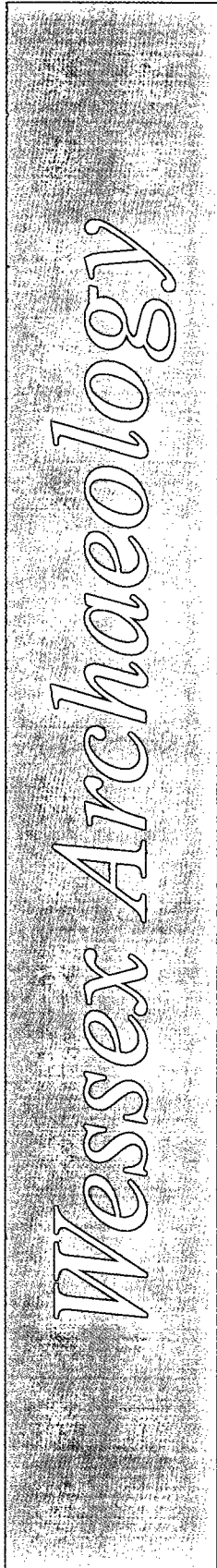
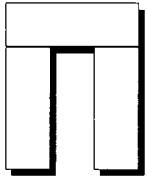
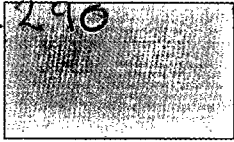


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EXCAVATIONS AT HORTICULTURAL RESEARCH INTERNATIONAL, LITTLEHAMPTON 1997

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In October to November 1997 Wessex Archaeology conducted an archaeological excavation at the site of the Horticultural Research International (HRI), Worthing Road, Littlehampton. The investigations revealed an Early Romano-British settlement with an enclosed working area, probably with beginnings in the Late Iron Age. Pottery was produced on the site for about 100 years between c.AD43 and AD150 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.

INTRODUCTION

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 re-development 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. 6m aOD at the south to c. 4m aOD at the north towards Black Ditch, a water course 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 0.40m and 0.60m below current ground level. The landuse 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 400m 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 (Gilke's and Hammond 1991), c. 700m 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. A number of 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.2km 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 is the remains of Angmering Villa (Fig.1), a 1st and 2nd century complex of buildings on the banks of the Black Ditch. 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 forthcoming), c. 400m 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 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

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 and 2, Fig. 2) measuring a total surface area of 6825m² were selected for examination. 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 with all artefacts 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 were 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) was 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)

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

Enclosure 404

In the southern part of Area 2 was a sub-rectangular ditched enclosure (404) measuring 36m by 39m (the long axis aligned east to west). Generally, the ditch had moderately steep sides and a flat base, and measured between 1.31 and 1.72m wide and 0.54-0.73m deep. Up to three episodes of infilling were recorded with no evidence to indicate to which side, if any, an associated upcast bank may have existed. Finds from the ditch comprised site-produced pottery vessels and other local coarsewares, 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 sub-divided 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. This may have allowed different parts of the

enclosure to be used for different activities. The northern extent of ditch 363 was also obscured by waste deposit 406. 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.

The enclosure was most likely used as a working area away from the main settlement. Although the survival of bone on the site was extremely poor, it is probable that the different segments were used to segregate animals from each other or from other activities within the enclosure.

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.1m in diameter and at least 0.16m deep with vertical sides and a flat base. Although the upper part of the kiln had been truncated the remains of two burnt deposits were *in situ*. The uppermost deposit comprised 0.13m of pale greyish brown silty clay with fragments of burnt clay. Covering the base of the kiln was 0.03m 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 stokehole 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. 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 sub-divided and a droveway constructed.

Internal Divisions

During Phase 3 enclosure 404 was further sub-divided 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 a drainage function, channelling water into the enclosure ditch.

At some point, probably in this phase, the east to west internal ditch (409) was re-cut (ditch 410) and extended to the west, cutting through the earlier 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 latchlifter and a loop headed object of unknown function. The remains of a badly disturbed cremation, probably originally urned, was recovered from the junction of ditch 410 and ditch 363.

The Droveway

To the north of the enclosure was a ditch-lined droveway (comprising ditches 405 and 408, Fig. 3) which appeared to turn at the entrance of the enclosure to continue in a westerly direction. Although the dating evidence for the in-filling of the droveway

ditches suggest that it went out of use during phase 3, it was probably constructed at the same time as the enclosure. The remains of several pottery vessels (Plate 1) were recovered from the western droveway ditch (405). These included a cup-necked flagon (Fig. 5, 21) and three jars, one of which contained broad beans. The eastern side of the droveway divided into two ditches (ditches 408 and 413) as it approached the enclosure, possibly forming an area for corralling livestock. A necked storage jar (Fig. 4, 7 and Plate 2) was recovered from ditch 408. The droveway ditches in general were c. 0.5-0.90m wide and 0.5m deep with slightly concave sides and flat bases.

To the north of the main site and within Area 1 was a single east to west aligned 'V'-shaped boundary ditch (106; Fig. 2). Although unphased, this ditch is thought to be part of a field system contemporaneous with the droveway and Early Romano-British features. The ditch had been recut suggesting its continuous use through time.

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 and 407) covered large areas of the site. Pottery was still being produced (kiln 259) and much of the waste created by this activity was found in these waste deposits.

Kiln 259

Kiln 259 was situated on the western edge of droveway ditch 405 (Fig. 3 and Plate 3). This was similar in size and nature to the earlier kiln within the enclosure (Fig. 6). The upper part of the kiln had been truncated by ploughing and only 0.15m of the base had survived. Two burnt layers were identified within the kiln, the upper deposit comprising 0.05m 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 0.10m 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 stokehole 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).

Waste Deposits and Working Hollow 407

The largest of the waste deposits (406) was situated towards the middle of the site, masking the southern part of the droveway ditches and the northern side of the enclosure. Two slots were excavated through the south-eastern part of this deposit, which was c. 0.05m deep. These investigations revealed four inter-cutting 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.

To the south of deposit 406 and within the main enclosure was a large irregular north-south aligned working hollow (407) measuring c. 14m by 8m. At the base of the hollow were at least four small pits, several post-holes and stakeholes, and an approximately square feature (293), measuring c. 0.6m by 0.6m with post-holes located at each corner. The southern edge of the working hollow appeared to respect a natural out-crop of degraded chalk. This hollow and the features at its base were filled

with several discrete waste deposits (238, 239, 302, 352 and 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 and 314), both less than 1m in diameter and between 0.07m and 0.14m 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.

