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A POST-MEDIEVAL TILE KILN AT BEXLEY

By L. C. DALE

THE Manor of Baldwyns, adjoining the south-west corner of Dartford Heath, was the property during the Middle Ages of the Augustinian canons of Lesnes Abbey. The sacrist's accounts for c. 1513 have the following note of expenditure, presumably for building or repairs, quoted in A. W. Clapham's *Lesnes Abbey* (1915):

Tyle Kyln apud Bawdyne, LXVIs. VIIIId.

It has long been recognized that a track known as Tile Kiln Lane, running from Bexley village towards Wilmington and skirting the south side of Baldwyns, perpetuates in its name the ancient association of this area with a former tilery. Houses were built along the lane after the First World War, and over thirty years ago I observed kiln débris disturbed in one of the gardens during tree-planting. Investigation was then impossible but, in May 1971, the area was being cleared preparatory to laying a new access road to a building development taking place at the rear of the houses on the south side of the lane, and the mechanical excavator laid bare the outline of a rectangular structure, built of plain roof tiles, a few feet below the modern ground level (N.G.R. TQ 5047872533). By kind permission of the developers, Messrs. Malcolm Sanderson Ltd., an emergency excavation was carried out before all the evidence was destroyed. In this work I was aided by Mr. J. E. L. Caiger and Mr. P. J. Tester, F.S.A., who have also assisted with publication.

In the weeks following, several sections were observed in the builders' trenches which showed the filling of deep pits, obviously dug for clay used in tile-making, and containing quantities of burnt material and tile wasters, proving association with the neighbouring kiln.

When first discovered, it was thought that the kiln might have been medieval, but pottery associations indicate otherwise. A quantity of sherds recovered from the firing-pit has been examined by Mr. J. G. Hurst, M.A., V.-P.S.A., who has confirmed that they probably cover the late seventeenth and early eighteenth centuries with only a few residual medieval sherds. A metal button and a glass bottle found in the same situation are both datable to about the middle of the eighteenth century. It therefore seems that tile-making, established hereabouts at least as far back as the early sixteenth century, continued well into the eighteenth century. The natural resources for the industry were

readily to hand—an extensive clay outlier of the Woolwich Beds and fuel from the adjacent Joyden's Woods, these clearly being determining factors in the location and persistence of the industry. The necessary supply of water came, no doubt, from a small rivulet, the dried-up channel of which was observed in sections, running between the kiln and the lane and parallel to the latter.

On the 1839-40 Tithe Map, no kiln is shown here, but the field where it had stood was then enclosed within the Bexley Parish boundary, with land belonging to the Baldwyns Estate on three of its sides. Research among documents relating to the estate in the nineteenth century has failed to uncover any reference to tile-making in that period.

The main products of the kiln were plain red roof-tiles, but in addition there were a few apparent wasters of thick, crudely-made vessels which are assumed to have been fired in the kiln. The bulk of the sherds from the firing-pit were, however, not of local manufacture and must represent domestic rubbish discarded by the tile-makers. The inclusion of a few medieval rubbish-survivals indicates activity on the site long before the use of this particular kiln. In fact, it is very probable that earlier kilns were located on this clay deposit, the example forming the subject of these notes being one of the latest in the series.

APPENDIX

NOTES ON THE KILN CONSTRUCTION

By JOHN E. L. CAIGER

The ground plan of the kiln was rectangular, measuring 15×10 ft. externally and was entirely constructed of roofing-tiles. The average dimensions of the tiles were 10 in. \times $6\frac{1}{2}$ in. \times $\frac{1}{2}$ in. and each bore two peg holes, roughly pierced, at one end. Some tiles had square holes whilst others had round ones. The firing pit was 18 ft. in length, the enclosure being defined by two walls running north-east. These walls were constructed of roofing-tiles near the kiln end, but, about half-way along, the material used was random set brickwork. At this junction the walls curved inwards. Originally, this pit had been dug at least 3 ft. 6 in. below ground level. At the extreme north-east end the side walls turned a right-angle and at this position it is probable that there were steps down into the pit. From the plan (Fig. 1) it will be noted that the kiln had two firing-tunnels, separated by a central supporting wall. These tunnels had been destroyed down to within 5 in. of their floors which upon examination were found to be in good condition. They had been constructed from broken roofing-tiles laid closely

