

ART. VIII.—*Excavation of the Roman auxiliary tilery, Brompton.* By ROBERT HOGG, B.Sc., F.M.A.

Read at Carlisle, July 11th, 1964.

Introduction.

THE Roman auxiliary tilery which is the subject of this report was discovered completely by chance in May 1963 during surface levelling work for an extension to the recreation grounds of Irthing Valley School, Brompton. (Nat. Grid Ref.: NY 524613).

The surviving remains of the kilns were concealed by a thin soil layer which had been deep enough to put them beyond the reach of ordinary ploughing. The mechanical digger, however, employed in the levelling work dug deeply into the structures and might indeed have swept the greater part of them away in the mounds of earth which were being moved had not the presence of the kilns been revealed in a rather dramatic manner.

About a month after work on the site had started, the mechanical shovel broke through the oven floor of kiln no. 1 on which it had been standing and its tracks became embedded in the furnace chamber. News of the discovery was conveyed to our Chairman of Council, Miss K. S. Hodgson, and with the kind co-operation of the contractors, work on the restricted area of the discovery was stopped and permission was given for such examination of the structures which would be possible in the few days available for the work.

Groups of volunteer diggers were hurriedly marshalled by Miss Hodgson and Mr R. L. Bellhouse, and, working within the limits of their leisure-time, they endeavoured to recover such structural evidence as they could in the short time available.

The writer visited the site on 13 May and quickly appreciated that unless considerably greater facilities and

a longer time-schedule were made available the greater part of the evidence from this rare discovery would be lost. On his return to Carlisle he contacted Mr G. S. Bessey, the Director of Education for Cumberland, and explained the position to him. At Mr Bessey's suggestion a meeting of all parties concerned was arranged on the site, at which there were present: Mr W. Jackson, Chairman, Cumberland Education Committee, Mr G. S. Bessey, Director of Education, and specialist members of his staff: the sub-contractor, Mr S. Gibson, Mr J. D. Grey, Headmaster of the School, Miss Dorothy Charlesworth, Ministry of Works, Miss K. S. Hodgson, and the writer.

As a result of this meeting it was agreed by the County Authority to cease work temporarily on the site and to transfer the contractor's equipment to another site in S. Cumberland also scheduled for levelling, and that an emergency grant be made by the Ministry to the writer to carry out a systematic excavation over a period of one month.

The excavation took place from 20 May to 14 June, but surveying and measuring took a further three weeks. For the first three weeks four workmen were employed and for the fourth week three, but this labour force was effectively augmented by volunteer helpers, who, working for most part during the evenings under the watchful eye of Miss Hodgson, defined and cleaned the structures which had been excavated during the day.

One further requirement was imperative for the successful prosecution of the work. The site was composed of impervious clay and became water-logged within minutes of the start of rain. When the excavation began, the site was actually standing in water, but from the first day the weather cleared and for the following three weeks the excavation was conducted in brilliant sunshine. The photographs illustrating this report could not have been taken in the form they present but for this exceptional stroke of good fortune.

The site.

The Irthing Valley School is situated on the west side of the town of Brampton and on the west side of the Brampton—Longtown road. The kiln site (NY 524613) lies on the west side of the school on an area of heavy clay ground of fairly low relief which is bounded on the west and south sides by the Brampton Beck, a tributary of the River Irthing, which here forms a scarp slope some 30 ft. high.

Three-quarters of a mile to the north can be seen the wooded valley of the River Irthing with its north bank forming a prominent escarpment on which is the site of the Hadrianic frontier works. A half-mile to the east stands the prominent Mote Hill which is the termination of a long ridge of bedded sands, part of the great complex of glacial deposits lying to the east of Brampton. To the south and west the outlook is relatively flat.

As indicated the site lies on the western fringe of the Brampton Kame Belt, an area stretching some ten miles from north to south and four miles from east to west. The deposits consist for most part of bedded sands and gravels laid down in melt waters from the retreating glaciers, impounded as a temporary lake. The lake-bottom deposits consist of laminated clay suitable for brick and tile manufacture, but the outcrops of these clays are very local, due to their concealment beneath the later boulder-clay deposits of the final glacial phase — the Scottish Re-advance Glaciation.¹

Laminated clays are exposed in the valley of the River Irthing and the early detection and exploitation of these extremely local deposits at the Brampton kiln site by the Roman military personnel is worthy of note.

The map (Fig. 1) shows the relation of the tilery site to the frontier works. In this sector the dominant topographical feature is the River Irthing and both the

¹ *Geology of the Brampton District* 149; Trotter, *Glaciation of Eastern Edenside*, 580.

Flavian and Hadrianic works are sited in relation to it, but in fundamentally different ways. The isolated Stanegate forts lie on the south bank of the river and make the fullest use of the river as a protection for their northern sides. The Hadrianic works, however, lie on the opposite bank cresting the high escarpment, a position offering maximum advantage for surveillance which was the Wall's primary purpose.

The position of the kiln site lying on the south bank of the river, three-quarters of a mile to the east of the Stanegate fort of Old Church, Brampton, should be noted.

At the east end of the low boulder-clay ridge which lies between the fort and the kiln site is the Dark-Age site of Old Brampton which has produced late Roman remains.

When the excavation of the tilery began on 20 May, the site was already partially levelled due to work which had been carried out by the contractor during the previous month. Much of the site topography had thus been destroyed but its character is indicated by the contour survey (Fig. 2) prepared before levelling work began.

The site of the tilery will be seen to be situated on the top of a low lobe of out-wash material and the orientations of the kilns conform to the slope of the ground, i.e. in every case the stokehole faces down the slope, and thus for economy of labour the excavation for the stoking-pit was made into the slope. This was standard practice in kiln construction.

The proton magnetometer survey.

A proton magnetometer survey was carried out in the field (no. 643) to the west of the area containing the tilery by personnel from the Research Laboratory for Archaeology and the History of Art, Oxford. A strip of ground 300 ft. long and 100 ft. wide was surveyed, and the

ROMAN AUXILIARY TILERY, BRAMPTON: 1963. THE RELATION TO THE FRONTIER WORKS.

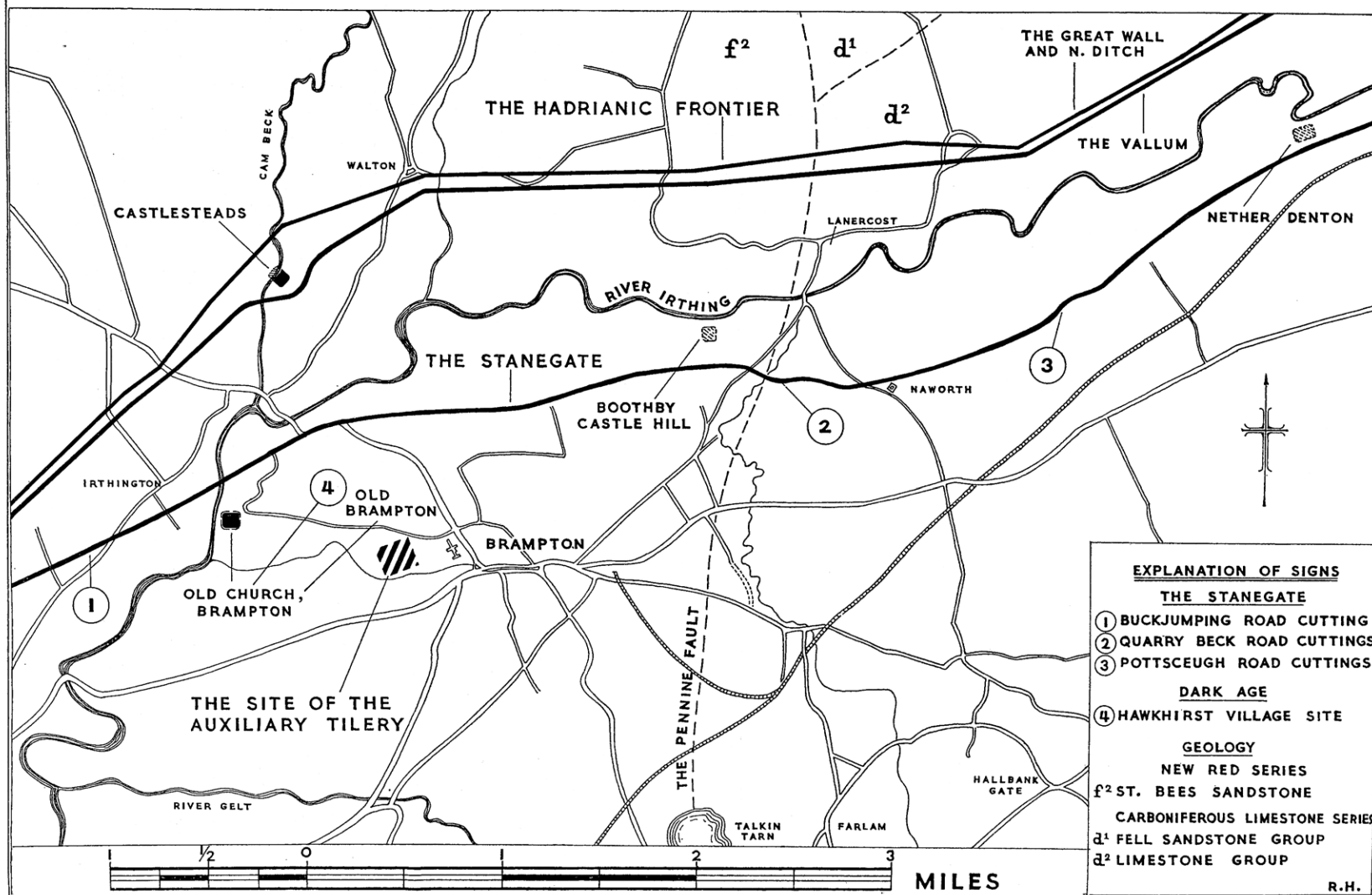


FIG. 1.—Map showing the relation of the tiler to the Roman frontier works.

