

*Proceedings of the*  
**SUFFOLK INSTITUTE  
OF ARCHÆOLOGY**

For 1960



**VOLUME XXVIII, PART 3**  
including title page and index to volume XXVIII.  
*(published 1961)*

PRINTED FOR THE SOCIETY BY  
W. E. HARRISON & SONS, LTD., THE ANCIENT HOUSE, IPSWICH.

## SOME SUFFOLK KILNS:

### II. TWO KILNS MAKING COLOUR-COATED WARE AT GRIMSTONE END, PAKENHAM

By NORMAN SMEDLEY, M.A., F.S.A., F.M.A. and ELIZABETH OWLES, B.A.

Since the publication of the account of the excavation of a complex barrow site at Grimstone End in 1953 and 1954,<sup>1</sup> quarrying operations have exposed over 170 sites, some of them well-defined and capable of controlled excavation, others mere scatters of pottery and other objects, any structure having been destroyed by the drag-line or plough. The greatest interest has been shown by the contractors and the drag-line operators, who have endeavoured to perform their task with as little archaeological damage as possible, and wherever excavation was practicable work has been diverted to allow it to take place.

It is evident that the area contained a number of kilns and probably over a period made pottery for the neighbouring settlement between Pakenham and Ixworth. Mr. Guy Maynard records the excavation of a Roman kiln 'on the side of the large gravel pit north-west of Pakenham water-mill',<sup>2</sup> and a skeleton. Re-examination in 1956 of the site, which was much disturbed by recent quarrying, showed indications of at least two and possibly three kilns, probably of the second or third century 'pedestal' type.

The object of the present paper is to describe two large kilns of a type quite different from those usually associated with Suffolk coarse grey ware, approximating more closely to those of the Nene valley and making pottery of a comparable type.

For the purpose of mapping the area as new finds were made, a datum line was laid down, and generally speaking finds to the west of this line have been given a number with a positive sign (+), those to the east a negative (-). In fact, the character of subsequent quarrying has rendered this device unnecessary, and few numbers are duplicated. For the sake of the record, however, it may be said that the kiln excavated in 1956 is numbered +22, that dug in 1960 being -147. For various reasons it was possible to maintain better records of the latter, and it will be described in greater detail. As both kilns were producing very similar types of pottery it will only be necessary to call attention to those structural points in which No. 22 differed from No. 147: the illustrations of the pottery will reveal more points of agreement than of difference.

<sup>1</sup> *Proc. Suff. Inst. Arch.*, vol. xxvi, part 3 (1954), pp. 188 *et. seq.*

<sup>2</sup> *Proc. Suff. Inst. Arch.*, vol. xxv, part 2 (1951), p. 214. The kiln site lies to the south-west of the mill.

## KILN 147

In June 1960, whilst clearing top-soil in preparation for the removal of ballast, the drag-line operator of Messrs. Allen Newport Ltd., Mr. R. Curry, exposed an area of black silt and reported it to a member of the staff of the Ipswich Museum, Mr. Basil Brown. The site (Grid Ref. TL/93656937) was examined by the present writers one of whom (N.S.) had been concerned in the 1956 excavation (22), and noted the similarity to the stoke-hole of that kiln. By courtesy of the contractors it was possible to excavate the greater part of the kiln from surface level without further damage by the drag-line.

The circular firing-floor (Plate XXX, *a*) was first uncovered in order to discover the alignment— $30^{\circ}$  east of north (or roughly N.N.E.). The stoke-hole was then sectioned by the removal, layer by layer, of the filling on the northerly side, and the section measured and drawn. The remainder of the stoke-hole was then cleared, and subsequently the kiln-chamber was first sectioned and then totally excavated: photographs and drawings were secured at every stage.

Seen in plan (Fig. 34) the kiln consisted of a circular floor, 6 feet in diameter, surrounded by a wall of clay 3 inches in average thickness. As this floor lay only 1 foot 6 inches or so beneath the present ground level, the surrounding wall had only survived to a height of 4 or 5 inches at the highest point. It must originally have been at least one foot high in order to accommodate the pots

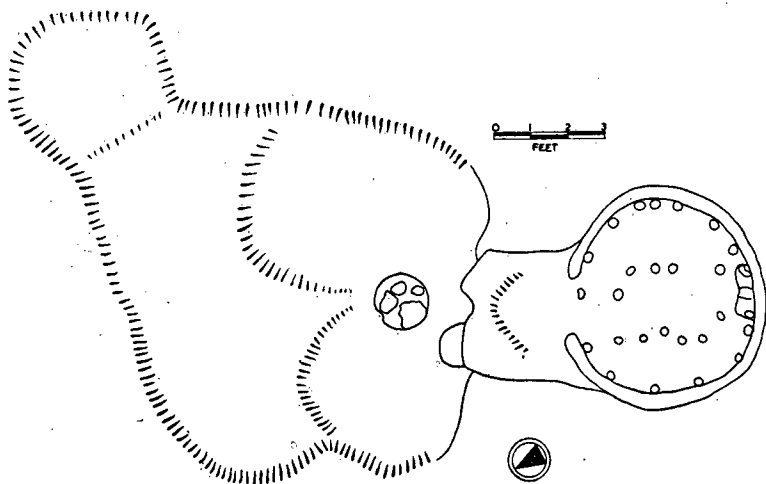


FIG. 34.—Kiln 147: Plan.

for firing, probably more. At the rear of the kiln was a kidney-shaped depression 16 inches by 4 inches, and 4 inches in depth, with a median ridge and vents at either end. In all there were 16 peripheral vents, and 11 others, in 2 rows, which proved to flank the pedestal. In front of the floor there was a hood of clay 2 feet 6 inches in length overlying the furnace arch. On either side the wall of the stoke-hole descended abruptly at this point, becoming less steep further away from the kiln.

#### THE STOKE-HOLE

The stoke-hole (Fig. 35) was an irregular square pit, 10 feet across, with a shelving entrance in the north-east corner. It had a general depth of 3 feet 6 inches from the modern surface, but two pits for the stokers, 6 inches deeper, flanked the furnace arch and extended 5 or 6 feet back from it. Immediately in front of the arch and little more than one foot away from it, was a cylindrical baffle 1 foot in height, constructed of stones, clay and rubble.<sup>3</sup> This was a puzzling feature, and seems to have been intended as an attempt at regulating the draught. (It will be seen that in the case of kiln 22 some difficulty had obviously been experienced, and a solution sought in the increase of length of the furnace arch; it is interesting to note that Mr. Brian Hartley came to the conclusion independently, as the result of his examination of examples of the pottery, that these kilns had been less efficient than those of the Nene valley).

The stratification (Fig. 35) of the stoke-hole was as follows:—<sup>4</sup>

- Layer 1. Top-soil.
- Layer 2. Brownish-grey silt at base of which was a quantity of bones of food-animals, mostly ox. It seems probable that the pit remained open at this level for some time.
- Layer 3. Blackish-grey fill, probably swept in during cleaning-up operations when the kiln was abandoned. This included many sherds and wasters.
- Layer 3a. A mixture of blackish debris with red fragments from the kiln wall, overlying
- Layer 4, which does not appear in the median section. It consisted of kiln debris which had fallen to the north-east of the arch.

<sup>3</sup> Baffles are known in some half dozen kilns at Colchester, for instance in kiln 30 which was making colour-coated ware of early third century date. (M. R. Hull, *Roman Potters' Kilns of Colchester*—in press. Information kindly supplied by Mr. B. Blake).