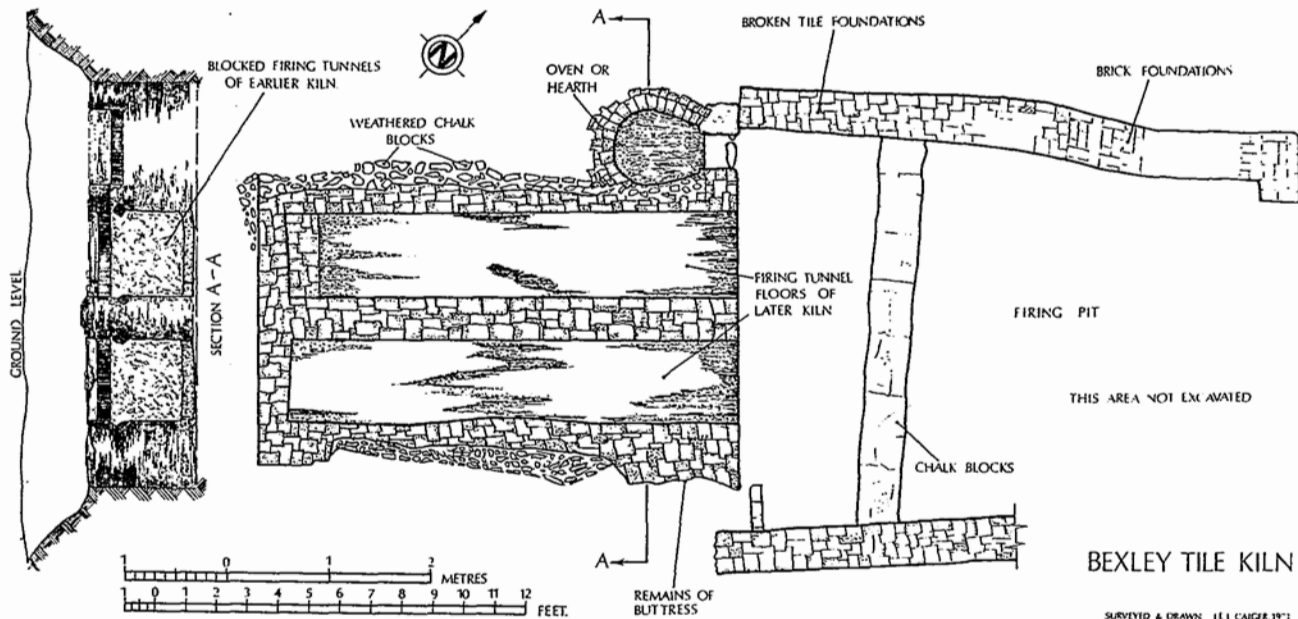


FIG. 1.

Fig. 1.