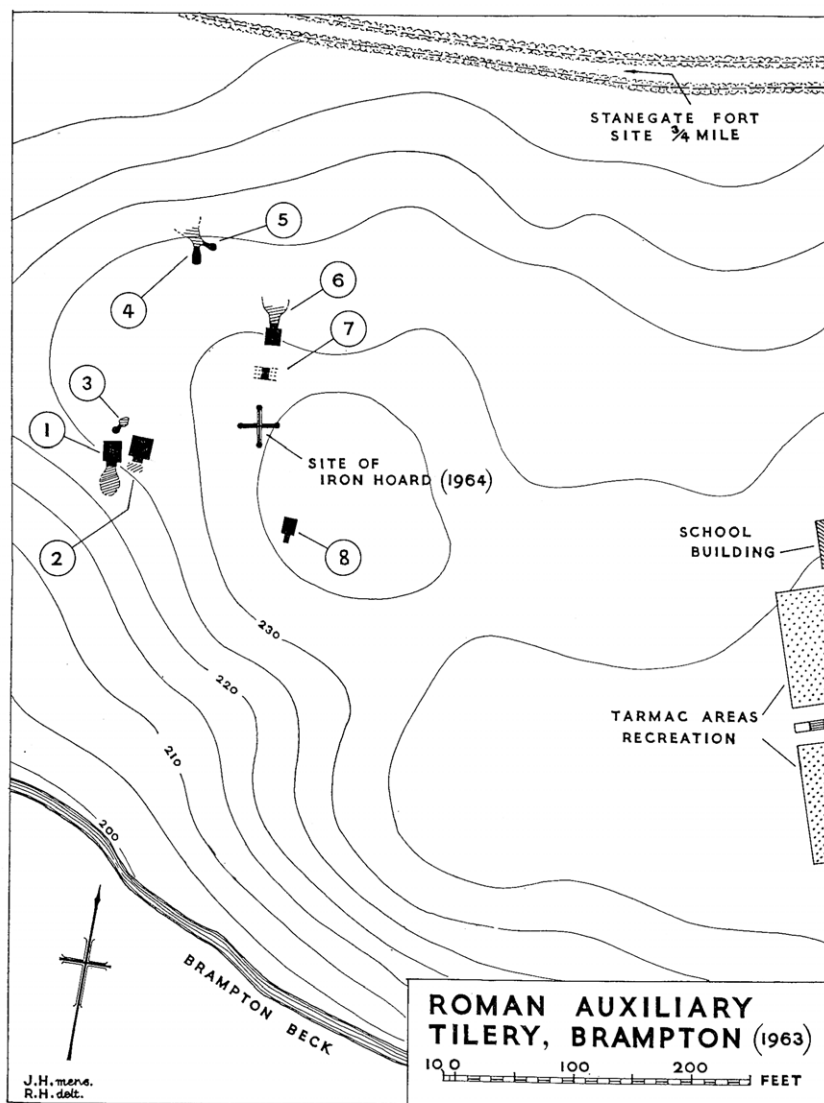


FIG. 2.—Plan of the site showing the distribution of the kilns.

results established quite conclusively that it contained no additional tile kilns.²

Twenty-one samples of the cross walls from several of the kilns were taken by the same laboratory personnel for archaeo-magnetic research in connection with magnetic dating, and the results of the measurements made have now been published.³

Structural details of the kilns.

In all, eight kilns were examined varying in their state of completeness from kilns nos. 1 and 2, the best preserved structures, in which the furnace chamber and part of the oven survived, to kiln no. 8 in which only the floor of the furnace was recovered. The eight kilns are numbered in order from the south-west corner of the site, there being some indication that this sequence was probably the chronological order in which the kilns were constructed, beginning with no. 1 the earliest.

Kiln no. 1.

In the free standing arches which formed the roof support of the furnace, kiln no. 1 provided a structural type which was not only unique on the site but has not been described before from Britain.

It was situated at the extreme western limits of the site, aligned N/S with its stokehole facing south. To the south of the kiln the ground sloped rapidly downwards some 20-30 ft. to Brampton Beck and the stokehole pit, the outer limits of which approached this slope, may indeed have made use of it in providing an access to the pit.

There were no surface indications of this, or indeed of any of the kilns, its discovery, the first to be made on the site, occurring in the dramatic manner described above (p. 133).

² Information from Dr M. J. Aitken.

³ *Archaeometry* vi (1963) 76 ff.

The kiln, Plate I, was of rectangular form, the overall dimensions of the oven chamber being some 15 ft. long by 14 ft. 6 in. broad. The fire tunnel projected 4 ft. 6 in. beyond the south face and opened into a stokehole pit which was traced southwards for 24 ft. of its length (Fig. 3).

As found, the entire furnace chamber, most of the oven floor and the foundation walls of the oven were intact, but no trace of the oven superstructure was discovered (Plate I).

The furnace chamber was essentially a rectangular pit, excavated in the compact laminated clay, some 11 ft. 6 in. long, 11 ft. broad and 8 ft. deep from the existing surface. The north and east walls of the chamber consisted merely of the clay sides of the original pit now hardened by heat, but the west wall was faced with rather roughly coursed red sandstone ashlar one stone thick, probably constructed to overcome a weakness on this side caused by the occurrence of a bed of loamy sand at a depth of two feet beneath the surface. This stonework showed only slight traces of the effects of heat.

Built against the east wall was a series of stone pilasters some 10 in. square, roughly constructed of sandstone slabs some $1\frac{1}{2}$ in. thick, bound and in part faced with clay. There were four such columns placed at intervals of about a foot apart. Their function was essentially structural, i.e. as supports for the sandstone slabs of the furnace roof, but it has been suggested that such structures helped to increase the turbulence of the hot gases within the furnace and thus produced a more even distribution of the heat.

The south wall was constructed in the same manner as the east but it was, of course, pierced by the fire tunnel. To the east of the tunnel there were two pilasters, one in the south-east corner of the chamber and the other midway between this and the fire-tunnel arch. The space between these structures was here, however, packed with

clay, flush with the outer faces of the pilasters. The same type of clay packing was also found between the projecting columns on the west side of the fire-tunnel, but here the clay packing extended to fill the space between the south wall and the lateral pillar associated with the first free standing cross-arch (Fig. 3, b). The function of the clay appears to have been to control the heat-flow, i.e. by eliminating possible "cold spots" in the chamber, and in forming channelled spaces for the passage of the heat.

The arches supporting the roof of the furnace (Plate II, b) were of a type unique in kilns described from Britain. There were four free standing semicircular arches some 30 in. internal and 50 in. external diameter. They were some 11 in. thick and placed at intervals of about 15 in. apart. They spanned the central axis of the furnace and were therefore aligned with the fire tunnel. The voussoirs of the arches were composed of roughly dressed yellow sandstone which had been burnt a bluish-grey colour to a depth of $\frac{1}{8}$ in. The clay binding of the stonework, too, had been hardened by heat.

At either side of each arch was a sandstone column, some 9 in. square in section and formed of sandstone slabs. Each pair of columns was connected to the corresponding arch by means of cross-slabs as shown in the diagram (Fig. 3, c). The whole construction was, however, very roughly built and lacked both precision and symmetry.

The floor of the furnace chamber was constructed in a manner apparently designed to assist the circulation of the hot gases issuing from the fire tunnel. The clay floor of the original pit, after the construction of the free-standing arches and lateral columns, had been paved with sandstone slabs which were continuous with the floor of the fire tunnel. The floor area beneath the arches had then been raised 11 in., by means of a spread of compact clay, which, by reducing the opening of the

arch, would have acted as a buffer to the direct flow of hot gases from the fire tunnel. By this means the gas currents would be diverted laterally and heat forced into the extremities of the chamber.

The roof of the furnace chamber was some 14 in. thick and was constructed of sandstone slabs some 4 in. thick, over which was a spread of puddled clay, the whole supported by the arches, columns and side walls of the chamber.

The sandstone roof slabs were drilled to form the vent-holes, and these perforations were continued through the clay layer to communicate with the oven chamber. The vent-holes (Plate II, a) averaged about 3 in. in diameter and were disposed in transverse rows corresponding in position to the intervals between the underlying arches. There was, however, a lack of regularity about the arrangement, the precise position of the holes being determined largely by the convenience with which the sandstone roofing-slabs could be drilled. Furthermore, they were completely absent from the south end of the oven floor.

Of the oven superstructure nothing remained except the foundation walls which were constructed of sandstone, regularly faced on the inside with ashlar, less regularly on the outer face which would, of course, be embedded in the clay backing. The core consisted of sandstone brash.