<sup>4</sup> The portion shown blank on the sections represents a trench dug in the initial stages, before the presence of a kiln was determined.

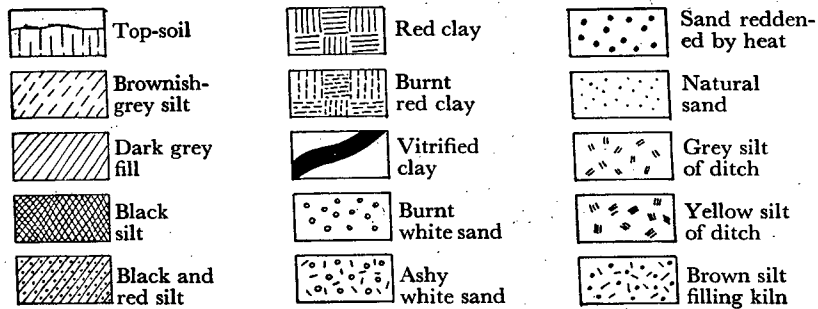
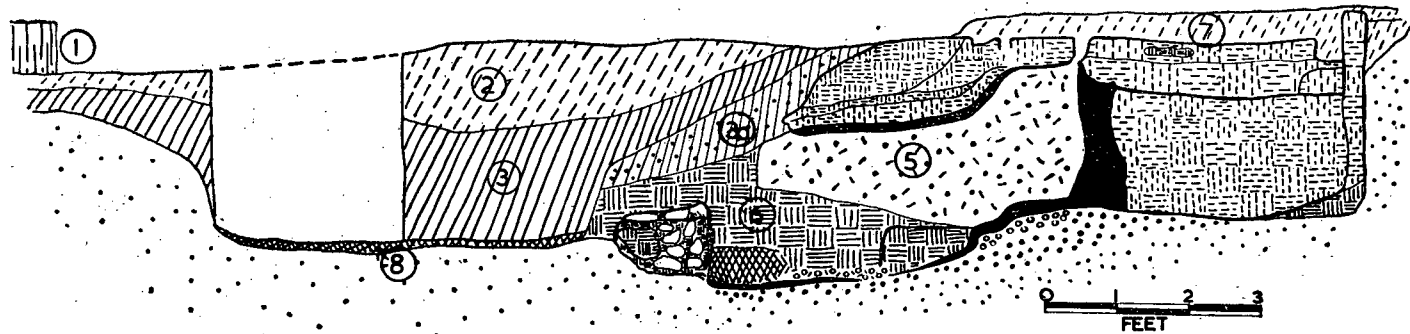


FIG. 35.—Kiln 147: Longitudinal section.

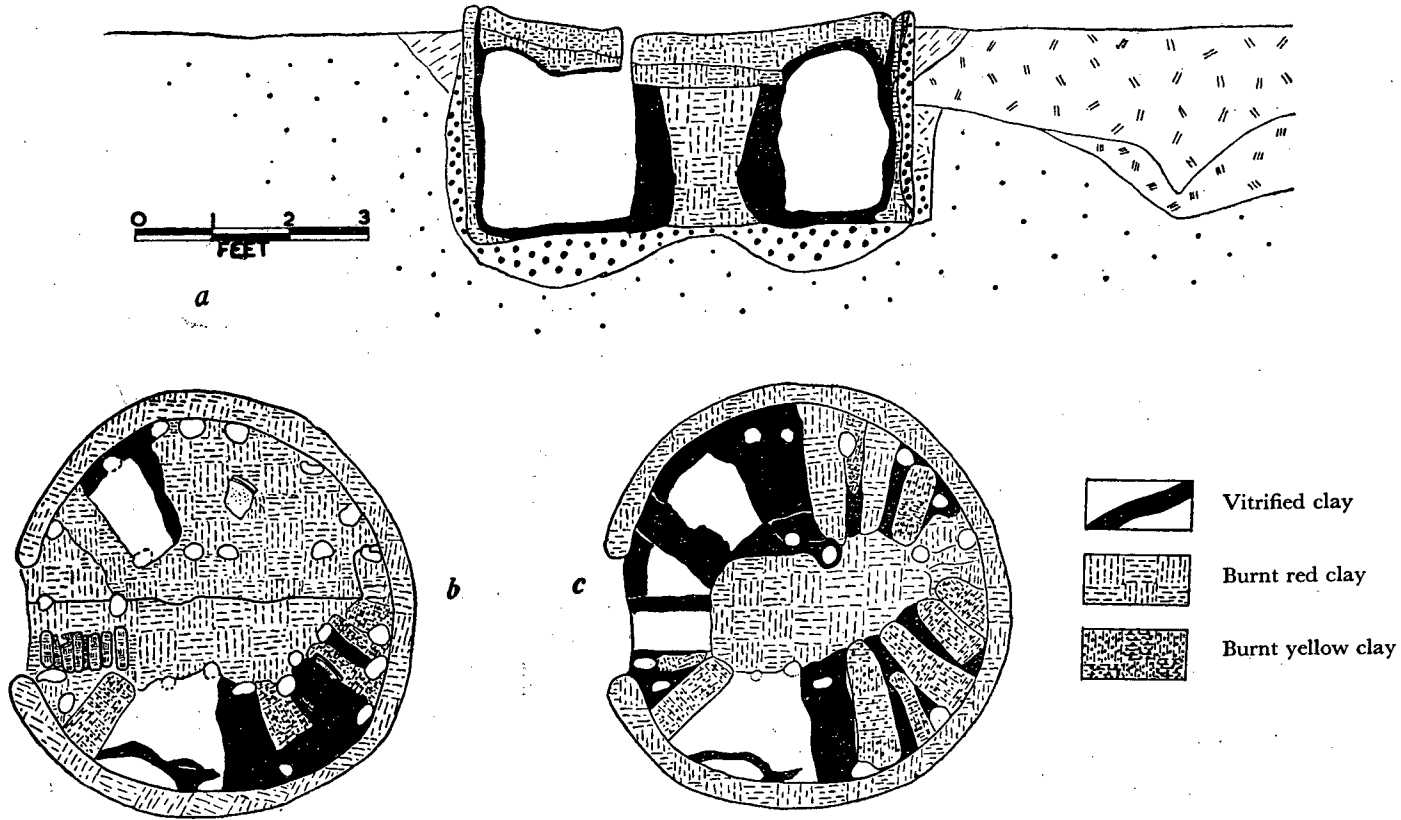


FIG. 36.—Kiln 147: *a*, Transverse section of chamber. *b*, Floor; in the upper half of the figure the upper layer has been removed; below, the second layer has been removed. *c*, Third layer completely removed, leaving pedestal, firebars and some of the vitrified lining below the bars. For rest of key, see FIG. 35, opposite.

Layer 8. Black ash mixed as was everything with sand, and representing the rakings from the furnace during the life of the kiln. This layer also contained abundant sherds.

Layer 6. A wedge of clay had been pushed in under the arch. This was followed by a much larger block of clay with some admixture of reddish kiln fragments, which sealed the mouth of the arch and covered the baffle. (This procedure was also followed in the case of kiln 22, and may represent the final sealing of the kiln to effect a reducing atmosphere).

#### THE CHAMBER

(Plates XXX and XXXI; Fig. 36)

Except for a pile of white sandy ash at the rear (Layer 11), on either side of the pedestal, the whole of the chamber below floor level was filled with a brown silt (Layer 5), completely sterile, which had no doubt filtered in through the vents in the course of time. (Kiln 22 was completely empty beneath the floor).