BEXLEY TILE KILN

SURVEYED & DRAWN: J. L. CAIGER, 1971

together set on edge. The three remaining outer walls of the kiln and the central dividing wall were constructed from both whole and broken tiles bonded together in some places with clay. No trace of mortar was noted. At the north-east end of the kiln the two outer walls terminated in heavy buttresses. Around the three walls of the kiln on their outer faces, were the weathered remains of chalk blocks. From the remains of these it has been inferred that the structure, as has been noted on other kiln sites, possessed an outer cladding of chalk blocks. This was erected against the tile-built walls to provide additional structural support and to conserve the heat within the kiln when it was being fired. The rough wall of large chalk blocks (shown on the plan, Fig. 1) and lying across the width of the firing-pit was found by excavation to have been a later addition and did not form part of the original construction. It was lying near the upper level of the pit and on top of an accumulation of ash and tile débris. Presumably, it had been deposited in the pit some time after the kiln had ceased to function. These chalk blocks may well have once formed part of the outer wall cladding of the tile kiln. The excavation of the Bexley tile-kiln revealed a feature for which, at the present time, no parallel has been found. A small horseshoe-shaped oven or hearth was uncovered which had been carefully contrived within the buttress footings on the north-west side. The base of this hearth was found to be in good condition, its fire-hole being accessible from the same firing pit which had served the twin tunnels of the tile kiln. Its floor level was only 4 in. below the floors of the two adjacent firing-tunnels. The maximum dimensions of the hearth were 3 ft. \times 2 ft. 6 in. and in common with the tile-kiln, it too, was entirely constructed of broken roofing-tiles. Vestiges of chalk still remained around the foundations of the small hearth. Excavation of the area between the chalk blocks and the kiln uncovered large quantities of ash, charcoal and broken tile; the latter presumably fell into the pit when the north-east wall of the kiln collapsed. During the excavation in this rather limited area, many sherds of pottery were found which provided some dating evidence for the working period of the kiln. As the excavation trench close to the firing-tunnels was increased in depth, it became apparent that the remains of an earlier tile-kiln underlay the one being examined. The tile springing for the arches above the firing-tunnels of this earlier kiln was visible in both the side walls and the central supporting wall (Fig. 1, section A-A). The floors of these earlier tunnels were found 2 ft. 10 in. below the firing-tunnel floors of the later kiln. Examination showed that the earlier tunnels had been completely blocked up with tile and brick rubble and the later firing-tunnels built above them. This discovery is by no means unusual as other investigators have found similar evidence of tile-kilns being rebuilt on earlier foundations. It has been recorded that it

A POST-MEDIEVAL TILE KILN AT BEXLEY

was the usual practice for these rural tile-kilns to be built at a minimum of expense.¹ Any serviceable materials readily to hand at the time of building would be used, and broken or waster tiles from the tile-yard, bricks and stone were all incorporated in the building of a new kiln. Due to these materials possessing poor refractory properties, together with rough workmanship and the intense heat to which they were subjected, kilns like these had a short working period. In consequence, after much patching and repair work had been carried out, the tile-formed archwork supporting the kiln chamber floor would ultimately collapse and a rebuild of the kiln became a necessity. When this occurred, it was the practice of the tile-makers to salvage what they could in materials from the older kiln and build again over the old foundations.

It was mentioned previously, that the purpose of the small oven or hearth set in the buttress foundations is something of an enigma. It is unlikely that this hearth was in use at the same period as the tile-kiln due to difficulties in firing both at the same time. It is more likely to have been constructed from the buttress remains after the kiln had ceased working and was in a partly ruinous condition. Several theories have been put forward as to the probable purpose of this small oven. They may be summarized as follows:

A. A trial oven or kiln where experimental pieces of hand-made pottery were fired. Amongst the many sherds recovered from the firing-pit were fragments of clumsily made vessels that appear to represent the work of tile-makers rather than competent potters. These pots could well have been used within the tile-yard for water storage purposes.

B. An oven simply for baking food.

C. A sand-drying kiln. During the manufacture of roofing-tiles large quantities of sand are required in the moulding process. It is an essential requirement that the sand is perfectly dry. To ensure this, some tileries, it is recorded, kept a small kiln used solely for this purpose.² Sand is indispensable to the tile moulder as it prevents the moist tile from sticking to the mould and also to the surface of his moulding table. In short, it acts as a release agent.

Fig. 2 shows a conjecturally restored view of the tile kiln. It is an isometric drawing based exactly on the ground plan as determined by archaeological excavation. The height of the kiln chamber, the hood above the firing chamber and a few minor details have been taken from an eighteenth-century illustration showing a tile kiln of

¹ E. Dobson and Searle, *A Rudimentary Treatise on the Manufacture of Bricks and Tiles*, London, 1936, 92.

² *Op. cit.*, 53.

