinated example (Fig. 9:28) is paralleled at Wiggonholt and dated there to c. AD 70–150 (Evans 1974, fig. 13:78). Also in this fabric is a girth fragment from a biconical beaker with a profile similar to Fishbourne type 69,

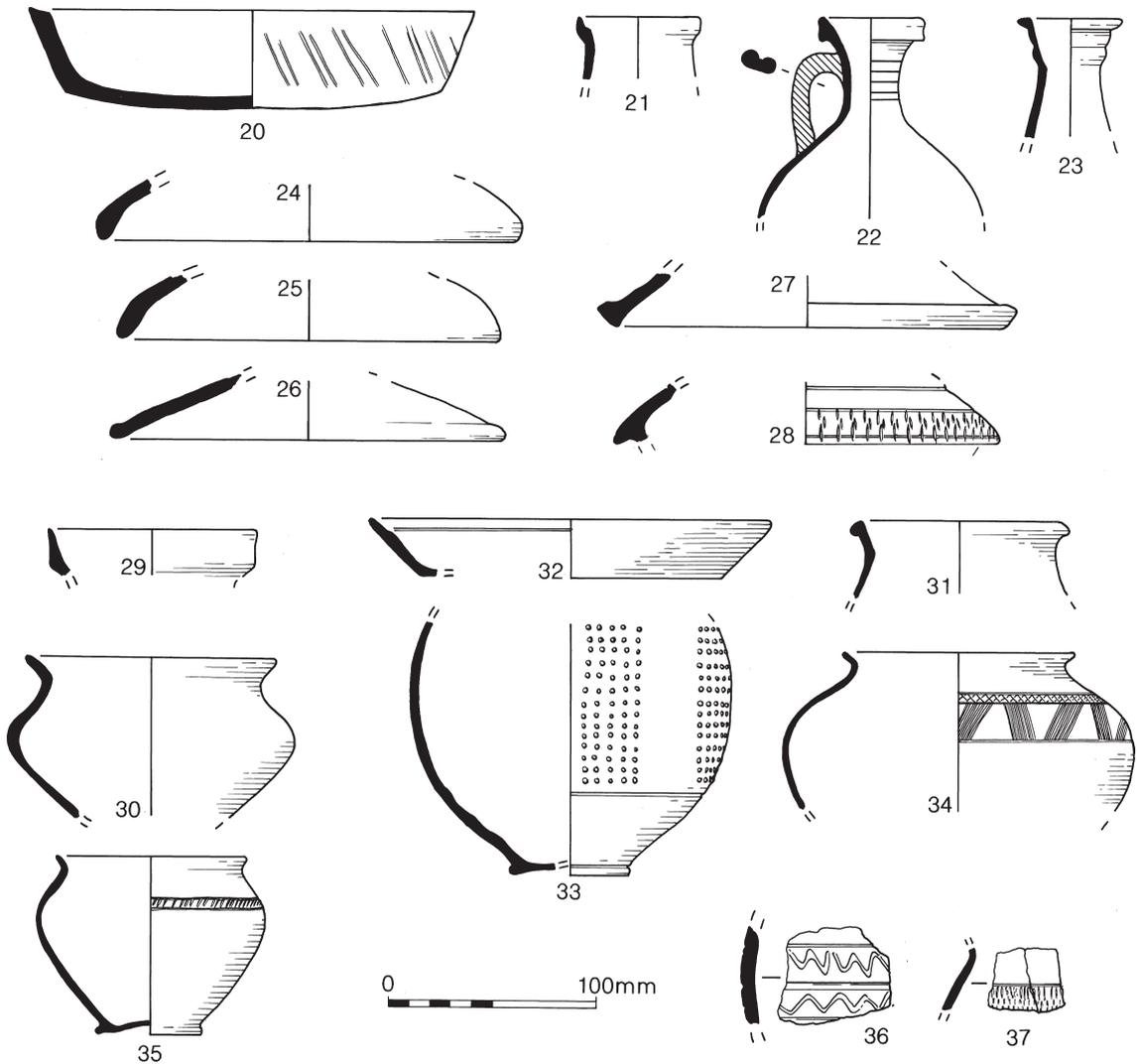


Fig. 9. Romano-British pottery. Scale 1:4.

dated AD 43–100 (Cunliffe 1971, fig. 89), and the base of a dot-barbotine panel decorated beaker probably of early to mid-2nd-century AD date (Fig. 9:33). This fabric has also been recorded at Bersted (Lyne n.d., fabric 6A). Other possible Hardham products include the moderately fine grey wares Q106 and Q113.

The fine sandy fabric Q117 includes at least one vessel (a pulley-neck flagon: Fig. 9:22) which is paralleled at North Bersted, Chichester and other places and may be an early Wiggonholt product (Rigby 1989, fig. 16.1, 33–5).

Fabric Q104, which includes oxidized and unoxidized sherds and a small number of sherds with a distinctive orangey surface finish, can be identified as a Rowlands Castle product on the basis of the fabric and the characteristic everted jar rim forms present (e.g. Fig. 8:12). It is known that Rowlands Castle

was supplying Chichester and west Sussex during the 2nd and 3rd centuries AD (e.g. Cunliffe 1971, fig. 114), but production is likely to have begun there earlier, perhaps even in the Late Iron Age (Lyne n.d., fabric 6B). Another possible Rowlands Castle product is the sparsely flint-tempered fabric Q116; a similar fabric was identified at Bersted (Lyne n.d., fabric 6C), which appeared during the Late Iron Age and continued into the early Roman period.