Pits and Post-holes

Eleven early Romano-British pits and twelve 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. 1m in diameter and generally less than 0.16m deep, although pit 299 was slightly deeper at 0.43m. Pit 394 was distinctive, as it was at least 0.81m deep (time constraints preventing 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 pre-date 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 were 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 glass vessel fragment came from the surface.

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. 6.4m in diameter and up to 0.50m 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 including elder, ash, oak sapwood and heartwood as well as the charred remains of sprouts, chaff and weed seeds.

The site appeared to have been abandoned in the middle 2nd century AD although a number of unstratified later sherds of pottery up to 3rd or 4th century were recovered

during the evaluation, suggesting some later activity occurring in the vicinity of the site.

POTTERY

by M. Laidlaw with a contribution by M.A.B. Lyne

The pottery assemblage from Littlehampton consists of 3185 sherds weighing 34,217 grammes, 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 coarseware vessels in a restricted range of forms which represent on-site pottery production. Much of this material has the appearance of being over- or under-fired and consequently is in relatively poor condition, with abraded surfaces and rolled edges.

Methods

The pottery was analysed 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 (X20), 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 (Excel) and full records exist in 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 <6mm. Generally pale orange surfaces and grey core.
- F3 Hard, moderately coarse fabric with moderate, moderately-sorted, angular flint <3mm (mainly 0.5mm); sparse, sub-rounded quartz 0.25mm. Variable firing.
- F4 Hard, coarse fabric with common, well-sorted, angular flint <3mm. Dark grey.

The bulk of the prehistoric sherds are derived from the base of a single vessel recovered from a damaged cremation burial (242). It should be noted that although a large number of sherds (127) 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. 4, 1). The remainder of 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, sub-angular rock (sandstone) <3mm, mainly 1mm; sparse iron oxide. Greyish.
- R2 Hard, coarse fabric with common, moderately-sorted, sub-angular rock (quartz-like) <5mm; 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. A possible source for the sandstone in fabric R1 is the Hythe Beds outcrops of the Pulborough Ridge. The single sherd in fabric R2 is unstratified and due 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 on the site
- Other coarse greywares
- 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 greywares.

- Q100 Hard, coarse fabric with common, well-sorted, rounded quartz <1.5mm. 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 <1mm (mainly 0.5mm). 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 oxidised, but a significant proportion of sherds are unoxidised and are likely to represent similar coarse greywares being produced in the area. Initially the distinction was made between oxidised and unoxidised 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. 4, 1-5, 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. 4, 8)

Form 2: Jars with short everted rims, some with slightly carinated shoulder (Fig. 4, 9, 10; Fishbourne types 313-4, fig. 114)

Form 4: Globular jars with simple rounded or beaded rims (Fig. 4, 13, 14; Fishbourne type 166, fig. 102; Wiggonholt fig. 11, 48)

Bowls and dishes

Form 6a: Lid-seated, convex-sided (?carinated) bowls (Fig. 4, 16; Fishbourne type 210, fig. 102)

Form 6b: Flared bowls with straight sides, with flat or triangular-sectioned rims (Fig. 4, 17-19; Fishbourne types 219-20, fig. 107; Wiggonholt fig. 12, 7-74)

Form 7: Straight-sided dishes with plain rims (Fig. 5, 20; Fishbourne type 200/202, fig. 103)

Flagons

Form 8a: Flagons with internally cupped lips (Fig. 5, 21; Fishbourne 107, fig. 94)

Form 8b: Flagons with screw neck (Fig. 5, 23; Fishbourne type 109, fig. 94)

Lids

Form 9: Miscellaneous lid forms (Fig. 25-7; Fishbourne fig. 104; Wiggonholt fig. 14 101-7)

The range of vessel forms represented is relatively restricted and occur 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. 4, 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 tended 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 types 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. 5, 26, 27) to convex (Fig. 5, 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. 4, 13, 14), two flagon rims (Fig. 5, 21, 23), and one carinated cup (Fig. 5, 29). Although these forms are attributed to fabrics possibly produced on site, due 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

Decoration is scarce for the coarse sandy fabrics Q100 and Q101 considering the large quantities of sherds recovered. 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. 5, 36). A small number of jars have necked cordons, while horizontal rilling appears to be restricted to bowls (Fig. 4, 17, 18); two small body sherds are rouletted.

Distribution

The coarse sandy fabrics from this group were recovered from a large number of features with very large concentrations from the waste deposits 253 (443 sherds) and 238 (432 sherds). Moderate quantities from driveway ditches 405 (157 sherds) and 408 (107 sherds) and from waste deposits within working hollow 407: layer 239 (218 sherds), layer 352 (157 sherds) and layer 374 (120 sherds). The rest of the sherds are dispersed in moderate to small quantities across the site.

Other coarse grey wares

The remaining coarse sandy fabrics have been divided into 12 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 coarseware tradition.

- Q102 Hard, fine fabric with sparse, moderately-sorted, rounded quartz <1mm; sparse mica flecks.
- Q104 Hard, moderately coarse fabric with common, well-sorted, sub-rounded quartz <0.5mm; 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 <0.5mm; rare iron oxide. Hardham type?
- Q109 Hard, coarse fabric with common, moderately-sorted, sub-rounded quartz <2mm. Generally thicker walled and very dark grey/black.
- Q110 Hard, coarse fabric with common, well-sorted, sub-rounded quartz <1mm (mainly 0.5mm); sparse moderately-sorted, sub-angular calcined flint <4mm; rare sub-rounded quartz 5mm. Generally dark grey surfaces, grey core and orange margins.