The fire tunnel (Plate III) was a well constructed passage 27 in. broad by 36 in. high, faced on either side with sandstone ashlar. The roof arch was of flattish shape and was for most part in a collapsed condition, due almost certainly to the weight of post-Roman deposits above the buried kiln. The central axis of the fire tunnel was roughly aligned with that of the furnace arches, being in fact displaced about 12 in. to the west. The passage projected some 5 ft. beyond the south face of the kiln into the stokehole pit. The side walls of this extension

were splayed outwards to give a maximum width of 32 in. at the end of the passage; furthermore, only the lower 2 ft. of the extension passage were vertical, above this level the walls were slightly inclined outwards. At a point 41 in. from the tunnel entrance, the walls of the extension passage were recessed to a depth of 9 in. and the passage continued for a further 2 ft. at this width.

The stonework of the fire tunnel showed signs of burning, and this effect extended on to the walls of the extension passage but was here confined to the first 2 ft. of the lower courses.

When excavated the fire tunnel was tightly packed with stone and tile debris set in clay, which had obviously been placed there after the last firing of the kiln to prevent the too rapid loss of heat during the cooling process.

On the south side of the kiln, opening out from the fire tunnel, was a great pit — the stokehole or stoking pit, the floor of which was continuous with that of the fire tunnel, and which when found was completely concealed by filling material. The pit was completely excavated in the region of the fire tunnel and sectioned both transversely and longitudinally for 24 ft. of its length. The transverse section, made 10 ft. from the stokehole, showed the sides sloping at some 30° to the horizontal. The longitudinal section was not completed, owing to the disturbed nature of the ground at its outer limits, and indeed the southern side, where it coincided with the slope of the ground down to Brampton Beck may have been open.

The filling of the pit showed at the base a spread of wood ash 1 or 2 in. thick. Near the stokehole was a mass of burnt clay, probably representing debris from fallen oven superstructure, but the upper 3 ft. of filling consisted of dark brown soil and cobble tip.

One small significant object was found associated with kiln no. 1 — a terracotta lamp, stamped with the maker's name FORTIS, (*et seq.*, p. 160, Plate X, a). The

lamp was found lying immediately to the west of the fire-tunnel entrance, just above a thin layer of black ash within the stoking pit, i.e. it had apparently been used immediately after the flue had been cleaned. The most logical explanation of its purpose is that it was an inspection lamp used for the examination of the dark interior of the fire tunnel and combustion chamber after the first or very early firing. This suggests that something was at fault, the partial collapse of the tunnel or the improper firing of the combustion chamber. In any case the slight degree of burning shown by structures within the combustion chamber prove that kiln no. 1 was abandoned after very short service.

The history of kiln no. 1.

There were six rectangular kilns found on the site, all except no. 1 were of Grime's type 3.⁴ The unique design of kiln no. 1, its early abandonment, its position on the western limits of the site, suggest that it was the first kiln to be constructed, built to an extremely rare and apparently faulty design which was later abandoned in favour of structures of more conventional type.

Kiln no. 2.

Kiln no. 2 was situated to the east of and immediately adjacent to kiln no. 1 with which it was directly aligned and oriented (Plate IV). It was a rectangular kiln of Grime's type 3 (Plate V, a) and not only had the greater part of the furnace and oven floor survived but there was also standing in places three courses of masonry of the walls of the oven superstructure. The internal dimensions of the oven were 10 ft. 3 in. long by 9 ft. 6 in. broad, and therefore the chamber corresponded closely in size with the effective area of the oven of kiln no. 1.

The furnace chamber measured 9 ft. 10 in. square and it had a depth of 4 ft. 9 in. It differed from the

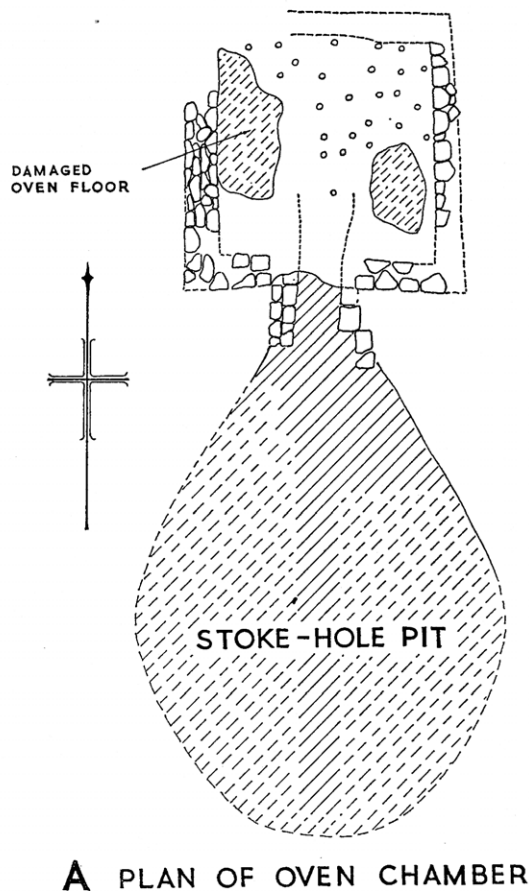
⁴ Holt Report, p. 58.

furnace of kiln no. 1 in two marked ways: in the structure of the roof-supports and in the more intense heat effects shown by structures within the chamber.

The inner walls of the furnace were completely lined with sandstone slabs laid end on, but were almost entirely concealed by the cross walls forming the roof-supports and the lateral flues lying between them (Plate V, b). The main flue was 33 in. wide and extended along the central axis of the furnace from the fire tunnel with which it was continuous to the rear wall of the chamber. The floor of this flue was paved but it was obscured by fallen roof debris and the seepage of water, the removal of which presented too big a problem for the resources of the project to attempt to clear. The vertical side walls of the main flue were 31 in. high and actually formed the inner sides of a pair of lateral platforms which supported the cross walls. There were six of these cross walls, each some 11 in. thick and spaced some 8 in. apart and they were carried over the main flue by means of corbelled arches (Fig. 4). They were constructed of sandstone slabs set in clay and faced in part with a clay rendering. The 8-in. intervals between the cross walls formed the side flues, the inclined floors of which formed of a packing of sandstone over which was a 2-in. spread of clay, sloped upwards from the base of the cross wall at the point of entry from the main flue to a point just beneath the furnace roof.

The furnace roof was formed of three structural layers. Resting immediately on the cross wall and therefore spanning the lateral flues was a layer of sandstone slabs. The slabs were each some 15 in. square and were notched at the middle of the edges spanning the lateral flues, so that the notches of two contiguous slabs made between them a vent hole $2\frac{1}{2}$ in. in diameter (Plate V, b). Above these slabs was a layer of clay 5 in. thick, the upper surface of which was ribbed for keying it to the uppermost layer, which was, of course, the oven floor

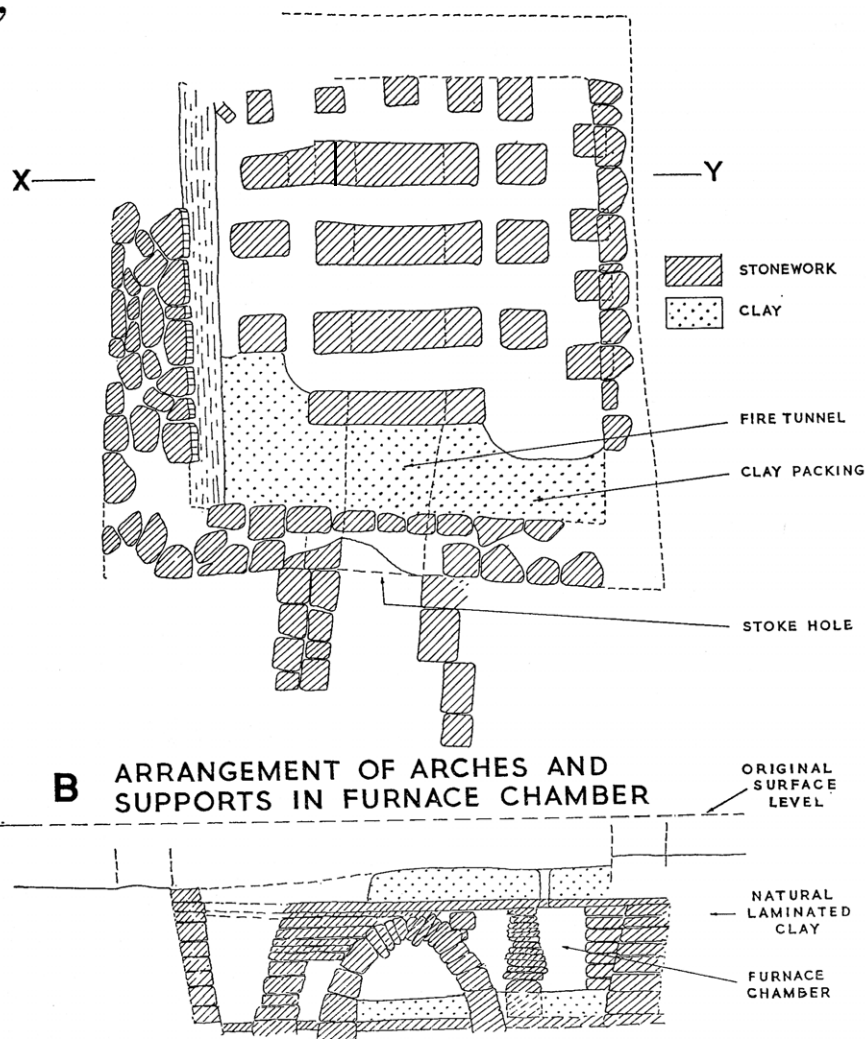
ROMAN AUXILIARY TILERY, BRAMPTON: KILN No I.