The technique employed in the construction of the chamber seems to have been as follows:—

A cylindrical pit was dug in the sand and gravel which constitutes the natural formation at this point (Figs. 35 and 36, *a*). This was lined with clay, built up in layers of 2 or 3 inches at a time. Very probably a 'tanning' fire was lit to dry out and harden the clay at this stage.

A tongue-shaped pedestal about 1 foot 6 inches in height and 1 foot 6 inches at its greatest width was then added, joined up to the rear wall, and projecting 3 feet 6 inches into the chamber. The kiln was then again fired.

Heavy, curved firebars, fired in another kiln, were then placed in position to bridge the gap between wall and pedestal. These bars were for the most part of un-levigated chalky boulder clay, remaining yellow after firing; others were brick-red in colour like the walls and pedestal. A series of rough tiles placed on edge took the place of firebars between pedestal and furnace arch.<sup>5</sup> Probably at this stage the undersides of the firebars were plastered with clay which shows the finger-marks of the potter. It would then be fired again.

<sup>5</sup> These do not appear in the sections as the kiln was not truly symmetrical, but may be seen in the photograph (Plate XXXI) to the left of the scale.

PLATE XXX



*a.* Kiln 147: General view showing floor in fore-ground, looking into stoke-hole. The dark patch in right-hand top corner is the entrance, in process of excavation.



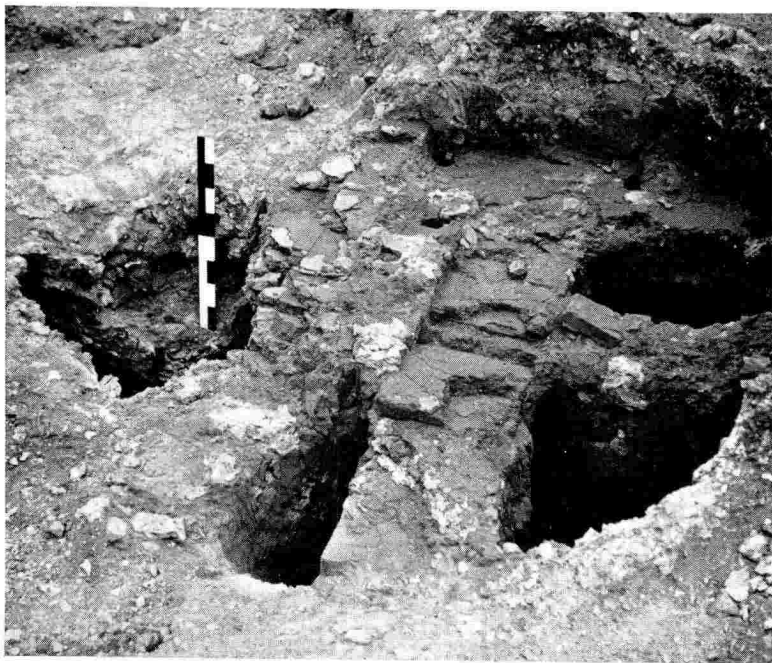
*b.* Kiln 147: View of kiln from stoke-hole. The baffle, flanked by the deeper stokers' pits, may be seen in front of the furnace arch.



PLATE XXXI



Kiln 147: The chamber floor in an advanced state of excavation, the upper two layers removed. Note tongue-shaped pedestal, firebars, and vertical tiles at furnace end of floor; sherds of mortaria built into floor.



*a*, Kiln 22: Floor of kiln showing radiating walls supporting arches. An arch joining periphery wall to radial wall may be seen on right. Note also position of vents.



*b*, Kiln 22: Furnace arch; the upper breach was made by the drag-line. The later extension can be seen forward of the scale.

PLATE XXXIII

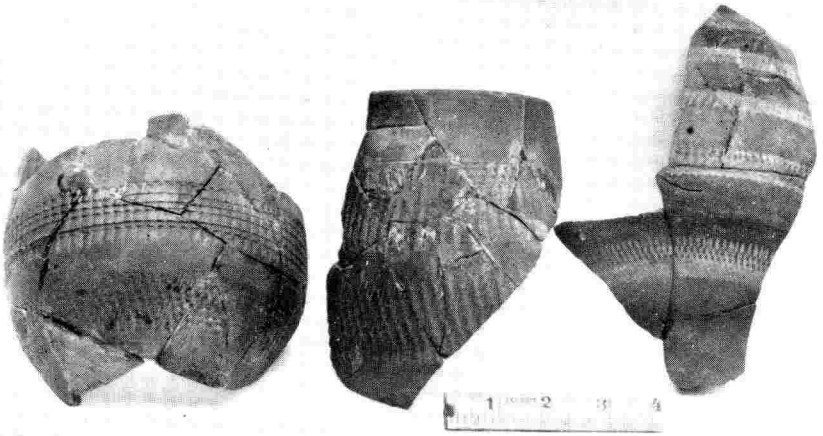


*a*, Pottery types; the lid is from kiln 22, the remainder from kiln 147.

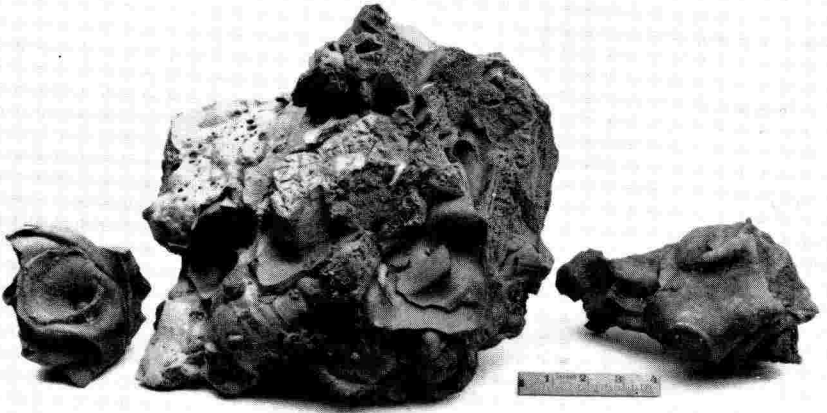


*b*, Pottery sherds from kiln 147.

PLATE XXXIV



*a*, Pottery sherds from kiln 147.



*b*, Wasters from kiln 147.

The whole was then given a coat of clay to bring the pedestal up to the level of the firebars, and the spaces between these filled in. At the same time vents were made between the firebars where they met wall and pedestal. It would appear either that the kiln had been reconstructed from time to time, or that wasters from another kiln had been incorporated. Fragments of mortaria were found let in to the pedestal and the layer immediately above it. Tiles were also used, quite indiscriminately, as in kiln 22 but to a lesser degree. One such tile bore the imprint of a paw which may be that of a cat, or possibly a puppy, indicated by the fine pricking of the claws.

Finally, a layer of clay from 3 to 4 inches in thickness was applied, the vents being continued through this.

Portions of kiln roof bearing grass-markings on both sides and indications of vents showed that the usual practice had been followed of packing the pottery with grass to prevent crushing by the clay 'crust', with additional grass on top.

#### THE FURNACE ARCH

The term furnace arch is preferred to that of flue; it is evident from examination of a number of kilns, and the experiments conducted in Calke Wood, Wattisfield, that the fire was actually located underneath the arch, whereas the term flue indicates a passage for the heated air generated by the furnace.

The arch in this case was some 2 feet 6 inches in length, 2 feet in height and 1 foot to 1 foot 6 inches in width. It was lined with clay on top and sides, but not apparently below. It was flanked by pillars of clay, and provided with a hood nearly 1 foot 6 inches in thickness. From the distinct nature of the layers, it would appear that the hood, like the floor, had been constructed in stages which showed the effects of successive firings.