One other sandy fabric containing calcined flint is the coarse fabric Q110. It is likely that this is a fairly locally-produced fabric and on the basis of the one small rim form, a short bead rim, it probably represents a Late Iron Age ceramic tradition which continued into the early Roman period (c. AD 30–60).

Sherds in the coarser sandy fabrics Q109, Q119 and Q121

sometimes proved difficult to assign to a particular fabric type. These three fabrics are visually very similar and differ only slightly in the frequency and size of the quartz inclusions and firing conditions. Texturally, these fabrics are comparable to Q100 but have been separated mainly on the basis of their dark grey colouring. A possible source may be the Alice Holt industry or, looking slightly further afield, the Black Burnished ware industry of the Poole Harbour region of east Dorset, which is well represented in the 3rd century AD at Chichester.

Fabric Q102 represents the fine ware element of the grey-ware assemblage. This fine micaceous fabric is thin-walled and was probably a locally-produced fabric which was being used to imitate the early fine-ware vessels such as 'London ware' and Gallo-Belgic forms.

The number of diagnostic vessel forms for the grey wares is small. The correlation of fabrics and vessel forms is presented in Table 2. The majority of rims are attributed to vessel types already discussed above. The most common forms are the short-necked jars (form type 2) in the Rowlands Castle fabric Q104 (Fig. 8:12). Three new form types have been recorded:

Form 5: Necked jars with distinct high shoulder and plain upright rim (Fig. 8:15; Fishbourne type 181, fig. 103; Wiggonholt fig. 13:86, 87);

Form 8c: Flagons with pulley neck (Fig. 9:22; Fishbourne type 297; Wiggonholt, fig. 10, 34);

Form 10: Miscellaneous carinated vessels (Fig. 9:28, Wiggonholt fig. 13, 78; Fig. 9:30, Fishbourne type 319, fig. 115).

Form 10 vessels comprise one decorated carinated jar (Fig. 9:28) and a carinated and necked bowl (Fig. 9:30), the latter dated c. AD 70–100 at Fishbourne. Other miscellaneous forms recorded include one butt beaker in fabric Q119 (Fig. 9:31).

Evidence for decoration is again rare. The most common decorative technique comprises shallow incised lines, found particularly on fabric Q114 and shallow horizontal grooves on the fine micaceous fabric Q102.

Overall the distribution of the other grey wares, although recovered in much smaller quantities from various features, is similar to that of the possible production fabrics, for example in waste deposits 253, 238, 239 and 374. The only feature which contained a larger proportion of grey wares to kiln waste was pit 237, while pit 267 and ditch 363 contained only the grey wares Q114, Q110, Q120.

Flint-tempered fabric

One flint-tempered fabric (F100) is attributed to the Late Iron Age/Romano-British period. All the sherds in this fabric are plain body sherds.

F100 Hard, coarse fabric containing moderate, well-sorted, angular flint <3 mm and moderate, well-sorted, rounded quartz 0.5 mm.

Sherds were dispersed in four Romano-British features (enclosure ditch 404, ditch 409, pit 319 and pit 314) and a natural hollow. Five of these features also contain either grog-tempered or fine-ware fabrics, and a Late Iron Age/Early Romano-British date for these flint-tempered sherds seems likely (1st century BC/1st century AD). Flint-tempered fabrics were well represented in both the 1st-century BC cremation cemetery and the 1st-century AD settlement at Westhampnett, Chichester (Mephram 1997; in prep.). Flint-tempered fabrics were also identified at North Bersted where they are considered to have originated as native Iron Age ceramic traditions, continuing in use into the early Romano-British period (Lyne n.d.).

Grog-tempered fabrics

With the exception of two small everted rims, the small quantity of grog-tempered sherds recorded are undiagnostic body sherds. Four fabric types were identified, all of which are visually very similar.

G100 Moderately soft, moderately fine fabric with moderate, well-sorted, grog <1 mm (mainly 0.5 mm).

G101 Moderately hard, moderately coarse fabric with moderate, poorly-sorted, grog <3 mm; sparse, moderately-sorted, angular flint <4mm; rare mica flecks. Orange.

G102 Moderately soft, moderately fine fabric with common, poorly-sorted, grog <2 mm; rare organic strands. Colour generally greyish to reddish brown.

G103 Moderately soft, moderately fine fabric with common, moderately-sorted, grog <4 mm (mainly 1 mm).

Fabrics G100 and G103 are comparable to a grog-tempered fabric recorded at Ounces Barn, Boxgrove, which is described as similar to East Sussex Ware (Middleton & Rudling 1995, fabric 33).

Decoration is rare and consists of three sherds with horizontal grooves, a technique characteristic of cordoned vessels dating from the late 1st century BC into the early Romano-British period.

The grog-tempered sherds were dispersed in a small number of features and were always associated with other Romano-British fabrics. Slight concentrations were found in waste deposit 238 and within segments through the enclosure ditch (404).