SCALES: IN FEET



DIAGRAM A
DIAGRAMS B, C.



C SECTION ACROSS X-Y

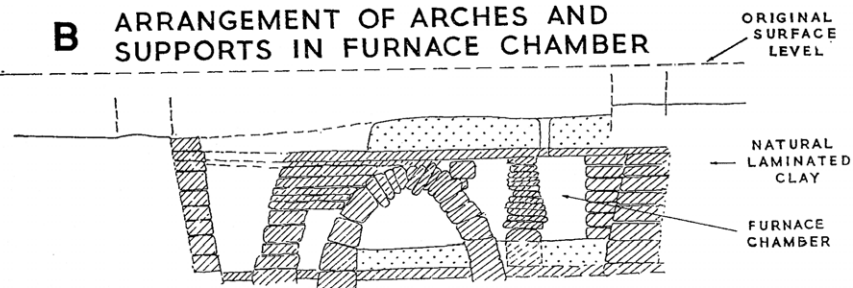


FIG. 3.—Kiln no. 1.

ROMAN AUXILIARY TILERY, BRAMPTON: KILN NO 2.

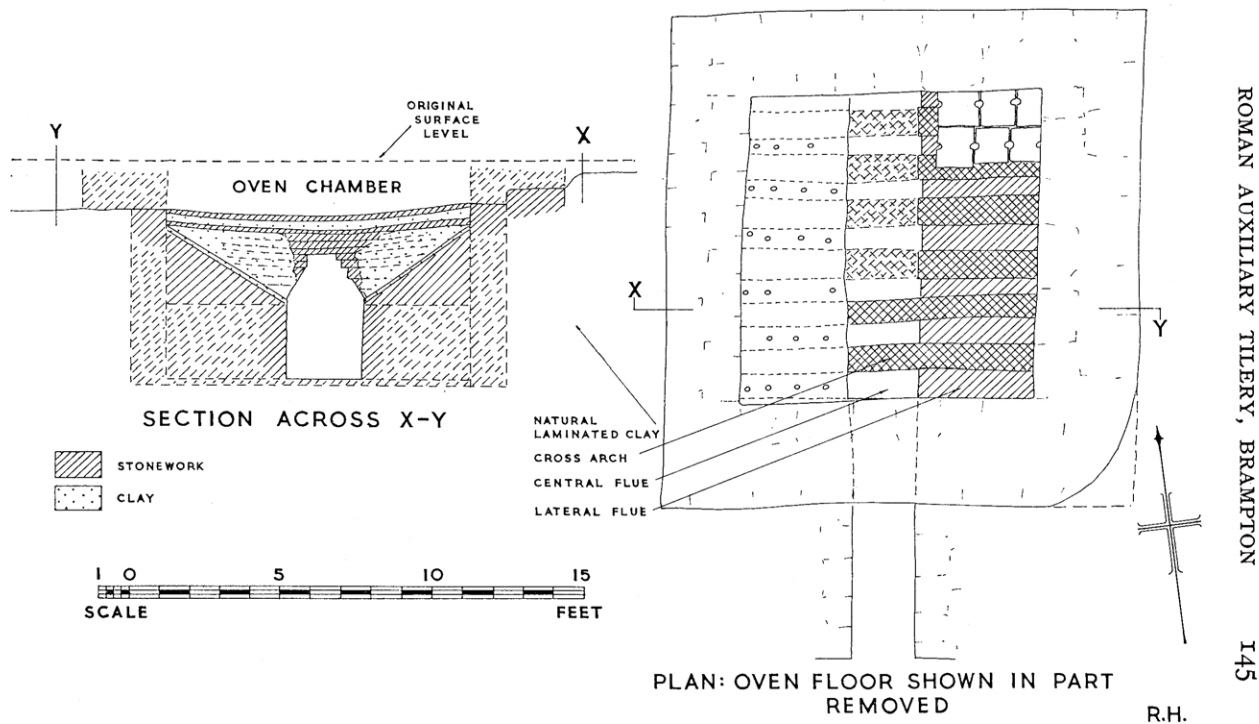


FIG. 4.—Kiln no. 2.

and was composed in part of sandstone slabs 2 in. thick set in clay.

The surviving foundation walls of the oven chamber measured some 3 ft. 6 in. broad and they were thus broader and more regularly built than the corresponding structures in kiln no. 1. They were standing in places three courses high and were faced on the inside with fairly regularly coursed slabs up to 18 in. long and some 5 in. average thickness.

The fire tunnel was 23 in. wide and 26 in. in height and extended 5 ft. 3 in. beyond the south wall of the kiln, and when excavated its mouth was packed with stone. A modern field-drain had been cut across the extension passage of this fire tunnel.

The stokehole pit was sectioned but its limits were not defined. It had been filled almost to the surface with wood ash and burnt clay which occurred in well-defined, alternating, stratified layers of black and red, almost certainly representing flue cleanings and discarded oven superstructure respectively. It would thus appear that these pits, after a kiln was abandoned, were used for dumping waste material from kilns still in use.

The effects of the intense heat which had been generated within the furnace chamber were shown to a most marked degree. Two structural materials were involved — sandstone and clay, and the heat effects on each differed distinctly. The red sandstone consisting, of course, almost wholly of silica with a little ferric oxide, was turned pale purple in colour but being a poorer heat conductor than the more compact clay, the colour change was less marked and the principal heat effect was confined to the surface of the stone, where surface fusion of the silica had occurred with the formation of a beautiful natural highly vitreous green glaze of presumably ferrous silicate. Furthermore, the heating and cooling had caused a complete shattering of the sandstone structures, with what significant results reference will be made below.

The compact red laminated clay, however, composed of the more homogeneous hydrous aluminium silicate, again with ferric iron as the principal subsidiary constituent, was a more efficient heat conductor and was also less fusible. The whole of each clay mass was therefore burnt evenly throughout a dark purple colour, but the surface of the mass remained dull and unglazed and there was no shattering effects in the brick hard mass to which the clay was converted.

Reference may be made here to the stack of fourteen pan tiles, each some 15 in. square and from 2 to 2½ in. thick, which were found standing on the floor of the main flue a foot from the rear wall. The stack had been subjected to furnace heat and all the tiles had in consequence been burnt a dark purple colour. In Plate V, a, the upper nine tiles of this column are shown removed from the main flue and standing on the oven floor.

The necessity to introduce this extra support for the furnace roof exposes a structural weakness in the design of the kiln. As described above, the furnace roof was carried over the main flue by means of corbelled arches joining the cross walls. With the firing of the kiln these arches became considerably weakened, due to their stonework becoming shattered by the furnace heat, and occasionally an arch would be so weakened that it was no longer capable of carrying the oven load and the arch and part of the oven floor would therefore collapse into the main flue. When this occurred only a local repair would be practical owing to the fused condition of the kiln after firing, and the repair apparently took the form of a roof prop in the form of a stack of tiles erected on the floor of the main flue to support a patch fitted into the breach in the oven floor. Further tile stacks were found in kiln no. 6 and reference to these will be made later.

The history of kiln no. 2.

The close proximity and alignment of two so structurally dissimilar kilns as nos. 1 and 2, and the evidence of the imperfections of the former and by contrast the efficiency of the latter, are facts which are best explained by concluding that kiln no. 2 was a replacement of no. 1, built by a more experienced hand, and to a standard design which became the pattern for the remaining rectangular kilns built on the site. Furthermore, the standard of workmanship of kiln no. 2 was by far the best on the site, and it is suggested from this that responsibility for the construction of the later kilns reverted to the auxiliary site personnel, working however to the design of kiln no. 2.

Kiln no. 3 (Plate VI, a).

Immediately to the north of kiln no. 1 was a small circular updraught kiln, 3 ft. 9 in. in diameter, with permanent vent-holed floor and having a central tongue-like column projecting from the far side of the furnace opposite the fire tunnel. This is Corder's type 4.⁵

The stokehole faced north, that is the kiln was almost back to back with kiln no. 1, and when found the furnace chamber and oven floor were intact. Associated with the kiln were a number of fragments of dark grey ollae, and this type of vessel was probably the main product of the kiln.

The structure of the kiln (Fig. 5) was of the simplest character, consisting of a circular pit 3 ft. in diameter sunk in the compact clay to serve as a combustion chamber, the horizontal scoring of the sides by the digging tool being still discernible. A second slightly larger pit was dug 3 ft. to the north of the furnace chamber to serve as a stoking pit, and these two excavations were connected by a narrow passage — the fire

⁵ P. Corder, "Structure of Romano-British pottery kilns", *Arch. J.* cxiv 16.

ROMAN AUXILIARY TILERY, BRAMPTON: KILN NO 3.