The floor of the chamber, in front of the pedestal, dropped at an average angle of  $15^\circ$  until it reached the limit of the arch, when it was stepped down almost vertically for some 4 inches, then sloping to the stoke-hole at a gradient of  $20^\circ$ .

The efficiency of the kiln depended on the maintenance of a constant and steady flow of heat, and this seems to have presented a problem. It has been found by experience that the most likely form of firing was by means of faggots of brushwood, and resort to a baffle must have been a somewhat desperate measure as it would increase the difficulty of feeding the furnace. The high proportion of wasters, including one huge block of collapsed beakers fused together (Plate XXXIV, *b*) measuring approximately 1 cubic foot, and weighing  $24\frac{3}{4}$  pounds, underlines the hazards which must

have been faced, and the disappointment when much good craftsmanship failed to survive firing. On the whole, kiln 22 probably produced rather more successful work.

There is no doubt that a fierce degree of heat was generated; the pedestal was vitrified to a depth of 6 inches where it met the full blast of the furnace at front and sides, and yet a wedge of raw clay remained where it joined the rear wall.

## KILN 22

In November, 1955, drag-line operations for the removal of top-soil (Grid Ref. TL/93606925) grazed the edge of the chamber of a large kiln. Through the two resulting holes, quite small, could be seen the rather remarkable spectacle of a series of vitrified arches, perfectly clean and clear of silt. Work was immediately halted, and the matter reported to the Ipswich Museum's local field-worker, Mr. Basil Brown. Nothing could be done until the following spring, but the contractors by-passed the site in the course of their operations, and excavation was subsequently carried out by one of the present writers (N.S.) with Mr. S. E. West, then Archaeological Assistant at the Ipswich Museum, Mr. Brown and Mr. A. Mackenzie, also a member of the staff.

It is not intended here to give as full a description of the kiln as in the case of No. 147. The ground had been more disturbed over the area of the stoke-hole, but a thorough excavation was possible, and the resemblance of the two kilns and of the pottery which they were turning out renders it extremely likely that they were constructed and used by the same potters.

### THE STOKE-HOLE

This was a more regular square than was that of No. 147. The bottom was covered with a layer of black ash corresponding to Layer 8. The mouth of the furnace arch had been blocked with a very large wedge of clay (*cf.* Layer 6) which extended some 6 feet into the stoke-hole. Above this lay a deposit of black fill (*cf.* Layer 3) with two bands of stones about 4 inches in thickness, at 9 inches to 1 foot above the bottom, and again at 1 foot 6 inches or so. The black fill contained much pottery, but a large proportion of this consisted of coarse grey ware of earlier date, some being recognisably early second century. Sherds of samian were also present. The explanation would appear to be that in digging, possibly for the construction of another kiln, this ready-to-hand pit had been used for the rubbish, much of it no doubt from the earlier kilns adjacent to the site. In view of this, no analysis has been attempted of pottery from kiln 22.

## THE CHAMBER

(Plate XXXII, *a*)

So alike were the two kilns in general construction that the points of difference seem the more remarkable.

The natural ballast of the area varied from fine sand to stones of some size, and these were in greater abundance at this point. The chamber wall had therefore been strengthened by ramming in stones behind it to a width of 9 inches outside the wall.

The floor was much the same in appearance as that of No. 147, 6 feet in diameter, with a series of peripheral vents, and others arranged more centrally. These formed a different pattern, however, as instead of being arranged along the side of a median pedestal, they indicated the lines of the underlying construction now to be described.

In place of a long median pedestal, a wall projected from the rear of the chamber for about 2 feet, with four other radiating walls at intervals round the periphery, and each about 1 foot 6 inches in length, 9 inches in width and nearly 2 feet in height. These continued as arches which met centrally. The intervening spaces were bridged by curved firebars much like those used in the other kiln. Slots had been made in the chamber wall to accommodate these before the kiln was first heated. The floor incorporated a number of tiles towards the front, in this case laid flat and not on edge.

Sherds had been used in what was evidently a rebuilding of the radial walls. One of these, to the north-west of the entrance, was indeed so close to the next wall that it was probably a later addition to reinforce a weakness at this point.

## THE FURNACE ARCH

(Plate XXXII, *b*)

The arch had originally projected 2 feet beyond the chamber wall, but an additional section, 1 foot in length, had been built on later. This seems, like the baffle in No. 147, to have been an experiment calculated to improve the draught—possibly not so much the temperature as the distribution of heat.

The axis of the kiln lay almost diametrically opposed to that of No. 147, nearly 120° west of north (or roughly S.W.), so that the arch faced the direction of the prevailing wind. The baffle of No. 147 was probably intended to counteract down-draught, the added length of arch in No. 22 to increase draught.

On either side of the arch was a heavy buttress of clay, and the top of the arch was thick but not so definitely hooded as in the other kiln. Built into the arch was a perforated firebar of unusual form (Fig. 37), and a portion of another was found later.

The floor sloped at a slighter angle from the chamber, about  $10^{\circ}$  for 2 feet 6 inches, dropping almost vertically for 3 or 4 inches and continuing with a slope of  $10^{\circ}$  to the stoke-hole.

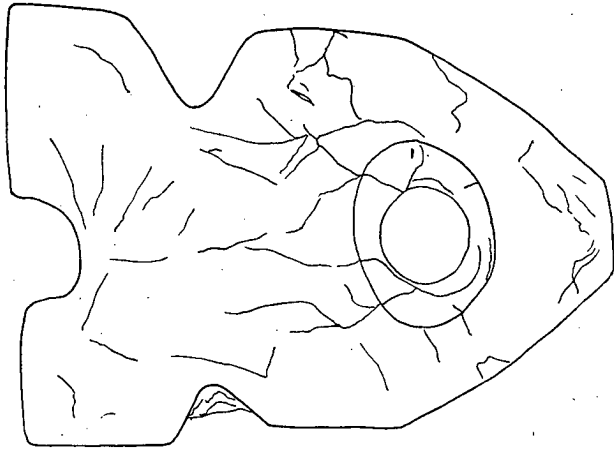


FIG. 37.—Kiln 22: Firebar of unusual form. The perforation may be intended to reduce risk of fracture in firing. ( $\frac{1}{3}$ )

## THE POTTERY

Mr. Brian Hartley, who has excavated many kilns making colour-coated ware <sup>6</sup> in the Nene valley, has kindly examined the samian and a selection of the coarse pottery and his comments have been incorporated in the following notes. He was struck by its similarity to the products of the Nene valley: Types A, B and E are all common in third century groups in this area. He remarked, however, on the relative coarseness of the Grimstone End material; the fabric is thick and sandy, the colour-coats thin and of poor quality, and extreme and patchy variation in the surface colours on most of the vessels hint at imperfect control of the kiln atmosphere during firing and also suggest random loading of the kilns instead of regular stacking.<sup>7</sup>

<sup>6</sup> Colour-coated ware is pottery which has been coated with a slip, applied as a liquid, differing in colour from the fabric of the pot, and made from more finely-levigated clay, thus producing a higher gloss.

<sup>7</sup> B. Hartley, *Notes on the Roman Pottery Industry in the Nene Valley*, Peterborough Museum Soc., Occasional Papers No. 2, (1960), p. 19.