Fine wares

The fine wares can be divided into imported and British wares. The imported wares consist of 29 sherds of Samian, including both Southern and Central Gaulish products. Identifiable vessel forms are confined to Dr. 18 or 18/31 platters, which have an overall date range of mid-1st to early 2nd centuries AD, and one Dr. 30 bowl (AD 70–110). Samian sherds recovered from waste deposit 239 include one repaired vessel which still has a rivet in place and a stamped base. Another stamped base was found in waste deposit 253. The remaining were dispersed in ditch 363, pits 319 and 383, post-hole 338 and waste deposits 238, 352 and 374, all within enclosure 404.

British fine wares were subdivided into the five fabric types listed below and include both oxidized (orange-red and pale firing) and grey ware fabrics. Diagnostic vessel forms are scarce; the majority of sherds are plain body sherds and often abraded.

Q103 Hard, fine fabric with sparse, moderately-sorted, rounded quartz <0.5 mm; sparse mica flecks. Generally thin-walled and dark grey.

Q107 Moderately hard, fine fabric with rare, moderately-sorted, rounded quartz <0.5 mm (mainly 0.25 mm); rare mica flecks. Generally orange.

Q108 Moderately hard, fine fabric with moderate, well-sorted, sub-rounded quartz <0.25 mm. Generally pinky or buff.

Q111 Moderately soft, fine fabric with rare, moderately-sorted, sub-rounded quartz <1 mm. Generally white or pale grey.

Q115 Hard, moderately fine fabric with moderate, well-sorted, sub-rounded quartz 0.5 mm. Buff fabric.

A large number of sherds are attributed to the fine, micaceous fabric Q103 which is slightly misleading, as over half of these are derived from a single jar from ditch 410. This vessel is decorated with a well-executed horizontal band of incised cross-hatching on the shoulder with an incised zone of

chevrons below (Fig. 9:34). Other vessel forms include a small everted rim jar with a shoulder band of angled incised lines (Fig. 9:35) and a platter (Fig. 9:32), both in fabric Q103 and both from ditch 410. Decoration occurs only in fabrics Q103 and Q111 and is limited to incised lines and rouletting, with two grooved sherds and one sherd with applied barbotine.

One possible source for the pale-firing fine-ware fabrics (Q108, Q111, Q115) is Wiggonholt which was producing flagons, jars, mortaria, dishes and cups in fine white/buff fabrics in the early 2nd century AD (Evans 1974).

The fine-ware sherds were dispersed in small quantities across the site with larger concentrations recovered from waste deposits 253, 238, 239, 352, and ditch 410.

Pottery sequence (phases 2 to 4) by M.A.B. Lyne

Phase 2

The majority of jars from phase 2 contexts, including site-produced wares, tend to have weakly everted rims and rather slack profiles (Fig. 8:2, 4). Jar rims are paralleled in assemblages dated AD 43–75 from Fishbourne (Cunliffe 1971, figs 102–3, types 162–81).

Phase 2 also produced a bead rim jar (fabric Q110) from enclosure ditch 404, which probably dates to c. AD 30–60 on analogy with similar forms made in 'Silchester ware' and the Alice Holt equivalent. Other sand-tempered bead rims, particularly form type 4 (Fig. 8:13), fall within the date range of AD 50–80.

Locally imported wares further confirm the generally pre-Flavian date of phase 2, but suggest that the phase continued into the Flavian period. The pulley-neck flagon form from ditch 363, a possible early Wiggonholt product (Fig. 9:22), appears during the pre-Flavian occupation at Fishbourne Palace as type 297 (Cunliffe 1971), but becomes more common after AD 70. Other fine sandy fabrics such as Q114 include early forms such as a small jar in micaceous Hardham 'London ware' (enclosure ditch 404) and a biconical beaker similar to Fishbourne type 69.

Phase 3

There are comparatively few diagnostic rims from phase 3 assemblages, but what there are suggest a date range of AD 70–100 and include a necked liquid storage jar of form 1a (Fig. 8:7), from driveway ditch 408, a carinated and necked bowl (Fig. 9:30) from the same feature, and a cupped flagon neck from driveway ditch 405 (Fig. 9:21). Cooking pots differ little from those associated with phase 2, but one example also from driveway ditch 405 has reeding on the inside of its rim and is Flavian or later in date.

Phase 4

The pottery from this phase is far more varied than that from the previous two phases, both in forms and fabrics: there is a somewhat greater range of local imports. The date range overlaps with phase 3, with an earliest potential date c. AD 70, but extending as late as AD 150. The necked jars, including site-produced wares, have better developed rim edge beading and well-formed everted rim jars (Fig. 8:9, 12) appear for the first time. Further lid-seated jar rims are in the Hardham/Wiggonholt ceramic tradition and come from vessels similar to an example from the Hassocks cemetery with a low-slung carination below its girth (Lyne 1994, fig. 8:32). The type is poorly dated, but a small jar from the Chichester, St Pancras cemetery (Down & Rule 1971, fig. 5:26–228a), although lacking

lid-seating, is in a similar fabric and has the same type of carination: the burial includes Samian and other vessels of Antonine date.