- Q113 Very hard, moderately coarse fabric with moderate, moderate-sorted, rounded quartz <3mm (mainly 0.5mm). Distinctive blue grey colour. Hardham type?
- Q114 Hard, moderately fine fabric with moderate, moderate-sorted, rounded quartz <1mm (mainly 0.5mm). Distinctive orange core and dark grey surfaces. Hardham type.
- Q116 Hard, moderately coarse fabric with common, well-sorted, rounded quartz 0.5mm; sparse, moderately-sorted, angular flint <7mm. Generally dark grey.
- Q117 Hard, moderately coarse fabric with common, well-sorted, rounded quartz 0.5mm. Mainly oxidised buff to pale orange. Wiggonholt type?
- Q119 Hard, moderately coarse fabric with moderate, well-sorted, sub-rounded quartz 1mm. Dark grey.
- Q120 Moderately hard, moderately fine fabric with moderate, moderately-sorted, sub-rounded quartz <1mm; sparse, moderately-sorted grog <1.5mm. Greyish brown.
- Q121 Hard, coarse fabric with moderate, well-sorted, sub-rounded quartz <1mm. 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 is a Hardham type, and includes at least two bowls in micaceous 'London ware'. The carinated example (Fig. 5, 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, dated AD 43-100 (Cunliffe 1971, fig. 89), and the base of a dot-barbotine panel decorated beaker of probable early-mid 2nd century AD date (Fig. 5, 33). This fabric has also been recorded at Bersted (Lyne n.d., fabric 6A). Other possible Hardham products include the moderately fine greywares Q106 and Q113.

The fine sandy fabric Q117 includes at least one vessel (a pulley-neck flagon; Fig. 5, 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 oxidised and unoxidised 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 (eg. Fig. 4, 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 (*ibid.*, 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 greyware assemblage. This fine micaceous fabric is thin walled and was probably a locally produced fabric which was being used to imitate the early fineware vessels such as 'London ware' and Gallo-Belgic forms.

The number of diagnostic vessel forms for the greywares 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. 4, 12). Three new form types have been recorded:

Form 5: Necked jars with distinct high shoulder and plain upright rim (Fig. 4, 15; Fishbourne type 181, fig. 103; Wiggonholt fig. 13, 86, 87)

Form 8c: Flagons with pulley neck (Fig. 5, 22; Fishbourne type 297; Wiggonholt, fig. 10, 34)

Form 10: Miscellaneous carinated vessels (Fig. 5, 28, Wiggonholt fig. 13, 78; Fig. 5, 30, Fishbourne type 319, fig. 115)

Form 10 vessels comprise one decorated carinated jar (Fig. 5, 28) and a carinated and necked bowl (Fig. 5, 30), the latter dated c.AD 70-100 at Fishbourne. Other miscellaneous forms recorded include one butt beaker in fabric Q119 (Fig. 5, 32).

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 greywares, 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 greywares to kiln waste was pit 237, while pit 267 and ditch 363 contained only the greywares 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 <3mm and moderate, well-sorted, rounded quartz 0.5mm.

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 fineware 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; forthcoming). 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 <1mm (mainly 0.5mm).
- G101 Moderately hard, moderately coarse fabric with moderate, poorly-sorted, grog <3mm; sparse, moderately-sorted, angular flint <4mm; rare mica flecks. Orange.
- G102 Moderately soft, moderately fine fabric with common, poorly-sorted, grog <2mm; rare organic strands. Colour generally greyish to reddish brown.
- G103 Moderately soft, moderately fine fabric with common, moderately-sorted, grog <4mm (mainly 1mm).

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 and 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).

Finewares

The finewares 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 century 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, posthole 338 and waste deposits 238, 352 and 374, all within enclosure 404.

British finewares were subdivided into the five fabric types listed below and include both oxidised (orange-red and pale firing) and greyware 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 <0.5mm; sparse mica flecks. Generally thin walled and dark grey.
- Q107 Moderately hard, fine fabric with rare, moderately-sorted, rounded quartz <0.5mm (mainly 0.25mm); rare mica flecks. Generally orange.

- Q108 Moderately hard, fine fabric with moderate, well-sorted, sub-rounded quartz <0.25mm. Generally pinky or buff.
- Q111 Moderately soft, fine fabric with rare, moderately-sorted, sub-rounded quartz <1mm. Generally white or pale grey.
- Q115 Hard, moderately fine fabric with moderate, well-sorted, sub-rounded quartz 0.5mm. 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. 5, 34). Other vessel forms include a small everted rim jar with a shoulder band of angled incised lines (Fig. 5, 35) and a platter (Fig. 5, 31), 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 fineware 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 fineware 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. 4, 2, 4). Jar rims are paralleled in AD 43-75 dated assemblages from Fishbourne (Cunliffe 1971, figs. 102-3, types 162-181).

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. 4, 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. 5, 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; fig. 5, 28) 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 an AD 70-100 date range, including a necked liquid storage jar of form 1a (Fig. 4, 7), from driveway ditch 408, a carinated and necked bowl (Fig. 5, 30) from the same feature, and a cupped flagon neck from driveway ditch 405 (Fig. 5,

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. 4, 9, 12) appear for the first time. Further lid-seated jar rims are in the Hardham/Wiggonholt ceramic tradition and from vessels similar to an example from the Hassocks cemetery with a low-slung carination below its girth (Lyne 1994, fig. 8, 8-32). The type is poorly dated but a small jar from the Chichester, St. Pancras cemetery (Down and 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. 4, 16), dated AD 100-150. The horizontally-rilled forms (Fig. 4, 17-18) 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. 5, 28) has a similar date range. The dot-barbotine panel decorated beaker (Fig. 5, 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 and M.A.B. Lyne

Pottery production

Evidence on site for pottery production consists of at least two simple updraught kilns (259 and 359) one of which (259) contained traces of burnt clay lining and kindling. The large dumps of coarseware 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 greywares in the second half of the first 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. It seems clear that pottery was made on the site throughout the period of occupation. **Table 3** summarises the main fabric types by

phase and illustrates the dominance of the site-produced fabrics, especially within phase 4 features.

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. 4-5)

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, liquid storage jar with incised decoration; fabric Q100. PRN 553, driveway ditch 408, phase 3.
7. Necked jar with bead rim; fabric Q121. PRN 650, enclosure ditch 404, phase 2.

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 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. Platter; fabric Q103. PRN 431, ditch 410, phase 3.
32. Butt beaker rim; fabric Q119. PRN 472, posthole 344, unphased.
33. Base of beaker with vertical band of barbotine dots; fabric Q114. PRN 624, pit 383, phase 4.
34. Fineware jar with short everted rim and bands of incised decoration; fabric Q103. PRN 567, 568, ditch 410, phase 3.
35. Fineware 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), glass, fired clay and ceramic building material.

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

Glass: 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 and Price 1995, figs.7.5, 9.3). The window glass is of blue-green 'matt-glossy' type.

Fired clay: 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.

Ceramic Building Material: 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).

THE ENVIRONMENT

CHARRED PLANT REMAINS BY PAT HINTON

A total of eleven bulk samples was 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 0.5mm mesh and the residues were sieved into 5.6mm, 2mm and 1mm fractions and dried. The coarse fraction (>5.6mm) 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.