## KILN NO. 147

The pottery found in the kiln was remarkably homogeneous, for instance there is not a single example of the grey cooking pot which is so abundant in the pits and gulleys round about. The six types described below were found in every layer including 8 and 11 (the bottom of stoke-hole and chamber respectively) whose contents were undoubtedly made in the kiln. Moreover several sherds from these two layers joined with those from other layers, especially 3 and 4 which were very rich in pottery. It is therefore virtually certain that the bulk of the material found was made in the kiln.

## A. BEAKERS

The chief product of the kiln was obviously the beaker; of some 2,300 sherds counted 5 out of 6 were vessels of this type, folded and bag-shaped in equal proportions, and all the lumps of fused wasters were composed of beakers. The fabric ranges between pink and dark grey and the slip is orange, brick red, dark brown or black; the vessels vary in height between  $4\frac{1}{2}$  and 9 inches. With the exception of seven sherds *en barbotine*<sup>8</sup> the decoration is confined to bands of rouletting on the bag-shaped beakers; the folded beakers are sometimes unadorned except for a series of girth grooves and sometimes have a band of rouletting above and below the indentations. Occasionally this is bold and clear but mostly it is of extremely poor workmanship (Plates XXXIII, *a* and XXXIV, *a*).

1. *Bag-shaped Beakers*

Fig. 38, *a*. Fabric pale orange, slip ginger shading to dark grey, rouletting weak (Layer 4).

*b* and Plate XXXIV, *a*. Fabric pale pink, slip black. This beaker was rouletted after dipping in the colour-coat, so that the pale clay shows where the teeth of the wheel have cut through the slip (Layer 4). A few examples are known from the Nene valley; only a score were found in this kiln including one from Layer 8.

*c* and Plate XXXIII, *a*. Fabric brick red, colour-coat very patchy, red, buff and dark grey; rouletting faint (Layer 8).

*i*. Pink fabric, brown slightly metallic slip with orange streaks, rouletting well defined (Layer 3).

2. *Folded Beakers*

Fig. 38, *d* and Plate XXXIII, *a*. Fabric pale orange, colour-coat ginger with blotches of red. Rouletting of good quality (Layer 8).

<sup>8</sup> Applied relief decoration.

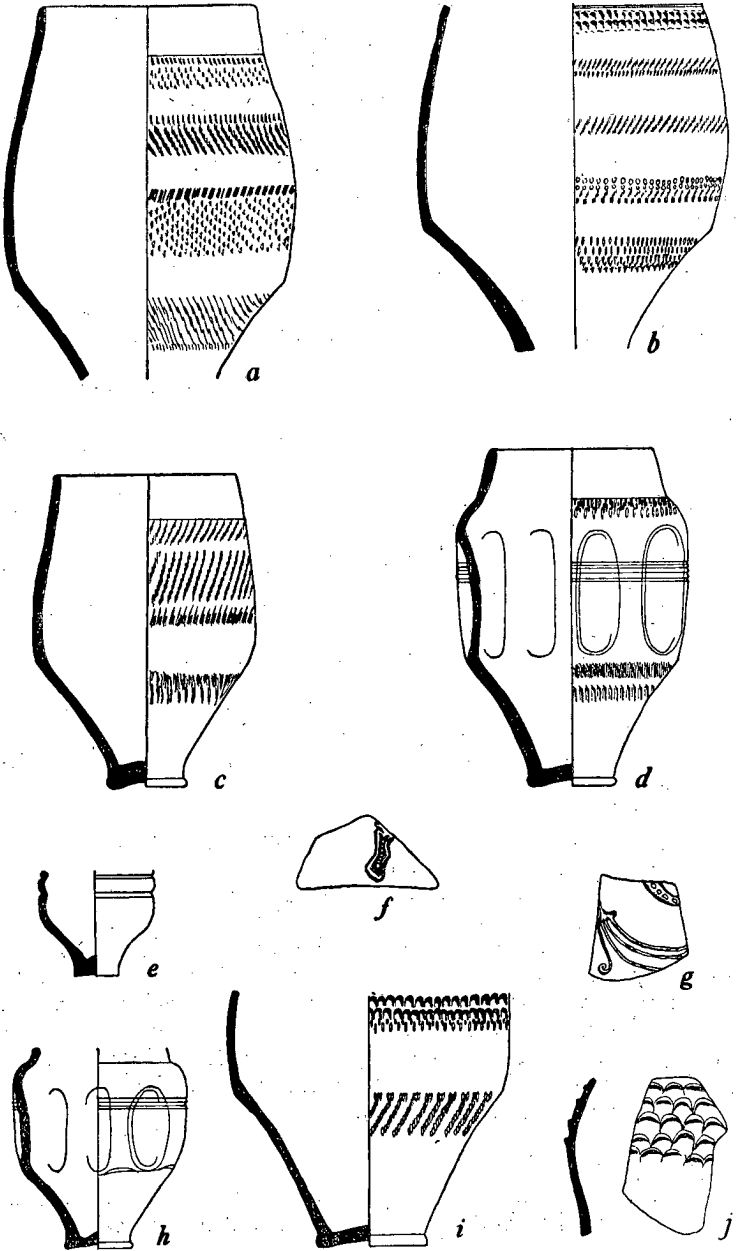


FIG. 38.—Kiln 147: Beakers. (4).

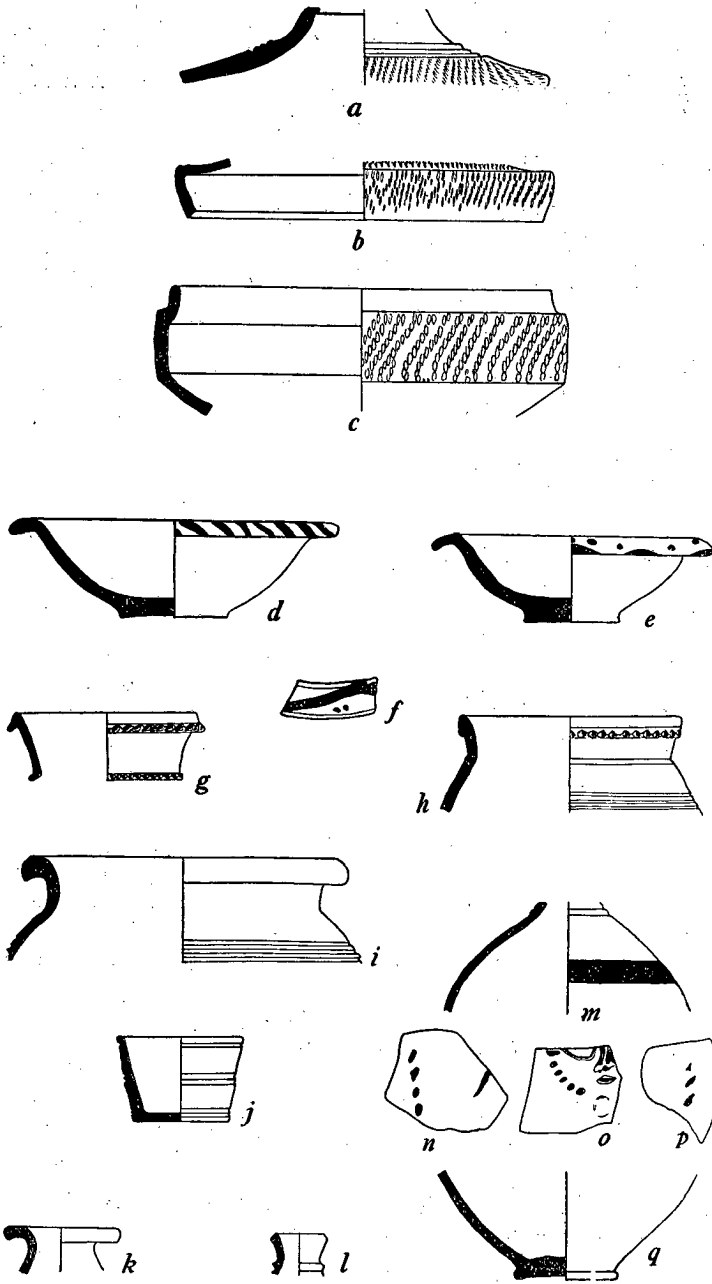


FIG. 39.—Kiln 147: Pottery. (½).