The bowls from the phase-4 assemblages, including site-produced wares, include a lid-seated form (Fig. 8:16), dated AD 100–150. The horizontally-ribbed forms (Fig. 8:17–19) are in the Hardham/Wiggonholt ceramic tradition and paralleled on a number of Sussex sites; they are generally dated to c. AD 70–150, and the carinated bowl in Hardham 'London ware' (Fig. 9:28) has a similar date range. The dot-barbotine panel decorated beaker (Fig. 9:33), also a Hardham product, is likely to be early to mid-2nd century AD in date.

The phase-4 working hollow 407 produced a Central Gaulish Samian Dr. 18/31 platter fragment dated c. AD 120–150 and a fragment from a South Gaulish Dr. 30 bowl (AD 70–110).

Discussion by M. Laidlaw & M.A.B. Lyne

Pottery production

Evidence on site for pottery production consists of at least two simple updraught kilns (259 & 359) one of which (259) contained traces of burnt clay lining and kindling. The large dumps of coarse-ware pottery within waste deposits 253 and 238, and in smaller quantities other features, consisted predominantly of variants of one sandy fabric (Q100/Q101), many sherds of which show evidence of misfiring such as warping and inconsistent firing conditions. The range of vessel forms produced is restricted, consisting mainly of necked jars; also represented are globular jars, bowls, dishes and lids. The fabrics and vessel forms are closely comparable to those being produced at known kiln sites in the Arun Valley, such as Wiggonholt and Hardham, which were producing grey wares in the second half of the 1st century and first half of the 2nd century AD (Evans 1974). The kilns at Littlehampton can therefore be seen as an extension of the Arun Valley production centre.

Kiln waste, represented by fabrics Q100 and Q101, accounts for a total of 78% of the total pottery assemblage from the site. Table 3 summarizes the main fabric types by phase and illustrates the dominance of the site-produced fabrics, especially within phase-4 features. It is apparent that pottery was made on the site throughout the period of occupation, but what is not clear is whether this process was continuous, or operated as two separate episodes of production in phases 2 and 4 respectively.

The assemblage from Littlehampton is also closely comparable to vessels from Fishbourne and Chichester and illustrates the trade of local imports from the Alice Holt and Rowlands castle industries. On the basis of comparable assemblages and the lack of later fabrics such as colour-coated ware, the pottery may be dated to the early 1st century AD continuing to the mid-2nd century AD.

List of illustrated vessels (Figs 8 & 9)

Prehistoric

1. Prehistoric flat-topped rim, fabric F1. PRN (Pottery Record Number) 6, subsoil 200.

Romano-British

Form 1a

2. Necked jar with bead rim; fabric Q100. PRN 29, enclosure ditch 404, phase 2.
3. Necked jar with bead rim; fabric Q100. PRN 421, ditch 410, phase 3.

4. Necked jar with everted rim; fabric Q100. PRN 176, enclosure ditch 404, phase 2.

5. Longer necked jar; fabric Q100. PRN 218, enclosure ditch 404, phase 2.

6. Necked jar with bead rim; fabric Q121. PRN 650, enclosure ditch 404, phase 2.

7. Necked jar, liquid storage jar with incised decoration; fabric Q100. PRN 553, driveway ditch 408, phase 3.

Form 1b

8. Necked jar with thicker walls; fabric Q100. PRN 115, waste deposit 253, phase 4.

Form 2

9. Short-necked jar; fabric Q100. PRN 113, waste deposit 253, phase 4.

10. Short-necked jar; fabric Q100. PRN 116, waste deposit 253, phase 4.

11. Short-necked jar; fabric Q105. PRN 124, waste deposit 253, phase 4.

12. Short-necked jar; fabric Q104. PRN 91, waste deposit 253, phase 4.

Form 4

13. Globular jar with bead rim; fabric Q100. PRN 178, pit 237, phase 4.

14. Globular jar with cordons; fabric Q100. PRN 662, pit 403, phase 4.

Form 5

15. Shouldered jar with upright rim, incised decoration; fabric Q114. PRN 189, ON (Object Number) 2, pit 237, phase 4.

Form 6a

16. Lid seated bowl; fabric Q100. PRN 112, waste deposit 253, phase 4.

Form 6b

17. Bowl with rilled decoration; fabric Q100. PRN 110, waste deposit 253, phase 4.

18. Bowl with flat-topped rim; fabric Q100. PRN 111, waste deposits 253, phase 4.

19. Bowl with flat-topped rim and rilled decoration; fabric Q119. PRN 439, driveway ditch 408, phase 3.

Form 7

20. Straight-sided dish with plain rim; fabric Q101. PRN 623, pit 383, phase 4.

Form 8

21. Flagon with internally cupped lip (8a); fabric Q100. PRN

Table 3. Percentages of fabric types by phase (percentages are by weight).