RESULTS

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 which are possibly *Triticum 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. 4mm 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.2mm 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 which are more likely to represent weeds than cultivars.

DISCUSSION

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 grains 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. 2mm.) 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 driveway 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

METHODS

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 10³mm. 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 count the growth rings.

Classification is according to *Flora Europaea* (Tutin, Heywood *et al.* 1964-80).

DISCUSSION

The charcoal remains were probably the fuel residues from the final firing of the kiln. The charred oak 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 blackthorn has 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.

A comparatively narrow range of taxa was identified. Interpretation of the use of selected fuel is difficult from the few samples available and the small quantity of identifiable charcoal.

Charcoal from kiln 259, directly associated with the firing process, included oak sapwood, maple and blackthorn. Similar species were identified from the waste deposits 253 and 239 and pit 396 with the addition of oak heartwood, elder, ash and hawthorn or related species. Deposits in the waste dumps and pit are assumed to be kiln fuel residues, inferred by the density of pottery waste, although the large deposits of cereal grain may indicate a more domestic origin. These woods 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, where a wide range of woody material was also used in combination with cereal waste and other herbaceous material.

It seems probable that, as at the Norfolk site, the use of fuel at Littlehampton would have been influenced by the woodland components of the local landscape.

SITE 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, recovered during the excavation suggests 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 period. The focus for the settlement was identified during the evaluation 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 have certainly 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 some type of livestock management although the east-west aligned ditch also had a drainage function. A droveway approached the site from the north and it is probable that animals were driven to and from the enclosure by this means.

Pottery production occurred at HRI over a period of about 100 years between c. AD43 and AD150 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 probably would have been fired a number of times and were 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 from the site. The majority of this (58.4%) was from phase 4 suggesting an increase in pottery production in the late 1st to mid 2nd century AD.

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. 7) (Peacock 1987).

In the centre of the enclosure was a large working hollow which may have been sheltered from the wind by a reed fence constructed along the north-south internal ditch. A number of pits and post-holes were also excavated, although the function of these is unknown.

Environmental evidence suggests that crop-processing, in particular spelt, was occurring nearby. A number of quernstones were recovered from this site and others in the vicinity (Toddington) suggesting that wheat was consumed in some quantity. The remains of a 2nd century Roman watermill were located c.400m to the north of the site.

At Coldwaltham (Kenny pers comm; Fig. 7), c.7km 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. Further evidence of pottery production was revealed 8.5km to the north-east of Littlehampton where a possible Late Iron Age kiln and pottery wasters were found at Nutbourne.

Elsewhere in West Sussex at Copse Farm, Oving (Bedwin and Holgate 1985) c. 6km to the west of Littlehampton, a Late Iron Age/Early Romano-British sub-rectangular enclosure (30m by 25m) was used to demarcate plots of land, and for drainage purposes, within a more extensive enclosure. Towards the centre of the enclosure was a working hollow (c.7m in diameter and up to 0.25m deep) with associated small pits and post-holes, some of which contained the residues from industrial activities.

The evidence from HRI, Littlehampton seems to fit in with this pattern of small-scale localised pottery production in the West Sussex area.

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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>	<i>157</i>	<i>583</i>	<i>1.7</i>
Rock tempered			
R1	5	21	
R2	1	6	
<i>sub-total</i>	<i>6</i>	<i>27</i>	<i>0.1</i>
ROMANO-BRITISH			
Site produced wares			
Q100	2050	24298	71
Q101	244	2397	7
Total	2294	26695	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	604	1.8
Q120	5	265	0.8
Q121	20	536	1.6
<i>sub-total</i>	<i>440</i>	<i>5047</i>	<i>14.8</i>
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>	<i>60</i>	<i>473</i>	<i>1.32</i>
British Finewares			
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>	<i>197</i>	<i>1319</i>	<i>4</i>
Imported Fineware			
Samian	29	388	1.1
TOTAL	3185	34217	

Table 2: Correlation between vessel form types and fabrics

Forms	Site produced wares		Other greywares											
	Q100	Q101	Q102	Q104	Q108	Q109	Q110	Q113	Q114	Q117	Q119	Q120	Q121	Total
JARS														
Form 1a	24	4						1	1				1	31
Form 1b	7													7
Form 2	39	31	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

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	19616	392	26633
<i>% of phase</i>	<i>69.65</i>	<i>71.42</i>	<i>83.05</i>	<i>87.31</i>	-
<i>% of total site-produced</i>	<i>9.30</i>	<i>15.58</i>	<i>73.65</i>	<i>1.47</i>	-
OTHER COARSEWARES					
Wt. sherds	929	1090	2630	24	4673
<i>% of phase</i>	<i>26.13</i>	<i>18.76</i>	<i>4.81</i>	<i>5.35</i>	-
<i>% of total coarsewares</i>	<i>19.88</i>	<i>23.33</i>	<i>56.28</i>	<i>0.51</i>	-
FLINT TEMPERED WARES					
Wt. sherds	16	1	6	12	35
<i>% of phase</i>	<i>0.45</i>	<i>0.02</i>	<i>0.03</i>	<i>2.67</i>	-
<i>% of total flint-tempered</i>	<i>45.71</i>	<i>2.86</i>	<i>17.14</i>	<i>34.29</i>	-
GROG-TEMPERED WARES					
Wt. sherds	124	15	211	8	358
<i>% of phase</i>	<i>3.49</i>	<i>0.26</i>	<i>0.89</i>	<i>1.78</i>	-
<i>% of total grog-tempered</i>	<i>34.64</i>	<i>4.19</i>	<i>58.94</i>	<i>2.24</i>	-
FINEWARES					
Wt. sherds	10	554	1136	7	1707
<i>% of phase</i>	<i>0.28</i>	<i>9.54</i>	<i>4.81</i>	<i>1.56</i>	-
<i>% of total finewares</i>	<i>0.59</i>	<i>32.69</i>	<i>66.55</i>	<i>0.41</i>	-
TOTAL					
Wt. sherds	3555	5809	23620	449	33433