*h.* Fabric pink, colour-coat black with orange patches, plain except for two girth grooves (Layer 3).

#### B. CASTOR BOXES

Some 10 boxes and 18 lids were represented with an overall rouletted decoration. The range of colour in fabric and slip is the same as for the beakers.

Fig. 39, *a.* Upper part of lid in light brown fabric with light brown colour-coat shading to dark grey (Layer 8).

*b.* Lower part of lid in orange fabric, slip dark brown, almost black (Layer 3).

*c* and Plate XXXIII, *a.* Castor box, orange fabric, traces of dark brown slip. Waster (Layer 4).

#### C. SEGMENTAL DISHES

Dishes in pink or buff fabric with cream slip. The rims are decorated in orange or dark brown paint with simple patterns of spots and stripes. Fragments of 16 dishes were found, 3 of them in Layer 11. These are obviously copies of a form, Gillam<sup>9</sup> 299, which is now known to have been introduced by A.D. 230. At Water Newton, in the Nene valley, these dishes were fired in the same kiln as colour-coated ware, but they were in pipe clay fabric on which the red brown decoration was painted directly.

Fig. 39, *d.* Buff fabric, orange paint. Waster (Layer 3).

*e.* Pink fabric, dark brown paint (Layer 3).

*f.* Buff fabric, dark brown paint (Layer 3a).

#### D. JARS

Jars in cream fabric or buff fabric with cream slip resembling the segmental dishes; the rims are sometimes angular, sometimes decorated with nail marks which give them a frilled appearance: this is a fairly common third century type.

Fig. 39, *g.* Buff fabric, traces of cream slip. (From chamber floor).

*h.* Buff fabric, cream slip (Layer 3).

*i.* Sandy cream fabric (Layer 4).

#### E. MICA DUSTED WARE

Imitations of samian form 31 (Ludowici Sb variety) in fawn or pinkish clay heavily dusted with mica which makes it glitter in sunlight. Fragments of 26 dishes were found. Mr. Hartley states that these are commonly found in third century kiln groups in the Nene valley. Mr. Graham Webster, however, would place

<sup>9</sup>J. P. Gillam, 'Types of Roman Coarse Pottery Vessels in Northern Britain', *Archaeologia Aeliana*, vol. xxxv (1957).

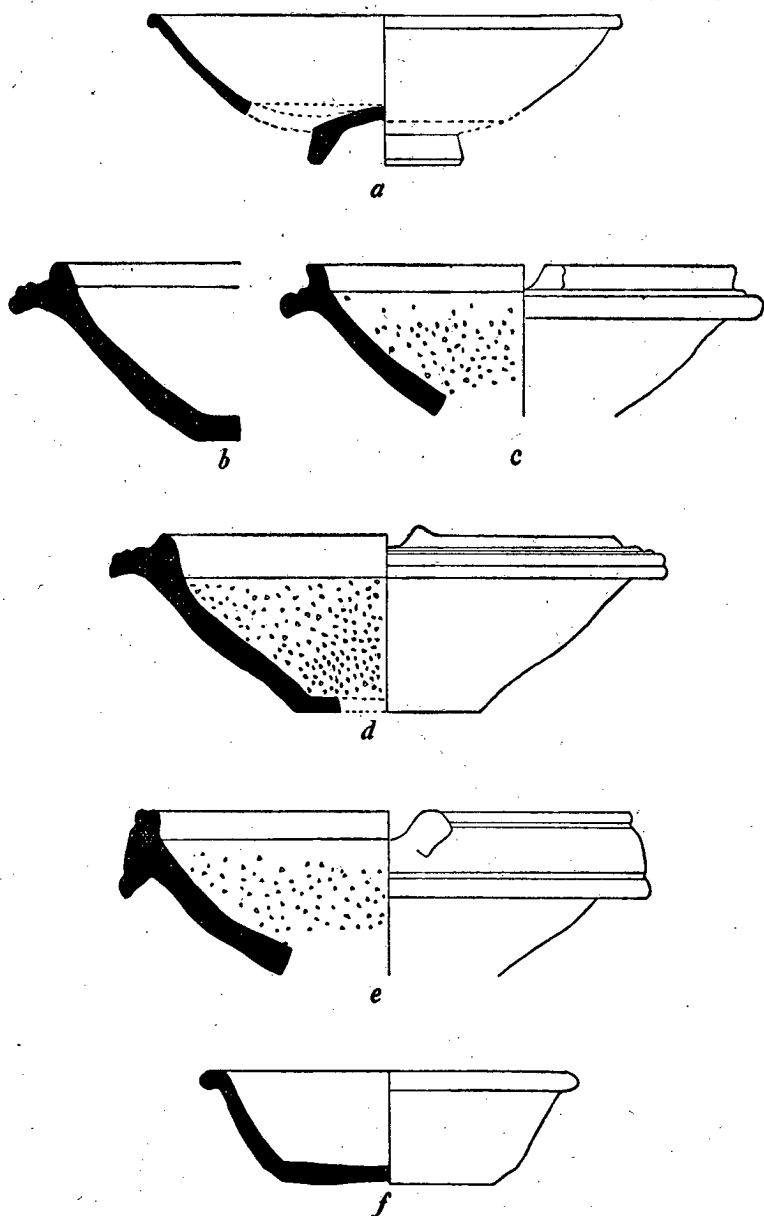


FIG. 40.—Kiln 147: Pottery. (4).

them early in the century, while for the rest of the products he would prefer a late third or even fourth century date. He was, therefore, doubtful whether they were in fact kiln products. But in view of the fact that identical ware came from both kilns and that two sherds were found in Layer 8, it seems at least possible that in this remote area forms were still being made which had gone out of fashion in the main centres of production.

Fig. 40, *a*. Pinkish buff fabric (Layers 3 and 8).

#### F. MORTARS

17 examples were found of an unusual type with reeded flange: these are perhaps derived from the Norfolk or Nene valley series<sup>10</sup> or represent a parallel tradition.

Fig. 40, *b*. Sandy grey-buff fabric, grey and white flints (Layers 3 and 8).

*c*. Sandy yellow fabric, very brittle, grey and white flints. Waster. (Built into floor of chamber).

*d*. Sandy whitish grey fabric, white and grey flints. Waster (Layers 3a, 4 and 7).

Two examples were found of near wall-sided mortars, both wasters.

*e*. Sandy yellow fabric very brittle, flints white and pale grey. Built into pedestal and partly vitrified.

Mr. Hartley would assign both types to the third century.

#### MISCELLANEOUS

Fragments were found of three small beakers with horizontally corrugated profile (*Gillam*, 94, A.D. 200-270). Mr. Hartley observes that the purplish coat, often held to be typical of New Forest products, is not unknown in the Nene valley.

Fig. 38, *e*. Fabric dark grey, slip purple, grossly overfired (Layer 3).

Seven beaker sherds were decorated *en barbotine*.