	Phase 2	Phase 3	Phase 4	Unphased	Total
SITE-PRODUCED WARES					
Wt sherds	2476	4149	19,616	392	26,633
% of phase	67.76	71.17	83.07	88.49	-
% of total site-produced	9.30	15.58	73.65	1.47	-
OTHER COARSE WARES					
Wt sherds	930	1109	2630	24	4693
% of phase	25.45	19.02	11.14	5.42	-
% of total coarsewares	19.82	23.63	56.04	0.51	-
FLINT TEMPERED WARES					
Wt sherds	16	1	6	12	35
% of phase	0.44	0.02	0.02	2.71	-
% of total flint-tempered	45.71	2.86	17.14	34.29	-
GROG-TEMPERED WARES					
Wt sherds	122	17	226	8	473
% of phase	6.08	0.29	0.96	1.80	-
% of total grog-tempered	46.94	3.59	47.78	1.69	-
FINE WARES					
Wt sherds	10	554	1136	7	1707
% of phase	0.27	9.50	4.81	1.58	-
% of total fine wares	0.59	32.69	66.55	0.41	-
TOTAL Wt sherds	3654	5830	23,614	443	33,541

59, driveway ditch 405, phase 3

22. Flagon with pulley rim (8c); fabric Q117. PRN 321, ditch 363, phase 2.

23. Flagon with screw neck (8b); fabric Q101. PRN 241, waste deposit 238, phase 4.

Form 9

24. Lid with rounded lip; fabric Q101. PRN 133, waste deposit 253, phase 4.

25. Lid with curved sides and rounded rim; fabric Q100. PRN 636, pit 383, phase 4.

26. Lid with plain rim; fabric Q100. PRN 238, waste deposit 238, working hollow 407, phase 4.

27. Lid with thickened and flattened rim; fabric Q100. PRN 266, waste deposit 239, working hollow 407, phase 4.

Form 10

28. Shoulder from carinated jar fragment; fabric Q114. PRN 286, working hollow 407, phase 4.

29. Carinated cup with plain rim; fabric Q100. PRN 155, enclosure ditch 404, phase 2.

30. Carinated jar; fabric Q119. PRNs 433, 434, driveway ditch 408, phase 3.

Miscellaneous forms

31. Butt beaker rim; fabric Q119. PRN 472, post-hole 344, unphased.

32. Platter; fabric Q103. PRN 431, ditch 410, phase 3.

33. Base of beaker with vertical band of barbotine dots; fabric Q114. PRN 624, pit 383, phase 4.

34. Fine ware jar with short everted rim and bands of incised decoration; fabric Q103. PRN 567, 568, ditch 410, phase 3.

35. Fine ware jar with upright rim and incised decoration; fabric Q103. PRNs 583, 584, ditch 410, phase 3.

Decorated body sherds

36. Wavy lines; fabric Q101. PRN 603, waste deposit 374, phase 4.
37. Rouletted decoration; fabric Q103. PRN 666, pit 403, phase 4.

OTHER FINDS By Emma Loader

Other finds recovered from the site comprise metalwork (iron and copper alloy), stone, glass, fired clay and ceramic building material.

The 18 iron objects consist of one latch-lifter, one loop-headed object, one unidentified curved object, 13 nails and a small unidentifiable fragment. The latch-lifter and the loop-headed object both came from ditch 282. Latch-lifters are common on Romano-British sites; this example conforms to the known typology (Manning 1985, fig. 39:O16). Apart from the nails, the other objects are of uncertain function. Two copper-alloy objects were found, comprising one small unidentifiable fragment and a concave disc with a single central perforation (pit 403); a similar object came from Greyhound Yard, Dorchester (Mills & Woodward 1993, fig. 69, 118).

Fragments of five greensand quernstones (including one lower and two upper stones) came from waste deposits 238 and 374; a further 10 fragments, in both greensand and quartz conglomerate, could also derive from quernstones (waste deposits 238, 253, 352 and 374).

Three fragments of Romano-British glass were recovered, comprising one vessel (pit 251) and two window fragments (waste deposit 238, layer 374). The vessel fragment is a rolled-in rim in blue-green glass, a rim form found on a range of vessel types, such as jugs, jars and flasks, in the 1st and 2nd century AD (eg. Cool & Price 1995, figs 7.5, 9.3). The window glass is of blue-green 'matt-glossy' type.

A significant quantity of fired clay was recovered (11,523 g), most of which (7929 g) derived from three features around kiln 259 (pit 351, waste deposits 253 and 238). A smaller concentration was noted around kiln 359. Most of the fragments are small, featureless and abraded, although a few have surviving surfaces. This material is thought to derive from kiln structures, although its precise structural function is unknown.

A small quantity of ceramic building material (18 fragments) was identified as Romano-British, including four *tegula* fragments (pit 353) and a box-flue tile (topsoil).

ECONOMIC EVIDENCE

CHARRED PLANT REMAINS by Pat Hinton

Eleven bulk samples were processed from a range of feature types across the site for the recovery and assessment of charred plant remains. The samples were processed by standard flotation methods; the flot was retained on a 0.5 mm mesh and the residues were sieved into 5.6 mm, 2 mm and 1 mm fractions and dried. The coarse fraction (>5.6 mm) was sorted, weighed and discarded. The charred plant remains were generally fragmented as a result of poor preservation. The quantities given throughout this report represent minimum numbers.

In all samples *Triticum* (wheat) appears as the major cereal. Most, if not all the grains can be described as *Triticum spelta*

(spelt) type, but there are a few which are shorter and more compact and are possibly *T. aestivum* (bread wheat).