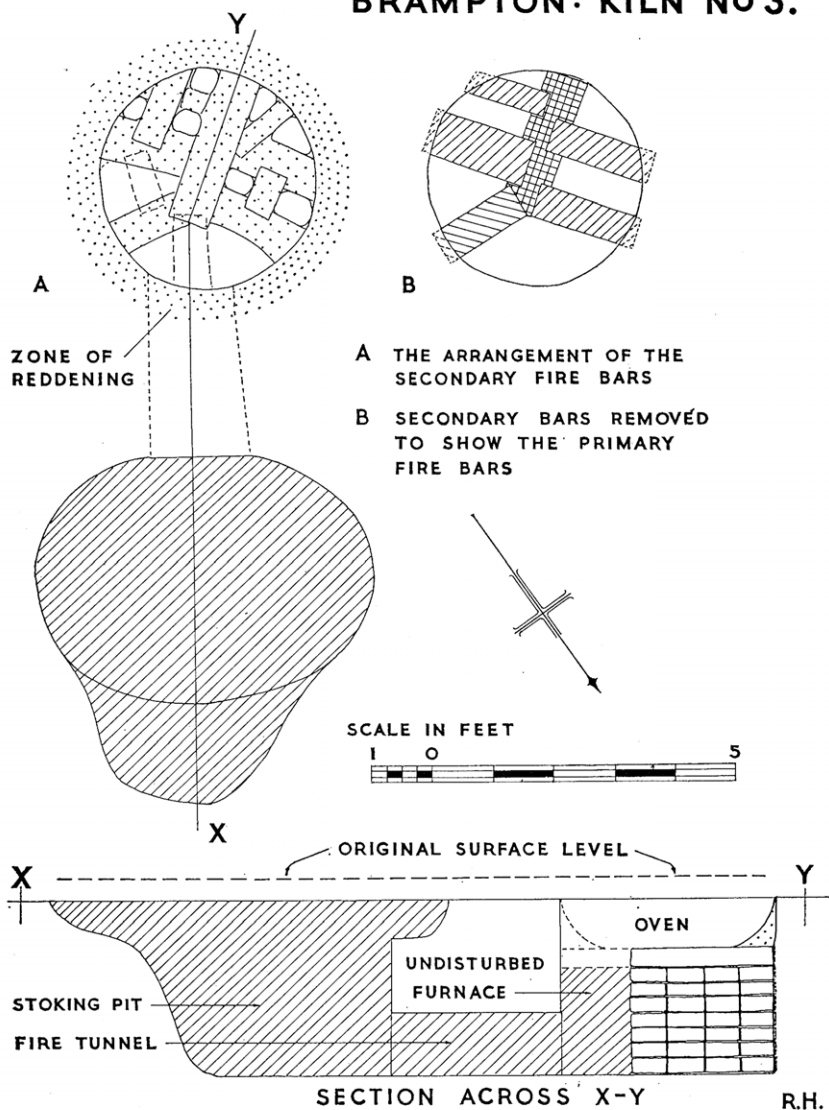


FIG. 5.—Kiln no. 3.

tunnel, 1 ft. 8 in. wide, 12 in. high and 2 ft. 9 in. long. Apart from a single pan tile, used as a facing for the east wall of the fire tunnel at its entrance, neither this passage nor the furnace was lined with any placed material.

The principal support for the oven floor was the projecting tongue, to which reference has already been made. It was made of baked tiles, 7 in. square, stacked in four columns and bound in clay. The fixed end of the tongue was embedded into the side of the furnace chamber. The primary fire-bars were made of baked tiles 22 in. long and 8 in. broad, one end of each bar was embedded into the furnace wall and the other rested on the tongue projection in such a manner that the bars on opposite sides of the furnace alternated in position on the tongue support (Fig. 5, b). Smaller secondary fire-bars lay across the primary series, and the two sets were bound together in clay in such a manner as to leave an irregular pattern of vent holes between the two sets of bars.

The inner face of both the furnace chamber and the surviving part of the oven showed the effects of heat. The clay lining was burnt brick-hard and changed in colour from the natural brown to a dark grey. The heat effects penetrated to a depth of 6 in. into the natural clay, the dark grey zone was $1\frac{1}{2}$ in. deep, beyond which was a bright red zone shading to the natural brown colour at a distance of 6 in. from the furnace chamber.

The history of kiln no. 3.

The extremely simple structure of kiln no. 3 is an excellent example of the ready manner in which units of the Roman army could exploit local resources in making themselves self-sufficient in isolated forward positions. However, when the rather crude construction of this kiln is compared with that of no. 5, one of similar type, but in spite of its more fragmentary condition shown to have been built in a much more efficient manner, e.g.

with its well constructed fire tunnel and tile-lined furnace, the inference appears clear: kiln no. 3, built in close proximity to no. 1, is surely the work of the same inexperienced hand that was responsible for the latter, and was constructed in the early days of the tilery before expert help had been directed to the site to improve the standard of kiln construction.

Kilns nos. 4 and 5 (Plate VI, b, Fig. 6).

These two kilns had a common stoking-pit and were therefore worked as a pair. Such an arrangement does not occur commonly,⁶ but it is much rarer for two kilns of different form, as in the Brampton example, to be associated in this manner.⁷

The kilns were situated in a relatively isolated position 150 ft. to the north of kiln no. 3. Kiln no. 4 (Plate VII) was sub-rectangular in form and conformed to Grime's type III, while kiln no. 5 was circular, and as far as could be made out from the surviving remains was of Corder's type 4. The common stoking pit faced west, the angle between the axes of the two fire tunnels communicating with the pit was 73°.

Both kilns were fragmentary, only the furnace chamber and fire tunnel walls surviving in each case. The external dimensions of the furnace of kiln no. 4 were 9 ft. by 7 ft., and the fire tunnel was 6 ft. long. In the circular kiln no. 5 the internal diameter of the furnace was 4 ft. 6 in. and the fire funnel was some 4 ft. long.

Kiln no. 4.

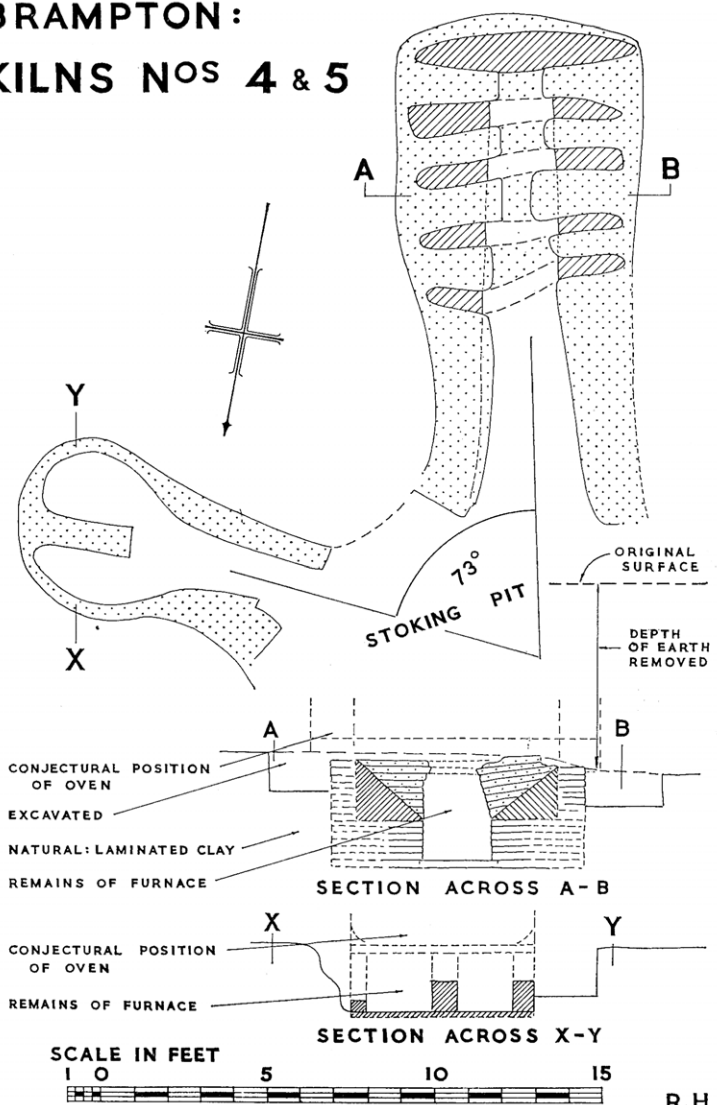
This was a well constructed kiln, smaller but of the same general type as kiln no. 2. The kiln was constructed in part of tile and in part of sandstone. The outer walls of the furnace were composed of tiles and the platforms supporting the cross walls, and therefore forming the

⁶ Corder, *op. cit.*, 25.

⁷ Hull, Colchester Report, p. 35 *et seq.*

ROMAN AUXILIARY TILERY, BRAMPTON:

KILNS NOS 4 & 5



R.H.

FIG. 6.—Kilns nos. 4 and 5.

walls of the main flue, were constructed of large pan tiles.

There were four cross walls, all the arches of which had collapsed; the rearmost two cross walls were constructed of sandstone, but the first cross wall was built partly of stone and tile and the second cross wall wholly of tile. Kiln wasters were largely used for kiln construction and it would seem that when this material was in short supply the deficiency was made good by the use of sandstone.

The space between the rearmost cross wall and the rear wall of the furnace had never been used as a cross flue but was packed solid with clay. A similar arrangement was noted in kiln no. 6 and was probably a device to prevent the creation of cold spots in the combustion chamber.

The main flue was 2 ft. wide and was paved with large sandstone flags (Plate VII). It was continuous with the fire tunnel which was an excellently constructed passage built in sandstone ashlar. The side walls of the fire tunnel were splayed outwards and the passage was thus 39 in. wide at the mouth of the tunnel, narrowing to 25 in. at the point where it joined the main flue.