*j*. Fabric pale pink, slip black with a continuous scale pattern (Layer 3). This technique was occasionally used in the Nene valley. A similar sherd was found at Leicester where it was dated A.D. 180-230.<sup>11</sup>

*f* and Plate XXXIII, *b*. Orange fabric, traces of brown slip, leg of, presumably, a horse quite well executed (Layer 3).

*g* and Plate XXXIII, *b*. Pink fabric, dark brown slip, tendril pattern (Layer 6).

<sup>10</sup> D. Atkinson, 'Roman Pottery from Caistor-next-Norwich', *Norfolk Archaeology*, vol. xxvi, part ii, R. 34-44, and Hartley, *Notes*, Fig. 3, 10.

<sup>11</sup> K. Kenyon, *Jewry Wall Site, Leicester* (1948), Fig. 32, 22.

Only in these three, and four other minute fragments, was the barbotine technique used and they all came from the deliberate infilling of the kiln after abandonment, which may well have contained some alien, and possibly earlier, material.

Fig. 39, *j*. Small cylindrical jar in white fabric similar to type D. Mr. Webster suggests that it may be an imitation of an ivory dice box (Layers 3 and 4).

*k*. Flagon neck in white clay with traces of black slip (Layer 6).

*l*. Flagon neck in dark grey ware with purple slip similar to Fig. 38, *e*. (From chamber floor).

*m—q*. Five portions of what was probably one flagon came from Layer 3. The clay is pinkish buff, with a cream slip, a band of red paint  $\frac{1}{2}$ -inch wide on the shoulder. A body sherd bore part of a mask with the eyes, nose, mouth and chin in relief and a line of dots in red paint running from chin to temple (Fig. 39, *o* and Plate XXXIII, *b*). Two other sherds had similar lines of dots in red (Fig. 39, *p*) and brown (*n*). Similar flagons were made in the Nene valley with moulded masks and details added in paint; a mould for making them was found at Stibbington (Hartley, p. 20, and Fig. 4, 15).

It cannot be determined whether these vessels were made in the kiln.

#### *Black Burnished Ware*

Fig. 40, *f*. Three fragments of an imitation black burnished dish were found at the bottom of Layer 3 (Gillam, 225, *c*. A.D. 190–240), and Mr. Hartley quotes a piece exactly similar from a mid third century deposit at Bainbridge in Yorkshire. As this was the only example of black burnished ware it was almost certainly not made in the kiln.

#### *Samian*

One fragment of form 33 and two substantial pieces from cups of form 46 are all apparently Central Gaulish and late second century. They are perhaps likely to be residual but it would not have been impossible for them to have survived in use into the third century.

#### KILN NO. 22

The stoke-hole contained, in addition to colour-coated beakers, a high proportion of grey cooking pots and samian, and at least two types, a poppy-headed and a rough-cast beaker, which had gone out of use before colour-coated ware went into production.

The contents of the stoke-hole have, therefore, been regarded as contaminated by material lying on the surface and have been ignored in this survey. The pottery from the extreme bottom of the stoke-hole, the kiln chamber and under the furnace arch was virtually indistinguishable from that found in kiln 147.

#### A. BEAKERS

These were again the main product. On the whole the quality is slightly higher, the paste is harder though the colouring is still uneven in the extreme.

##### 1. *Bag-shaped Beakers*

Fig. 41, *a*. Fabric pink, slip black, blotched with orange. Waster.

##### 2. *Folded Beakers*

*e*. Orange fabric, orange slip blotched with black, fairly distinct lines of rouletting.

*f*. Brick red paste, faint traces of orange slip, unadorned except for 5 girth grooves.

Particles of sand were fused to the surface of all three beakers.

#### B. CASTOR BOXES

Fig. 41, *b*. Lid in red brick clay with somewhat darker slip, rouletting indistinct.

*c*. Box in buff clay with dark slip. This is unusual in having no decoration.

No examples of Type C, the segmental dishes, were found in this kiln.

#### D. JARS

Fig. 41, *d*. Cream fabric with nail impressions just below the rim and scribble mark on the neck.

#### E. MICA DUSTED WARE

Fig. 41, *h*. Pink fabric; imitation of form 31.

*i*. Pink fabric; imitation of form 33.

#### F. MORTARS

Fig. 41, *j*. Hard pinkish buff ware, harder and of better quality than the mortars from kiln 147. The type is dated late second/early third century.<sup>12</sup>

<sup>12</sup> M. R. Hull, *Roman Colchester*, Fig. 123, 498.



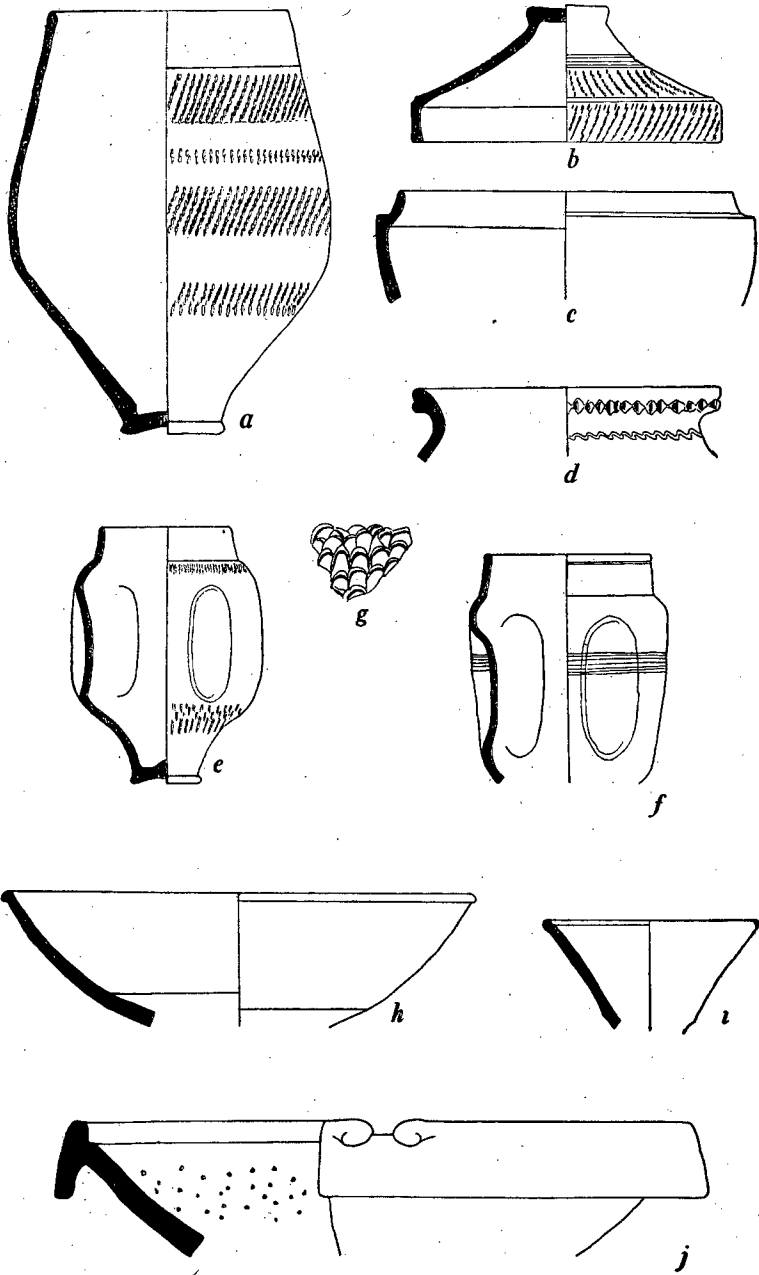


FIG. 41.—Kiln 22: Pottery. (†).