Evidence for germination was identified in several of the wheat grains which are shrunken or partially collapsed with a shiny, leathery, surface and subsequent reduction of the endosperm. A few better-preserved grains have a groove on the dorsal surface caused by the compression of a growing plumule (sprout) beneath the lemma, indicating that the grains had not been fully de-husked. Found in all but one sample were fragments of these sprouts, up to c. 4 mm in length. There are a few growing tips and many middle-section fragments, but only the basal parts closest to the parent grain have been counted. Some show the lower part of the growing sprout with bases of the primary and first lateral pairs of roots. Others are complete but measure only c. 2 mm and appear to be the young plumule and coleorhiza (embryo) with roots just beginning to emerge. Occasionally the scutellum with the sprouting embryo was found detached from the grain. These stages of germination are described and illustrated by Percival (1921).

Hordeum vulgare (hulled barley) also occurs in all samples but only as a minor component. In four samples (2, 6, 14 and 15 from driveway ditch 405, waste deposits 253, 239 and pit 299) asymmetric grains indicate the presence of 6-row barley. There is no certain evidence of germinated barley.

Avena sp. (oats) appears in even smaller numbers, although some samples include larger numbers of awn fragments. Two floret bases show the oval disarticulation scar of *Avena fatua*, a wild oat; these are more likely to represent weeds than cultivars. The proportionate number of spelt glumes to grains in almost all samples suggests that the charred remains probably represent the by-products of crop-processing, either in ear or spikelet form. There is very little evidence for straw, except for one stouter culm node from waste deposit 239. The charred chaff may have resulted from accidental burning while parching the wheat prior to de-husking. However, in this case, sweepings of chaff, seeds and tail grains were used as fuel for kilns, which were cleaned out periodically and the residue spread about the site.

Germinated grains were present in almost all samples and may have occurred by a number of different means. The storage of grain in damp conditions can cause the onset of germination or the process may commence in the ear as a result of harvesting delayed by bad weather. Alternatively the wheat may have been deliberately moistened to encourage sprouting for the production of malt for brewing. Once the sprouts had reached a certain length (beyond three-quarters of the grain, or just as they burst free from the lemma) the grains would have been heated to stop the growth. The length and condition of some of the sprout fragments in these samples (c. 2 mm) may be a little too early for this stage of a malting process. The collapsed grains and fragments however indicate a longer period of growth, perhaps more than a week, by which time the endosperm has been converted to an almost liquid state. The partially shrivelled and contracted spelt grains recovered from the civilian settlement of the Roman fortress at Caerleon (Helbaek 1964) are interpreted as evidence for this type of malting process. At Catsgore, Somerset (Hillman 1982), corn-dryer samples produced germinated spelt together with many plumules from sprouted embryos as well as chaff and straw which formed part of the fuel.

The number of sprouts recovered from individual samples varied across the site with samples from kiln waste dump 253 and working hollow 407 containing larger amounts of sprouts

than samples from kiln 259. Samples from in and around the vessels in droveway ditch 405 produced much chaff but only a small number of sprouts. Noteworthy, however, are the seeds (whole and cotyledons) of about 15 *Vicia faba* (broad or field bean) in Sample 1. Could they be remnants of items stored within the pot, possibly even related to the few germinated grains and sprouts?

The most numerous of the weed seeds are nutlets of *Rumex* spp. (docks) and various *Vicia* species (tares and vetches) which might occur in both arable and grassland habitats. It seems reasonable to suppose that dried grasses and other meadow plants, particularly dried dock stems, might well have been used with other waste material as kindling. The Catsgore samples included a very similar range of wild plant seeds, i.e. weed oats, docks, clover and grasses were among the most numerous.

CHARCOAL by Rowena Gale

Five samples of charcoal (8, 6, 14, 21 and 26 from kiln 259, waste deposits 253, 239, pit 396 and ditch 363) were examined. Most samples included relatively small fragments, although some fragments measured up to 103 mm. Selected samples were identified to indicate the character of the fuel used in the firing process and to provide environmental information and aspects of woodland management. Where possible the maturity (i.e. sapwood/heartwood) of the wood was assessed. The material was too fragmented to examine or to count the growth rings. Classification is according to *Flora Europaea* (Tutin *et al.* 1964–80).

The charcoal remains were probably the fuel residues from the final firing of the kiln. The charred oak (*Quercus* sp.) and reed from ditch 363 is interesting since, although fuel deposits may be implicated, one could speculate that wind-breaks or barriers made from reeds, perhaps supported with oak posts,

may have been erected along the edge of the ditch, and possibly been destroyed later by fire.

None of the charcoal samples produced evidence that the wood was supplied from managed woodland i.e. with growth rings characteristic of coppice wood or poles, although most of the species here have the potential to grow as coppice (Rackham 1990). Oak fragments from waste deposit 239 and pit 396 testify to the use of stems/trunks or cordwood wide enough to have developed heartwood. The age of heartwood formation in oak is variable, but can occur in stems as young as 20 or so years.