The stonework of the fire tunnel showed evidence of excessive burning. Thus its colour had been turned from red to grey and the edges of the individual stones which had been softened by heat were excessively worn, presumably due to the stoking of the kiln. The worn rounded appearance of the stones produced by this action might aptly be described as "the loaf-of-bread" effect, and was well shown not only by the fire tunnel walls of this kiln but also those of kiln no. 6 (Plate VIII, a).

Kiln no. 5.

Although this kiln (Plate VI, b, Fig. 6) was extremely fragmentary, sufficient of the furnace and fire tunnel survived to show that it had been very well planned and

constructed. In form it resembled kiln no. 3 in being of circular up-draught type with a tongue-type support for the furnace roof projecting from the furnace wall opposite the flue, but the oven floor was completely destroyed and details of its construction therefore lost.

As in the associated kiln, no. 4, described above, kiln no. 5 was built in part of tile and in part of sandstone. Some of the tile fragments used were burnt blue and were obvious wasters from other kilns. The north wall of the fire tunnel was built of ashlar work but faced with two large pan tiles, 22 x 15 x 3 in. in size. The passage was splayed outwards and slightly recessed 12 in. from the open end, a point which was probably the position of the stokehole.

The history of kilns nos. 4 and 5.

The planning and construction of kilns nos. 4 and 5, built as they were under the stress of an exposed forward position, show a high standard of technical practice. The occurrence of a pair of kilns in juxtaposition and operated from a common fire-pit, as already stated (*supra*, p. 151) is rare. The arrangement, however, had many advantages and its use here implies the application of a high level of technical knowledge, experience which by contrast appears to have been lacking in the construction of kiln no. 3. These facts support further the inference already drawn that there were two phases of kiln construction of which the earlier, illustrated by kilns nos. 1 and 3, is characterized, in comparison with the later phase as illustrated by the remaining kilns, by a much lower level of experience and workmanship.

Kiln no. 6.

Kiln no. 6 (Plate VIII, Fig. 7) was situated between but a distance of some 70 ft. to the east of the group of kilns nos. 1, 2 and 3 lying to its south and kilns nos. 4 and 5 to its north. It was a rectangular kiln of Grime's

ROMAN AUXILIARY TILERY, BRAMPTON: KILN N^o 6

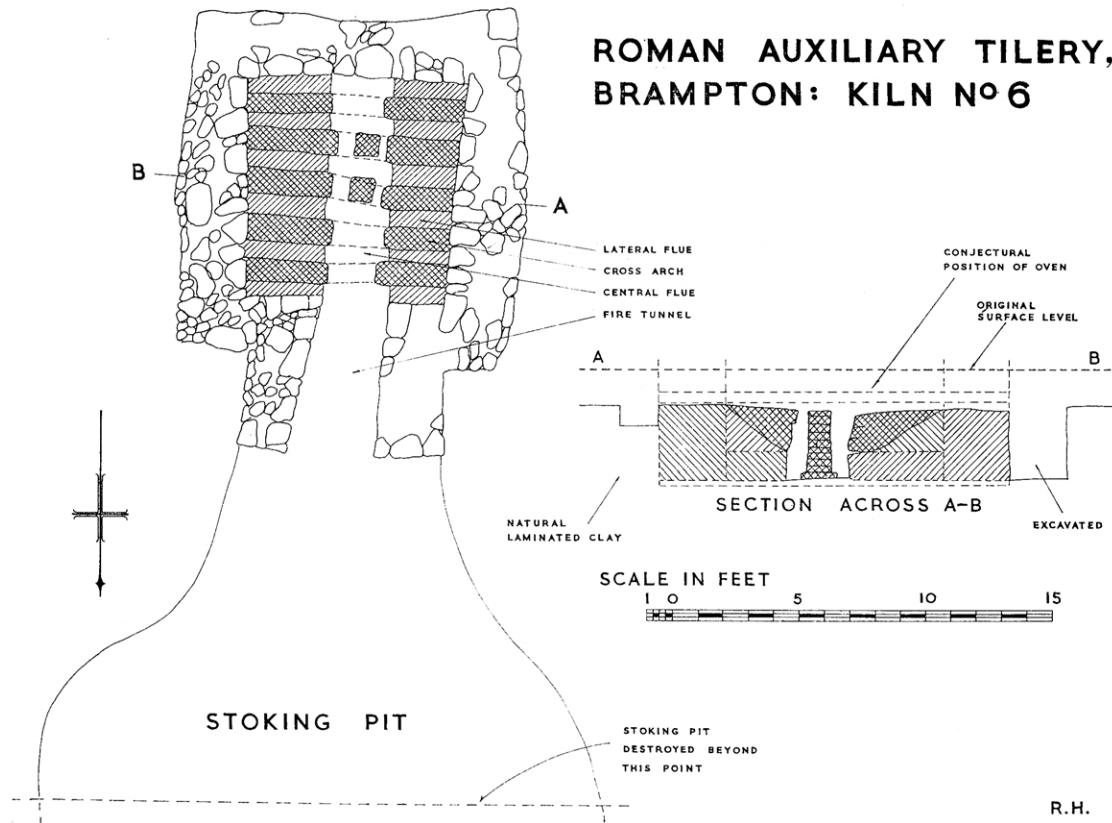


FIG. 7.—Kiln no. 6.

type III and oriented with its stokehole facing north. Only the furnace chamber, the passage walls of the fire tunnel, and part of the fire pit had survived. The mechanical shovel had cut away the greater part of the fire pit, but the limits of the surviving part were clearly marked in the clay (Fig. 7).

The planning of the furnace chamber was characterized by a lack of symmetry. Its internal dimensions measured 8 ft. 6 in. in length and the same dimension in breadth at the rear of the chamber but narrowing to a width of 7 ft. 10 in. at the front. Furthermore, the axis of the main flue was displaced to one side and thus the cross walls, and therefore the side flues on the west side were shorter than the corresponding opposite ones. This lack of precision in planning may possibly have led to the uneven distribution of the heat of the furnace gases and therefore to a lessening of the efficiency of the kiln, and such discrepancies may be taken as a reflection on the experience of the auxiliary personnel who, it is presumed, built the tilery.

The furnace chamber was solidly built of sandstone and the method of construction of this kiln type was determined for this particular kiln. In the first place a rectangular pit, the dimensions of which were equal to the external dimensions of the furnace chamber and a narrow trench for the fire tunnel, were dug into the solid clay. There was then erected within this pit the inner face of the walls of both the furnace chamber and the fire tunnel, constructed in well coursed ashlar work. The cavity remaining between these facing stones and the sides of the clay pit was then packed solid with sandstone brash. This method of construction explains the extremely irregular appearance of the stonework of the outer packing (Plate VIII, b).

The floor of the fire tunnel and that of the furnace chamber, in the position of the main flue, was then paved with sandstone flags and the channel of the main flue

built in line with the fire tunnel by the construction of the two lateral platform supports for the cross walls. The cross walls and corbelled arches over the main flue were then built in position, and the intervals between these walls — the side flues — were completed by the construction of the inclined floors. The method of roofing the furnace chamber has already been described for kiln no. 2 (*supra*, p. 144).

There were five cross walls, but all the associated arches had collapsed. With the exception of the west side of the first and the east side of the fourth wall which were made of tile, all the cross walls were built in stone. The fifth cross wall was of different construction to the other four and probably had a different purpose. It was built of sandstone but the opposite sides were not joined by an arch, and in the intervals between this cross wall and the rear wall of the furnace chamber there were no inclined floors, but the space was packed solid with clay and had therefore never functioned as side flues. This feature was also present in kiln no. 4 and was definitely a primary structure although it was absent in kiln no. 2.

The inclined floors of the side flues were constructed in the manner described for kiln no. 2, i.e. a packing of broken tile, etc., finished with a surface spread of clay.

Standing on the flagged floor of the main flue were two pillars formed of sandstone blocks, each some 12 in. square and varying in thickness from 3 to 4 in. They were placed opposite the third and fourth cross walls, that opposite the fourth wall being displaced towards the west side. The function and significance of these pillars have already been explained in connection with the comparable structure found in kiln no. 2 (*supra*, p. 147).

The fire tunnel was 6 ft. 6 in. in length and 3 ft. 6 in. wide at its mouth, narrowing to 2 ft. 8 in. at its junction with the main flue. The walls of the tunnel were constructed in sandstone ashlar work and were burnt grey, and the stonework showed what has previously been re-

ferred to as the "loaf-of-bread" effect, described for kiln no. 4.

The heat effects shown by structures within the furnace chamber were similar to but not as pronounced as those in kiln no. 2. Furthermore, the glazing on the sandstone was of a more granular character.

Kiln no. 7.

Kiln no. 7 was situated immediately to the south of kiln no. 6 but was aligned precisely at right-angles to it. Very little of the kiln survived, only part of the main flue to the level of the side flues and traces of the cross walls. Both the rear end of the furnace chamber and at the opposite end the fire tunnel and the stoking pit had been sheared off by the mechanical shovel, but the kiln was clearly another rectangular one and almost certainly was of Grime's type III.

The main flue which was 30 in. wide differed from all the others on the site in being paved with cobbles. This modification was probably introduced late in the history of the site because it was found that a burnt flag-floor was prone to excessive wear. The effects of such wear are shown very well in kiln no. 8 (Plate IX, b).