Appendix 1

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	
	220		256	257	222	239	264	298	353	369	243	
Context	1	2	7	8	6	14	9	15	21	23	26	
Sample	10	10	10	10	10	10	10	10	10	10	10	
Sample volume (litres)												
Cereals												
<i>Triticum cf 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		13	30	1	+++	100*	50*	2			200*	1
fragsments		+	++	+	9	++++	+++	1		1	++++	+
- plumules					+							
- plumule												
fragments												
<i>Triticum cf aestivum</i>	bread wheat	2	1		7	1				1		
<i>Triticum spp.</i>	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		1				1					2	
fragments												
<i>Avena cf fatua</i> - floret base	oats	1	3	1	3	5	1	1	1	1	13	

<i>Avena</i> sp. - grains - awn fragments		+	++	+	+	++	++	++++	++	+++	+++	+
<i>Avena/Bromus</i> sp	oats or brome grass		1	5			1		1	2	2	
Cerealia indet.	unidentified cereal fragments	2.5ml.	1.5ml.	1ml.	7.5ml.	5ml.	4.5ml.	2ml.	0.5ml.	3.5ml.	6ml.	0.5ml.
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

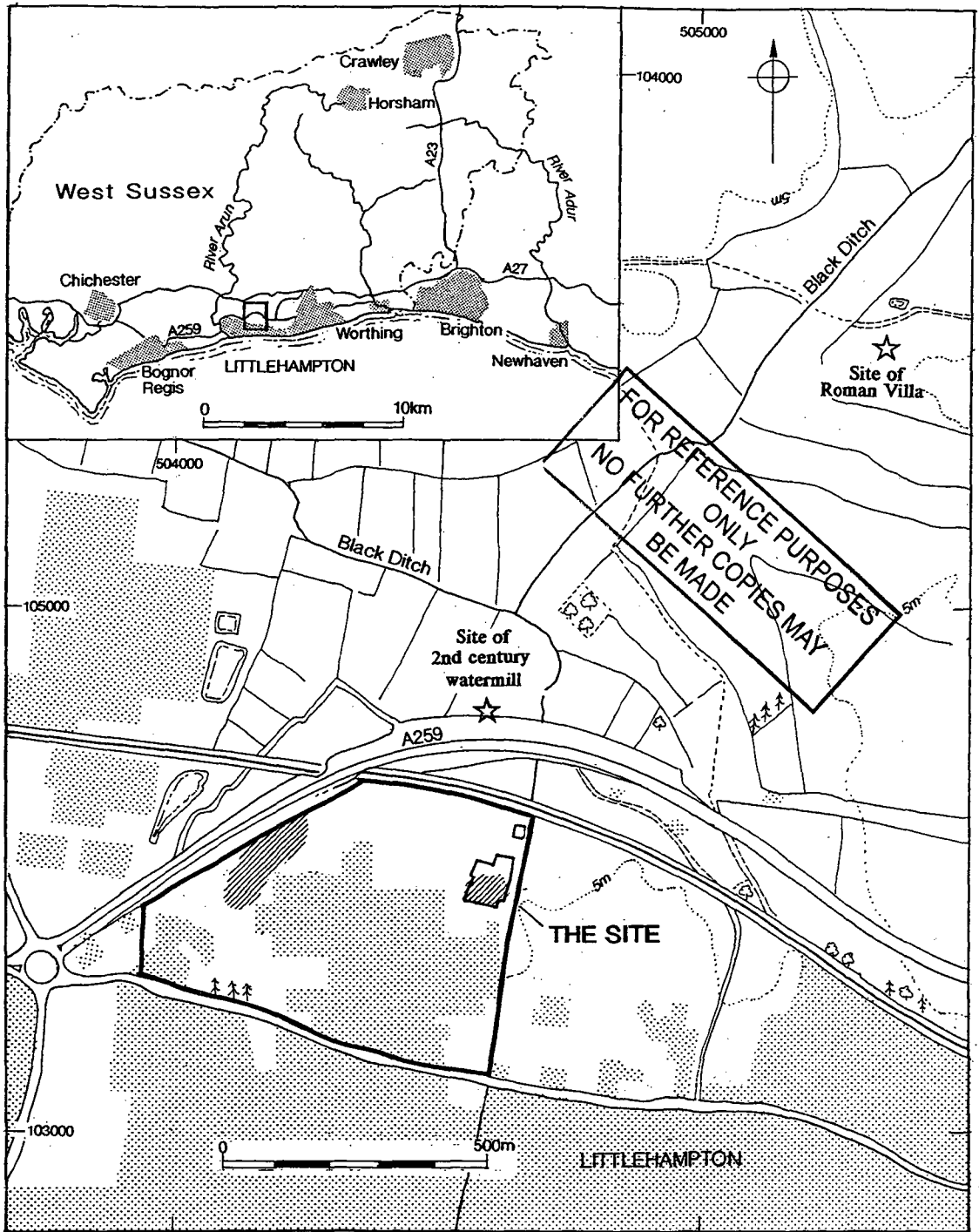


Figure 1

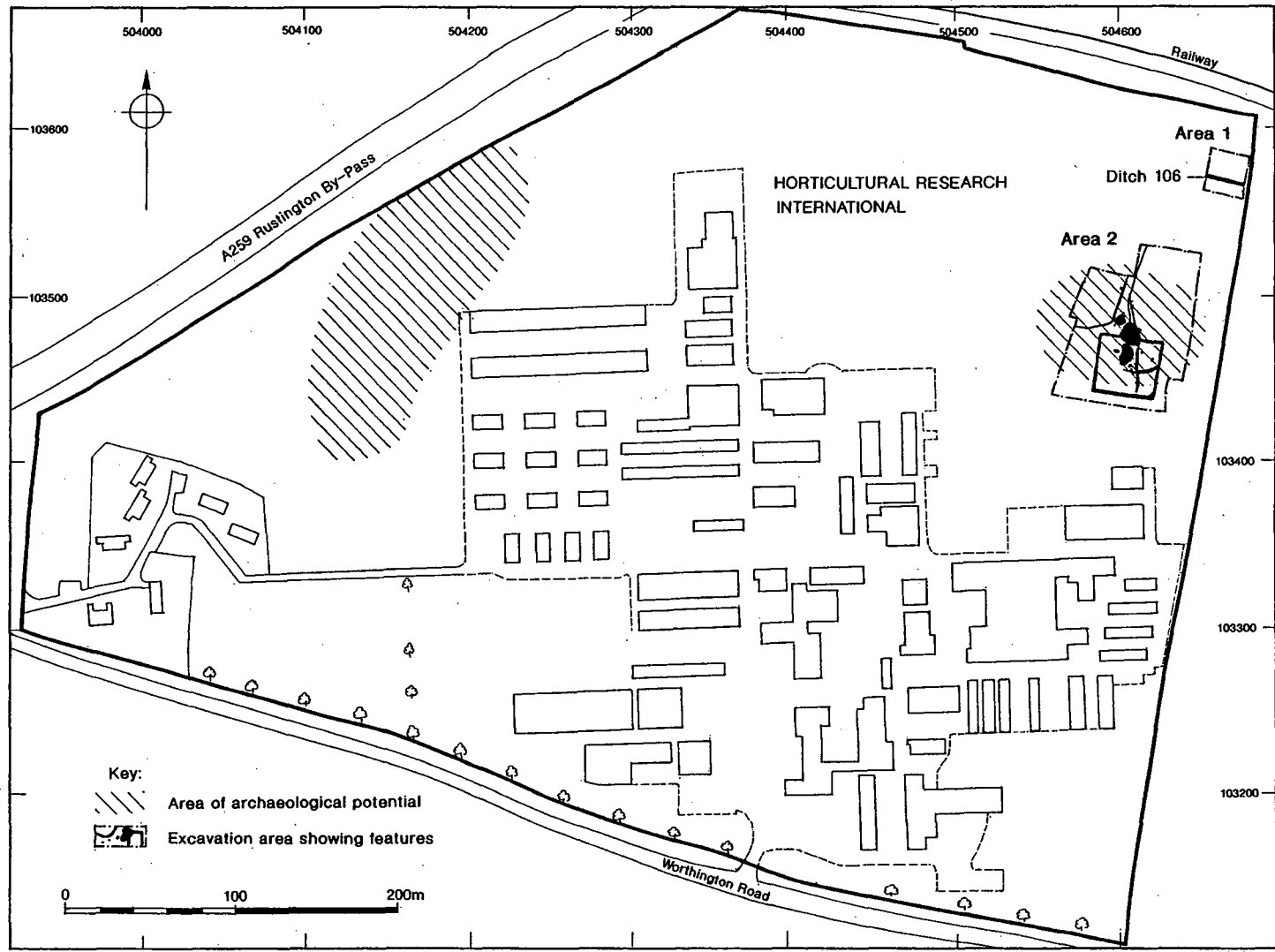


Figure 2

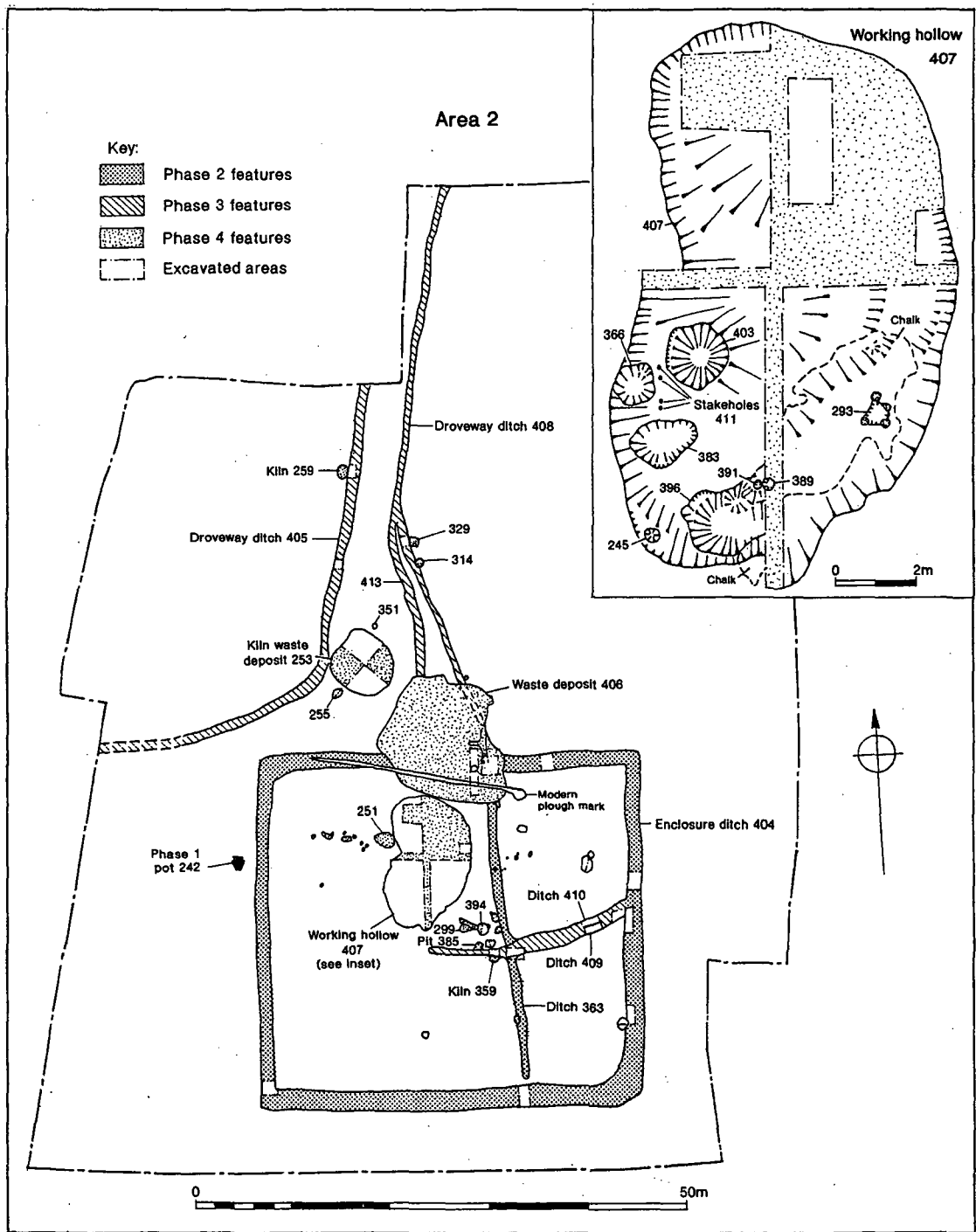


Figure 3

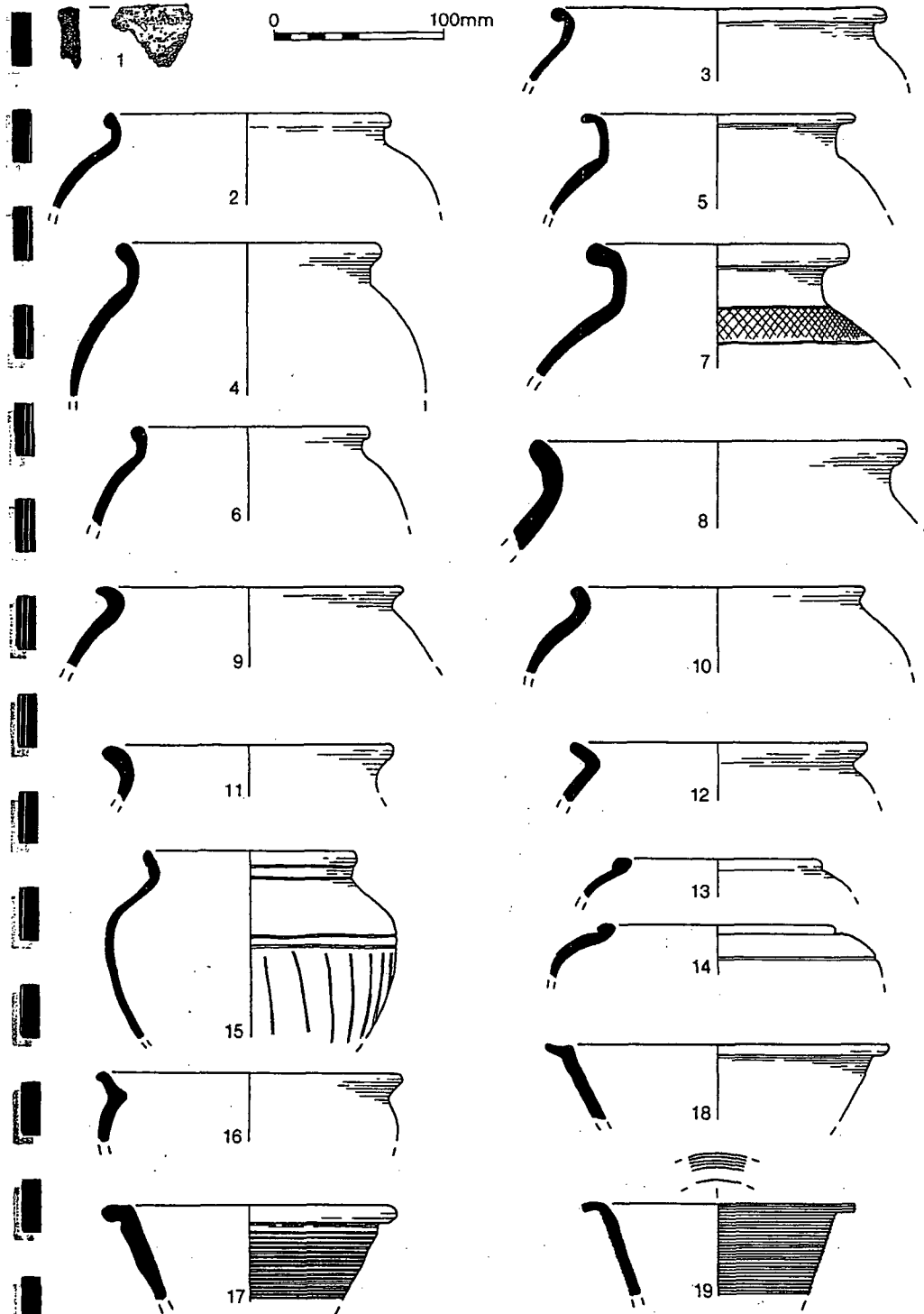


Figure 4

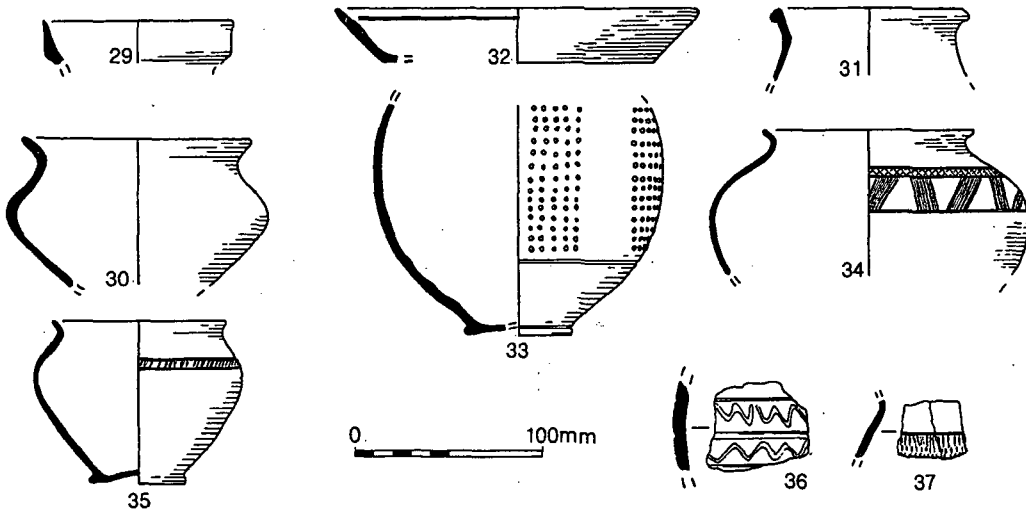
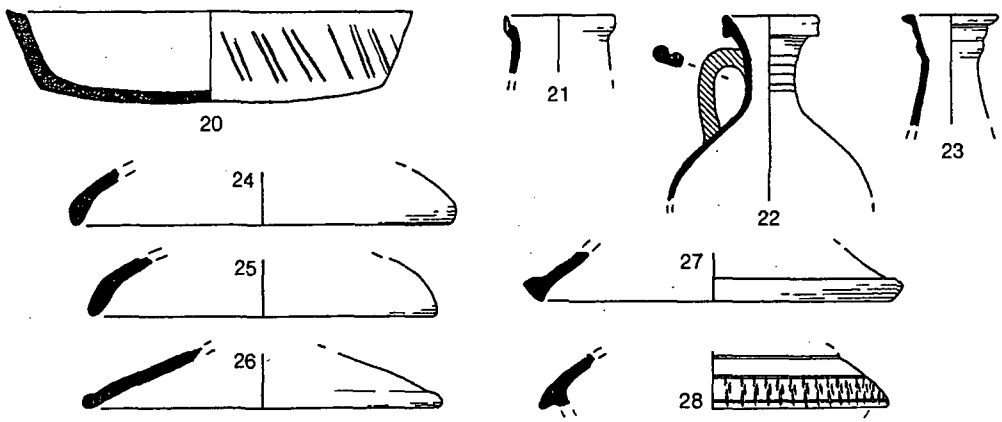