Charcoal from kiln 259, directly associated with the firing process, included oak sapwood, maple (*Acer* sp.) and blackthorn (*Prunus spinosa*). Similar species were identified from the waste deposits 253 and 239 and pit 396 with the addition of oak heartwood, elder (*Sambucus* sp.), ash (*Fraxinus* sp.) and hawthorn or related species (Pomoideae). Deposits in the waste dumps and pit are assumed to be kiln fuel residues, inferred from the density of pottery waste, although the large deposits of cereal grain may indicate a more domestic origin. Interpretation of the use of selected fuel is difficult from the few samples available and the small quantity of identifiable charcoal. The woods named are hard and dense, and when well seasoned, produce high-energy fuel, although oak has the highest calorific value (Webster 1919; Porter 1990).

Comparative data on fuelling pottery kilns in other areas of Roman Sussex are unavailable. Evidence from other areas in Britain, for example three groups of pottery kilns in Norfolk, revealed that a wide range of woody material was also used at Quidney Farm (Gale 2000), Ellingham and Two Mile Bottom (Gale in prep.) in combination with cereal waste and other herbaceous material. It seems probable that, as at the Norfolk sites, the use of fuel at Littlehampton would have been influenced by the woodland components of the local landscape.

DISCUSSION

The results of the investigations at the Horticultural Research International site have revealed activity dating from the Middle to Late Bronze Age. Finds, including the single cremation, suggest the presence of a settlement in the vicinity of the site. Numerous Middle to Late Bronze Age finds have been found in the area between the River Arun and the River Adur suggesting a shift in settlement from chalk to coastal plain during this period (Ellison 1978; 1980). The main period of occupation on the site was during the early Romano-British period, although the results of the evaluation suggest that the settlement probably originated in the Late Iron Age. During the evaluation the focus for the settlement was identified in the north-west of the site (Weaver 1995; Fig. 2) with an enclosed working area (Area 2) further to the east.

Two main activities were revealed during the excavation: pottery production and crop processing. The preservation of bone on Brickearth soils is poor,

so it is difficult to say if animals contributed to the economy at Littlehampton, although excavations carried out on similar sites suggest that they would certainly have played a part.

The excavated enclosure was constructed in the middle of the 1st century AD and appears to have fulfilled several different functions through time. The internal divisions suggest that areas may have been separated off for the performance of different activities and the enclosure seems to have been subdivided from the outset. At least one kiln was operating within the enclosure during phase 2. Production seems to have been very short-lived, however, and phase-3 activity seems to have been of a rather different nature. A new, east-west, ditch (409) further subdivided the main enclosure, cutting across the earlier features.

A droveway was constructed. This approached the enclosure from the north and apparently turned westwards towards the main area of settlement. It may have originated from fields further to the north

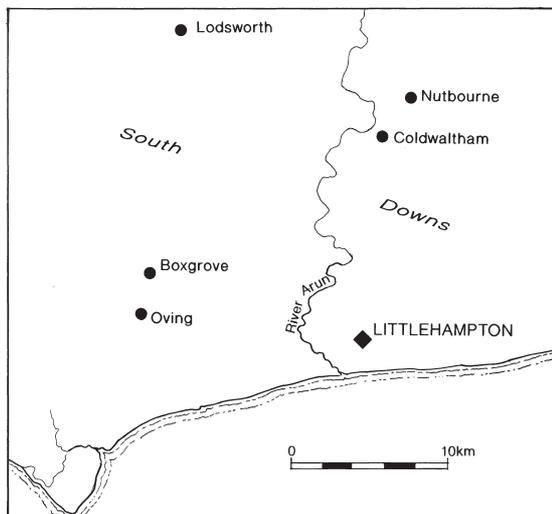


Fig. 10. Possible pottery production sites in the Littlehampton area.

where at least one substantial east–west ditch was recorded in Area 1. The easterly droveway ditch bifurcated just outside enclosure 404 and may have formed a coralling area outside the entrance to it, though no evidence for the physical relationship of these features was encountered because of later dumping and disturbance. This suggests a major reorganization of the immediate area and some type of livestock management for enclosure 404 in phase 3, although the internal ditch aligned east–west may also have had a drainage function.

The enclosure and droveway seem to have gone out of use by phase 4, droveway ditch 405, at least, having been allowed to fill almost completely before kiln 259 was cut into it, while several substantial dumps of kiln waste were deposited with no regard for existing features. A large ‘working hollow’ in the centre of the enclosure was associated with a number of pits and post-holes, although the function of these is unknown. This area was apparently used for crop-processing, particularly of spelt wheat, with some indication of possible malting in the presence of germinated grains. Fragments of rotary quern were also found within the kiln waste dumps and have been recorded at other sites in the vicinity (Toddington: Gilkes & Hammond 1991) suggesting that wheat was consumed in some quantity. The remains of a 2nd-century Roman watermill were recorded *c.* 400 m to the north of the site. Crop-processing waste was probably used as part of the

fuel for kiln 259.

Locally-produced wares from the Alice Holt and Rowlands Castle industries suggest that local trade occurred between settlements, possibly along Black Ditch, which was navigable during Roman times. Certainly the Greensand quernstones had most likely travelled from the quarries at Lodsworth (Fig. 10) (Peacock 1987).