## MISCELLANEOUS

Fig. 41, *g*. Only one sherd was found with any form of decoration other than rouletting. This was a small sherd, with a scale pattern similar to Fig. 38, *j*. It was warped and had acquired a greenish tinge as had all the pottery found in the bottom layer of the chamber.

## DATE OF POTTERY FROM KILNS

The almost complete restriction of decoration to rather coarse rouletting is interesting. Mr. Hartley thinks it may be significant chronologically. In the Nene valley general use of rouletting on such forms as the bag-shaped beaker seems to be characteristic of the mid and late third century, though it would perhaps be unwise to press the chronological implications of the decoration too far as the use of such a simple technique might recommend itself to potters who were not sufficiently accomplished to make use of more sophisticated decoration.

On the whole, the forms of the colour-coated ware suggest to him a date of manufacture within the range A.D. 190–280. If the use of rouletted decoration is to be taken into account, then the date range could probably be narrowed to *c.* A.D. 220–270. As has been seen the mortars and the black burnished bowl are also third century types.

## SPECTROGRAPHIC ANALYSIS

Mrs. E. E. Richards of the Oxford Laboratory for Research in Archaeology has kindly examined samples from the colour-coated ware and mortars as part of the general work being done on vessels of these classes found on kiln-sites.

The results, expressed as percentages of elements (their oxides), are:

Reference no.	Na <sub>2</sub> O	MgO	MnO	TiO <sub>2</sub>	CaO	FeO	K <sub>2</sub> O
<i>Colour-coated Ware</i>							
37	0.20	1.12	0.023	0.84	2.9	6.1	2.25
38	0.20	1.07	0.024	0.76	2.5	5.0	1.95
39	0.19	1.38	0.028	0.94	1.9	6.8	2.33
40	0.21	1.22	0.033	0.94	2.1	6.5	2.05
<i>Mortars</i>							
274	0.13	0.77	0.025	0.42	4.3		
275	0.08	0.64	0.024	0.48	6.6		
276	0.16	0.60	0.045	0.47	5.8		

These results are typical of all the material so far analysed from East Anglia and Kent,<sup>13</sup> especially in the high calcium content, and each group is internally consistent. Visual inspection suggests that different clays were used for the colour-coated ware and mortars and the analyses appear to confirm this. There is, of course, no reason why the same kiln should not have been used for firing both.

### OTHER FINDS

From Layer 3 in kiln 147 came an iron blade with long twisted handle, possibly one half of a pair of shears. The blade was unfortunately in too delicate a condition for complete preservation; the disintegrated portion is represented by the dotted line (Fig. 42).

An iron fragment, possibly part of a knife, and several iron nails also came from this layer.

No finds other than pottery came from kiln 22.



FIG. 42.—Kiln 147: Iron object. (†).

### ARCHAEOMAGNETISM

Kiln 22, described by R. M. Cook and J. C. Belshé<sup>14</sup> as 'the best preserved kiln that had yet been available', was sampled by those writers and by Prof. E. Thellier of the University of Paris. Samples were also examined by Dr. M. J. Aitken of Oxford University. The results were published in the above paper under the code numbers AF and AGA. A revised assessment has been prepared by Mr. Graham Connah, Mr. Cook's assistant in the

<sup>13</sup> K. F. Hartley and E. E. Richards, *Archaeometry*, II, pp. 21-31. E. E. Richards and K. F. Hartley, *Nature*, 185, No. 4707 (1960), pp. 194-6.

<sup>14</sup> 'Archaeomagnetism: A Preliminary Report on Britain', *Antiquity*, xxxii (1958), p. 172.

Museum of Classical Archaeology of Cambridge University, as follows:—

	<i>Declination</i>	<i>Inclination</i>
Paris	3° 7' W.	65° 38'
Oxford	1° 14' W.	65° 5'
Cambridge	1° 7' W.	65° 34'

As will be noted from the paper by Cook and Belshé, a tentative archaeological dating had been given at the time of their visit of A.D. 160–200. This was later adjusted to A.D. 230, and in the light of the comparison with Kiln 147 given above, the date is likely to be later still.

Connah remarks:—‘The results obtained by the three different centres present a significant coincidence. The direction of the field in this kiln would suggest a date in general agreement with that indicated by the archaeological evidence. A 3rd century date, perhaps an early 3rd century date, seems likely.’

Samples from Kiln 147 were taken by G. Connah and recorded under the code numbers DY (taken July 26th, 1960) and EF (taken October 7th, 1960). They are as follows:—

	<i>Declination</i>	<i>Inclination</i>
DY	3° 3' E.	63° 44'
EF	1° 49' E.	63° 37'

Of DY, Connah remarks:—‘This result is quite good. It would agree well with the suggested archaeological date.’

EF. Similarly, these results are quite good and agree with the suggested dating. The actual mean direction compares closely with DY.’

### SUMMARY AND CONCLUSIONS

Since the discovery in 1948 of the disturbed remains of one or more Romano-British pottery kilns of the pedestal type, evidence largely produced as the result of quarrying operations has shown that the Grimstone End site was occupied by potters in Roman times; Anglo-Saxon loom-weights were later also produced here; the presence of clay close at hand is shown on the Ordnance Survey map Suffolk (West) Sheet XXXIV S.W. (TL/93406930).

The present paper deals with two kilns, making colour-coated ware similar to that produced by the Nene valley kilns and, allowing for the different geological conditions and materials available, of not dissimilar structure. The pottery consisted for the most part of beakers, bag-shaped and indented, with and without rouletting, Castor boxes and mortars. The number of burials found near the

kilns, and the fact that most of these seem to have been enclosed in coffins, points to a continuous and prosperous occupation. There must have been good reason, possibly to be found in the extent of the settlements nearer the river and at Ixworth, and the villa site excavated in 1848<sup>15</sup> and 1948,<sup>16</sup> for the nature of the ground presented many difficulties, attempts to overcome which are evident in the constructional features of both kilns.

### ACKNOWLEDGMENTS

Thanks are due to the Contractors, Messrs. Allen Newport, Ltd., who readily allowed excavation of the kilns, and to Mr. R. Curry, whose skill in the operation of the drag-line reduced damage to a minimum, and whose interest has so frequently resulted in the making of new finds, to Mr. R. Godwin, who farms the land and has been most co-operative and helpful, and to the Ancient Monuments Inspectorate of the Ministry of Works, who made it financially possible to carry out the excavation. Acknowledgments are also due to our colleague, Mr. Basil Brown, who has for many years been responsible for maintaining a record of the various finds at Grimstone End, and who also took part in the work of excavation.

For a critical examination of the pottery we are greatly indebted to Mr. Brian Hartley of the University of Leeds; much of the comment included in our notes on the pottery is due to him. Mr. Graham Webster has also seen the material and has made a number of useful suggestions. Spectrographic analysis of specimens of the pottery was carried out by Mrs. E. E. Richards, and samples for dating by archaeomagnetism were examined by the Department of Geodesy and Geophysics of the University of Cambridge. Photographs of the pottery were prepared by Mr. F. W. Simpson and much is owing to Mrs. H. B. Miller for her help in preparing this paper for publication.

<sup>15</sup> *Proc. Suff. Inst. Arch.*, vol. 1, pp. 77-8.

<sup>16</sup> *Ibid.*, vol. xxv, p. 213.