Figure 5

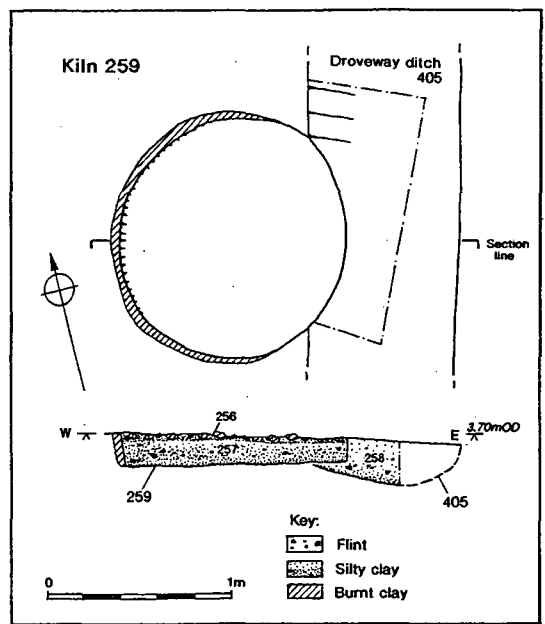


Figure 6

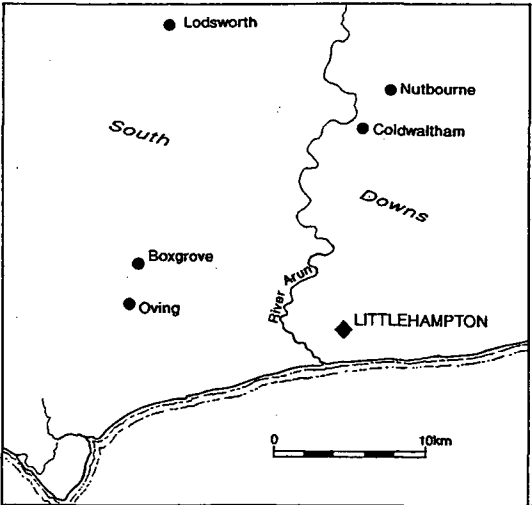


Figure 7



Plate 1

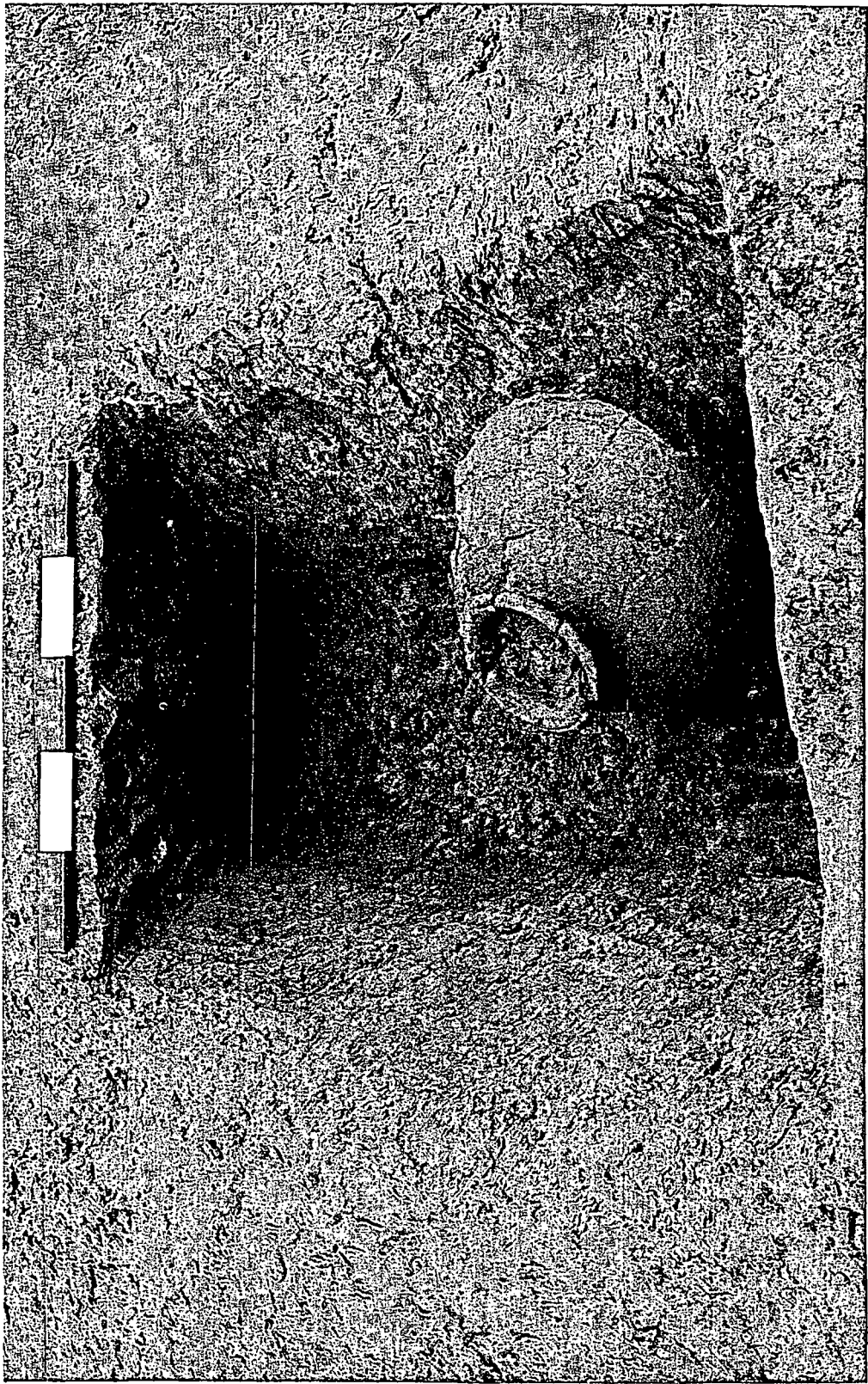
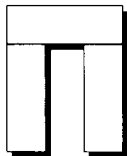


Plate 2



Plate 3



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