Pottery production occurred at HRI over a period of about 100 years between *c.* AD 43 and AD 150 using simple updraught kilns producing pottery comparable with that produced at Hardham and Wiggonholt and to vessels from Fishbourne and Chichester. Two surface kilns were revealed during the excavation and these could have been fired a number of times and would have been capable of producing a large proportion of the pottery found on the site. However, the possibility that others may exist outside the excavation area or have been ploughed away cannot be discounted. Site-produced pottery accounted for 78% of the pottery recovered. Most of this (58.4%) was from phase 4 suggesting an increase in pottery production in the late 1st to mid-2nd century AD, although it should be noted that the phase-4 waste dumps also contained earlier material. It is unclear whether pottery production on the site was continuous, or, as seems more likely, took place within two discrete episodes.

At Coldwaltham, *c.* 7 km to the north of the HRI, a large quantity of mis-fired pottery similar to that produced at Littlehampton was recovered from a series of field systems (Kenny pers. comm.; Fig. 10). Further evidence of pottery production was revealed 8.5 km to the north-east of Littlehampton when a possible Late Iron Age kiln and pottery wasters were found at Nutbourne.

Pottery production at the HRI can be seen as an extension of the Arun Valley production centre. Kilns within this area were certainly producing pottery for the local markets, including Chichester, but the possibility also exists that the HRI kilns, and perhaps others within this local industry, were controlled by villa estates. In this respect the existence of several early villas on the Sussex coastal plain can be noted and, specifically, the location of the HRI site within 1.5 km of the villa at Angmering (*see below*).

The relationship between the excavated enclosure discussed here and the focus of activity identified just to the west is difficult to determine as the latter has not been excavated, but it seems probable that

the main area of settlement lay beyond the excavated area in this western part of the HRI site. The enclosure itself, or the area it occupied, was certainly in use for a period of more than a century, during which time the type of activities associated with it changed from pottery production, as a minimum, in phase 2, through a period of apparent pastoral use in phase 3, to a more intensive industrial function in phase 4 with crop-processing and pottery production taking place in close proximity once the enclosure and associated driveway had fallen out of use. How far this reflects wider changes in the surrounding landscape is difficult to judge and it is quite possible that the location of pottery kilns, arable fields and pasture in relation to the settlement itself shifted around during the 1st and 2nd centuries AD, though the overall economic pattern remained stable.

Elsewhere in West Sussex, at Copse Farm, Oving (Rudling 1982; Bedwin & Holgate 1985) c. 6 km to the west of Littlehampton, a complex of Late Iron Age/Early Romano-British sub-rectangular enclosures appears to present a picture similar to that of the present site. Towards the centre of one enclosure was a working hollow (c. 7 m in diameter and up to 0.25 m deep) with associated small pits and post-holes, some of which contained the residues from industrial activities. This site lies within the area defined by the Chichester Dykes, adding some weight to the notion that the antecedents of the Sussex coastal plain villas lie in the territories of high-status individuals.

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Appendix. Charred plant remains.

Feature	Vessels 1 & 4 in Droveaway ditch 405		Kiln 259		Rubbish deposit 253	Rubbish deposit 239	Pit 267	Pit 299	Pit 396	Ditch 408	Ditch 363		
Context	220		256	257	222	239	264	298	353	369	243		
Sample	1	2	7	8	6	14	9	15	21	23	26		
Sample volume (litres)	10	10	10	10	10	10	10	10	10	10	10		
Cereals													
<i>Triticum</i> cf. <i>spelta</i> - grains	spelt		15	8	1	20	10	35	16	6	49	13	2
- glume bases	150*	200*	36	200*	350*	300*	42	9	52	350*	37		
- glume fragments	++++	++++	+	+++	++++	++++	++	+	++	++++	+		
- rachis node fragments	++	+++	+	+	+++	+++	++	+	+	+++	+		
- plumules	13	30	1	+++	100*	50*	2			200*	1		
- plumule fragments	+	++	+	9	++++	+++	1		1	++++	+		
				+									
<i>Triticum</i> cf. <i>aestivum</i>	bread wheat		2	1	7	1				1			
<i>Triticum</i> spp.	indeterminate wheat		20	3	8	40	58	36	33	4		25	
<i>Hordeum vulgare</i> L. - grains	hulled barley		4	1(1)	2	3	7	4(2)	2	4	6	6(3)	2
- rachis fragments			1				1				2		
<i>Avena</i> cf. <i>fatua</i>	oats							1	1				
<i>Avena</i> sp. - grains	1	3	1	3	5	1	1	1	1	13			
- awn fragments	+	++	+	+	++	++	++++	++	+++	+++	+		
<i>Avena/Bromus</i> sp.	oats or brome grass			1	5		1		1	2	2		
Cerealia indet.	unidentified cereal fragments (ml)		2.5	1.5	1	7.5	5	4.5	2	0.5	3.5	6	0.5
Pulses													
<i>Vicia faba</i> L.	broad/field bean		c. 15		1						1	(1)	
<i>Pisum sativum</i> L.	pea						1	(1)					
Key: * = estimated + = less than 10, ++ = 11–50, +++ = 51–100, ++++ = more than 100. () = identification uncertain													