The construction of the two lateral platforms which both formed the main flue and supported the cross walls was shown in detail by this fragmentary kiln. The inner faces of these two platforms which formed the side walls of the main flue were formed for most part of large pan tiles some 4 in. thick which were burnt blue. The platforms were 27 in. wide and solidly built of tile and stone and were constructed independent of the side walls of the furnace chamber. These outer walls of the kiln were some 25 in. wide and were similar in construction to those of kiln no. 6.

Kiln no. 8 (Plate IX, b).

This kiln was on the east side of the site in a relatively isolated position. Only the foundation walls survived, which conformed in plan and size to the rectangular kilns nos. 2 and 6. The fire tunnel was oriented to the south and the excessive burning and the worn nature of its floor showed that the kiln had seen a fair amount of use.

The finds.*The pottery*

Some 800 fragments of coarse ware pottery and tiles were collected from the site. Apart from a few fragments of light-grey cooking-pots associated with kiln no. 3 all the pottery was found as a general scatter over the site. A high proportion of the fragments were from kiln wasters, distorted, burnt, or under fired, vessels, and this fact together with the complete absence of Samian ware shows that we are dealing here with products from the site works and not domestic pottery used by the site personnel.

Only a general account of the pottery will be given here, but it is hoped to publish a detailed analysis of its typology at some future date.

There are some 80 fragments of bowls with reeded rims. Three fairly complete examples are illustrated in Plate X, b. In each the carination is softened to a curve, and this is typical of the Brampton bowls. In the majority of the bowls the rim tends to overhang the inner surface of the vessel, but in a few examples the inner surface turns outwards to form a continuous curve with the rim. Most commonly the rims are flat, but examples with pronounced downward slope (as in the example illustrated) is a rarer and most interesting form. Another rare form is a shallow dish with broad flat reeded rim and sloping sides.

Some 30 fragments of mortaria occur all with bead-

and-roll rims. Typically the bead is very well defined and is developed at times to the point of appearing as an inwardly projecting flange. In no example does the top of the rim curve rise above the level of the bead. The rim roll is typically thick to the point at times of being solid, and the base in every example is provided with a pronounced foot-stand.

Globular jars with everted rims and cooking-pots are amongst the commonest forms. Some 20 rim fragments occur of the former and some 30 to 40 examples of the latter, not including a large quantity of bases and body fragments on which lattice ornament is almost completely absent. Some 20 fragments of soft light-grey cooking-pots, one fragment with lattice ornament, were found associated with kiln no. 3.

There are several fragments of soft grey rustic ware.

Examples of various types of tiles, tegulae and imbrices, flat flooring-tiles, and box-tiles with scored outer surface occurred commonly on the site.

The terracotta inspection lamp (Plate X, a, Fig. 8).

The circumstances under which this lamp was found and the significance of its association with kiln no. 1 have already been given in the description of this kiln. The lamp bears the stamp of the potter FORTIS, and Professor E. B. Birley has kindly contributed the following note on this lamp manufacturer:

The full name of the potter was L. Aemilius Fortis⁸ and his pottery has been identified near Mutina = the modern Modena in the north of Italy, where a number of his kilns and tiles, with his full name stamped on them, came to light ninety odd years ago. He was by far the most prolific of all known lamp makers: something like a third of all the stamped lamps from Vindonissa were made by him, and he seems to have had by far the largest sales distribution — throughout Western Europe and

⁸ Loeschcke, *Lampen aus Vindonissa* (1919), 92-94.



PLATE I.—Kiln no. 1: General view from the south-west.



PLATE II, a.—Kiln no. 1: Oven floor showing the character and arrangement of the vent holes.



PLATE II, b.—Kiln no. 1: Arrangement of the arches in the furnace chamber.



PLATE III.—Kiln no. 1: The stokehole and fire tunnel from the south.



PLATE IV.—Kilns nos. 1 and 2 from the north-east.

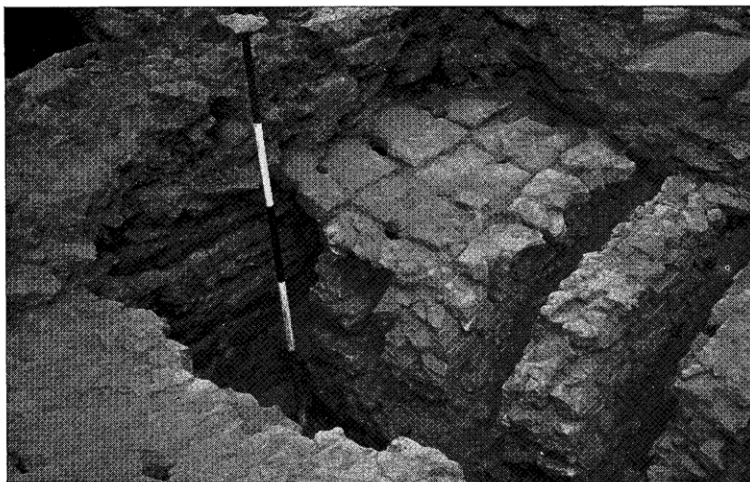


PLATE V, a.—Kiln no. 2: General view from the south-east, showing also the stack of nine tiles removed from the main flue.

PLATE V, b.—Kiln no. 2: Detail of the oven floor structure.



PLATE VI, a.—Kiln no. 3: General view from the north.



PLATE VI, b.—Kilns nos. 4 and 5: General view from the south-west.



PLATE VII.—Kiln no. 4: Surviving remains of the furnace chamber from the north, showing the flagged floor of the main flue.



PLATE VIII, a.—Kiln no. 6: Surviving remains of the furnace chamber from the north.

PLATE VIII, b.— Kiln no. 6: The east wall of the furnace chamber, showing the outer packing of sandstone brash.



PLATE IX, a.—Kiln no. 7: Surviving remains of the furnace, showing the main flue, in part, with the cobble pitching of the floor.



PLATE IX, b.—Kiln no. 8: Surviving remains of the furnace chamber and fire tunnel.

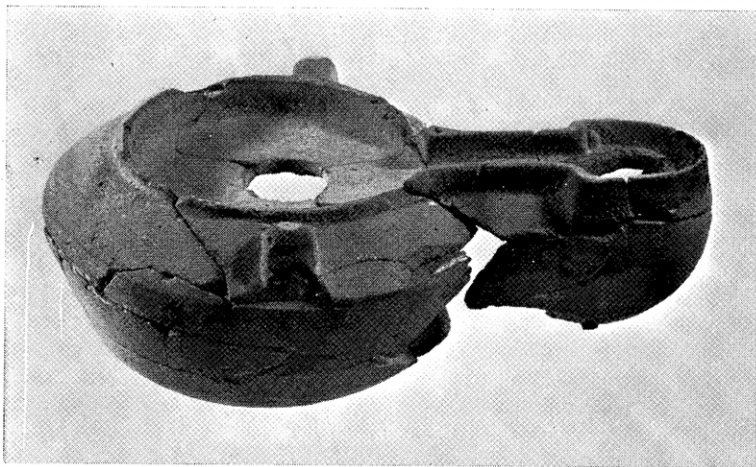


PLATE X, a.—Terracotta inspection lamp found associated with
kiln no. 1.



PLATE X, b.—Examples of pottery forms found in the general scatter.

into the Danube provinces, with isolated specimens turning up as far afield as Asia Minor. Site-finds include lamps of his in burials with coins as late as Marcus Aurelius, but the bulk of his lamps come from deposits of the Flavian period (beginning with half a dozen specimens from Pompeii) and tailing off with two or three early Hadrianic sites. On the whole, it looks as if his period of active production can safely be assessed as c. 70-110; but he was obviously producing on a very large

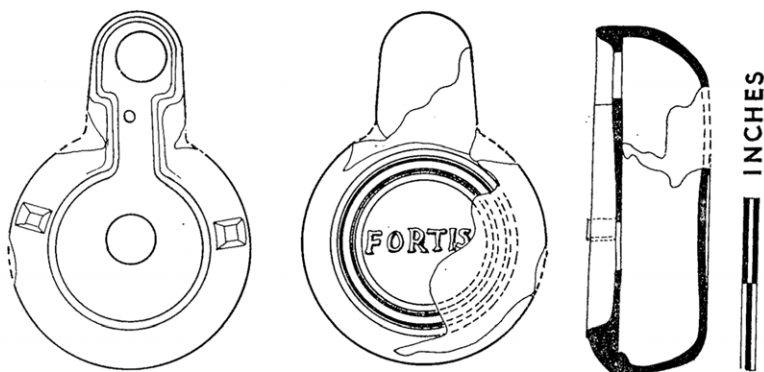


FIG. 8.—The terracotta inspection lamp.

scale and one might reasonably expect lamps made by him to be on sale in the shops, and thereafter in use in private hands, for many years after his firm ceased production.

Thus the occurrence on the site of a lamp by this potter conforms with the early 2nd-century date for the tiler as given at the conclusion of this report.

The hoard of Roman ironwork.

On 13 July 1964, the year following the excavation of the tiler when the work of levelling the site had been resumed, the chance find of a hoard of 58 pieces of Roman ironwork was made on the site.

The discovery was immediately brought to the notice

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of our member Mr J. Hutchinson, who is on the staff of the Irthing Valley School, who recovered the contents of the hoard and noted its precise location which is shown on Fig. 2. The complete hoard has been given by the Cumberland Education Authorities to Carlisle Museum, and a report on it will be published later in these *Transactions*. It will, therefore, be sufficient here merely to note the circumstances under which it was found and the significance of its occurrence on the site.

The metal was buried in a pit 2 ft. in diameter and 3 ft. deep, but as some 7 ft. of the upper soil levels had been removed the original depth of the pit must have been about 10 ft.

The burial in this manner of a mass of discarded iron was apparently standard military practice when a unit was vacating a site in an exposed forward position — the concealment of the huge mass of nails at Inchtuthil is the supreme example of the practice, and it was of course a precaution taken to prevent this costly and serviceable scrap metal falling into hostile hands.

The discovery of the hoard therefore confirms the general conclusions regarding the history of the site that the abandonment of the tilery was a planned operation and that it occurred at a time when the site lay still in an exposed position, i.e. before the construction of the Wall.

Historical conclusions.

As the Brampton tilery was discovered by the mechanical removal from the site of the upper layers of earth, any structural evidence contained in these superficial levels, such as debris from the dome structures of ovens, or the shallow foundations of ancilliary buildings, were inevitably lost, and for most part only subterranean structures, i.e. furnace chambers and stoking pits, survived.

The absence of part of this evidence could, however,

be otherwise explained. Thus living-quarters for the site personnel would almost certainly be in the fort at Old Church a few hundred yards to the west, and buildings such as potting- and drying-sheds which might have been constructed on the site, would probably be of wood. Furthermore, as the excavations for the furnace chambers and stoking pits were made in solid clay, the upcast material from these excavations would provide a supply of working material which would make the digging of separate clay pits unnecessary.

Although there is no direct proof of the fact, it is almost certain that the Brampton tilery was a military establishment operated by an auxiliary unit. The predominance of large rectangular-type kilns is a typical feature of military works where the principal items manufactured were the bulkier products such as tiles of various types and bricks, which would be in great demand by the military, and unlike domestic pottery supplies more convenient to make on the spot to cut down the high cost of transport.

Again the organization of the Brampton works was much simpler and cruder than that found at legionary establishments such as the tilery of the Twentieth Legion at Holt, and this fact together with the absence of legionary stamps would seem to confirm, what may be reasonably deduced from the situation of the tilery, that it was operated by an auxiliary unit, no doubt the one stationed at the fort of Old Church.

Where local supplies of clay were available the practice was to allow auxiliary units to manufacture their own supplies of pottery and tiles, and such units (e.g. as at Caersws)⁹ occasionally stamped their products.

The period of activity of the tilery as indicated by Mr Gillam's study of the scatter of pottery, amounting to some 800 fragments, is given by him as some time between A.D. 100-125. Thus the main activity of the site

⁹ Grimes, Holt Report, p. 46.

was probably associated with the phase of military consolidation along the Stanegate line in the earlier years of the 2nd century or later, but in any case before the building of the forts on Hadrian's Wall.

The legionary tilerly at Scalesceugh, six miles south of Carlisle, is a military works approximately contemporary with that at Brampton, and together these two tileries are a form of military activity within the region which was probably more widespread than the available evidence indicates. We may note, however, the auxiliary tilerly at Muncaster,¹⁰ a probable 2nd-century works associated with the fort of Ravenglass, and the occurrence of 4th-century rectangular kilns built within disused granaries within the Roman fort at South Shields.¹¹

The suggestion that the Brampton tilerly ceased production at the time of the building of the Hadrianic frontier raises the question why the site was abandoned at a time when building supplies would be in greatest demand. The probable explanation is that the Brampton works were designed for small-scale local production and were therefore too small to be effectively incorporated into the immeasurably greater schemes required by the new frontier plan. For this latter the massive requirements of building products would no doubt be met by the highly organized legionary tileries, and the dismantling of the Brampton fort and its associated tilerly would appear to indicate that the auxiliary unit concerned had been transferred to constructional duties on the new frontier.

After the description of each kiln as given above there is appended a brief statement of its possible history, and from these deductions may be obtained some indication of the development of the site as a whole. The reasons for concluding that kilns nos. 1 and 3 were the first structures built on the site have already been given. The unique

¹⁰ CW2 lx 1 and lxi 47.

¹¹ Information from Sir I. A. Richmond (unpublished).

and unorthodox design of kiln no. 1, the evidence of its inefficiency, considered together with the wretchedly crude construction of the small pot kiln no. 3 lying in close proximity to it, prove fairly conclusively that the site was established on the initiative of personnel lacking in technical experience.

Kiln no. 2, however, built in close relation to no. 1, although of comparable size, is in every other way a complete contrast to it. Thus the design of kiln no. 2 is of a common standard type, it is furthermore the best constructed kiln on the site, and its efficiency measured in terms of the furnace heat effects must have been of the highest order. The close association of these so remarkably dissimilar kilns requires an explanation, and the most logical one is that the difficulties met with in the early days of the tiler were overcome by the seconding to the site of an experienced craftsman who was responsible for the introduction of the more orthodox and efficient kiln design which set the pattern for the development of the rest of the site.

Thus the remaining rectangular kilns, nos. 4, 6, 7 and 8, are similar in design to no. 2, and the fact that they are of somewhat inferior construction, suggests that the site continued to be operated by the auxiliary personnel working, however, to the new pattern of kiln construction. The more superior construction of pot kiln no. 5, compared to that of the comparable form kiln no. 3, has already been discussed, and the grouping of kilns nos. 4 and 5, an arrangement designed to increase the efficiency of these small kilns, is a technical elaboration which further demonstrates the higher standards of construction shown by the presumed later kilns.

The occurrence of workable clay deposits close to the Stanegate fort of Old Church, Brampton, was a rather rare and fortuitous circumstance which the Roman military command was not slow to exploit. The history of the Brampton tiler is therefore part of the history of the

Stanegate line and terminated when the Stanegate forts were abandoned and the Hadrianic frontier defences established on the opposite bank of the River Irthing.

The history of the tiler site is therefore quite distinct from that of Old Brampton, lying on the boulder-clay ridge to the west of the tiler.¹² Old Brampton was a later development, a small rural settlement sheltering behind the Wall and exploiting the advantage of its close proximity to the Stanegate. New economic and strategic considerations probably caused the movement of this settlement in the post-Conquest period to the site of modern Brampton. The relation of Old Brampton to Brampton is probably paralleled by that of Old Penrith to Penrith, and of Old Carlisle to Wigton, and the explanation of these remarkable migrations of settlements is almost certainly the gradual movement of people, after the collapse of the Roman occupation, from settlement sites which were established as a result of Roman military planning, to positions better sited for the more effective economic development of the area. The history of the Brampton tiler is, however, in no way connected with these developments.

The Brampton tiler thus provides a fairly complete study of a military field-works of the Roman auxiliary army which was organized to exploit local natural resources for the duration of a specific military situation, and which ceased to operate when an entirely new situation arose which it was not designed to serve.

The relatively inferior planning of the tiler compared with that of a permanent legionary works probably reflects both the inexperience of the personnel concerned and the temporary nature of the works, but it is precisely these comparisons which makes the discovery so important, for of its type the Brampton auxiliary tiler offers the most complete study from Britain.

¹² CW2 xxxvi 179-182.

Acknowledgements.

The manner of the discovery of the Roman auxiliary tiler at Brampton is another example of the capacity of modern earth-moving equipment for locating and, unfortunately, for destroying buried historical remains. Frequently on such occasions little can be done to record systematically the discovery, but happily the Brampton find was one instance, when through the kind co-operation of all parties concerned, facilities were provided for such study, and it is a pleasant duty to record here our indebtedness for this assistance.

Our thanks must first be expressed to the sub-contractor, Mr S. Gibson of Newcastle, for his generous action in immediately reporting his discovery and for re-organizing his work programme to allow as much time as he could possibly spare for the examination of the site. To our member Mr Gordon S. Bessey, the Director of Education, the County Council of Cumberland, we owe our extreme thanks for the prompt action which he took to secure adequate facilities for the main excavation as soon as he was informed of its necessity, and in spite of the considerable inconvenience and expense in which this action involved his Department. The writer records with the greatest pleasure the kind co-operation which he received from Mr J. D. Grey, Headmaster, Mr J. Robertson, the Assistant Headmaster, and members of the staff of the Irthing Valley School, Brampton. A significant contribution was made to the work by the voluntary efforts of a number of helpers too numerous to mention by name. Of these, however, our special thanks must be expressed to Mr George Ritson whose experience as a former employee of the Cumberland Excavation Committee was put to effective use on most evenings of the excavation. A number of senior members of the Society gave invaluable assistance. The work of Mr R. L. Bellhouse at the time of the discovery and of Miss K. S. Hodgson throughout the excavation has

already been gratefully acknowledged. In addition, Mr J. Hughes carried out the site survey on which Fig. 2 is based.

The work was financed by an emergency grant made by the Ministry of Public Building and Works, secured for us on the recommendation of our member Miss Dorothy Charlesworth. An additional sum was received from the Society's excavation fund. In all, £125 was expended on the work.

The excavation was carried out as a research project of the Department of Archaeology, Carlisle Museum, and the writer, as Keeper of this Department, would record in conclusion his indebtedness to his assistant, our member, Mr R. P. Wilson, for his efficient help, especially during the lengthy process of measuring the structures in the field.