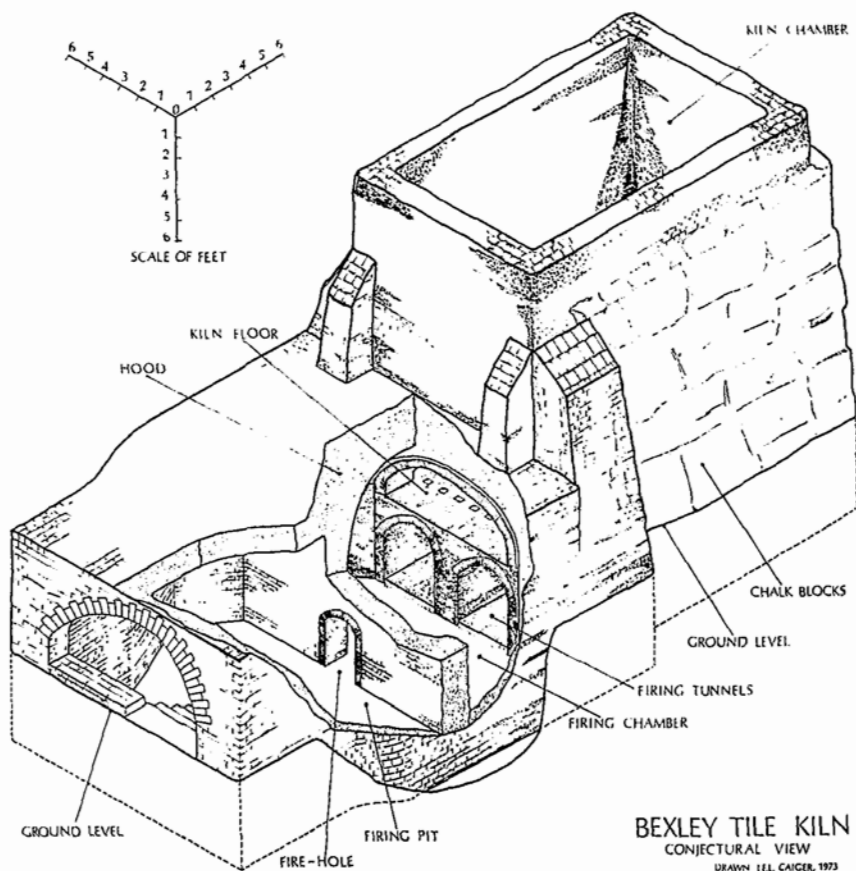


FIG. 2.

approximately the same period as the Bexley example.³ In order to give a better understanding of the manner in which these kilns functioned, the principal parts of the kiln have been annotated on the drawing and the description is as follows:

The kiln-chamber

The floor of the kiln-chamber was supported by the tile archwork above the two firing-tunnels and the central wall. Holes were provided in the floor which allowed the heat to rise through the newly made tiles stacked carefully on their sides within the chamber. The chamber had an opening (not shown on the drawing) which gave access into

³ D. Diderot, *Encyclopédie*, Paris, 1762, (Tuilerie), Pls. 1 and 3.

A POST-MEDIEVAL TILE KILN AT BEXLEY

the kiln for the purpose of loading and unloading it. This entrance was sealed up before firing the kiln.

The firing-chamber

Here, wood fuel was burned to heat the kiln. As will be seen from the illustration, this was placed immediately in front of the two arched firing-tunnels. When the kiln was fired, flames were drawn along their entire length and rose through the holes provided in the kiln floor. In addition, heat was deflected by the hood and entered the kiln-chamber through the upper arch at the extremity of the hood.

The firing-pit

In common with the firing-chamber the firing-pit was built a few feet below ground level in order that the fire would not be unduly affected by changes of wind direction. As this was a sunken enclosure care had to be taken to safeguard against water entering it. It was not unusual for a covered drain to be laid which would conduct away any water seeping into the pit. A writer on the subject of tile and brick manufacture during the latter part of the nineteenth century stresses the danger to the kiln and its contents if the site is not kept dry.⁴ The firing pit provided a sheltered position for the tile burner to attend and stoke the fire and keep a stock of dry fuel always ready to hand. The massive buttresses were a necessary feature of these kilns. They served a dual purpose, not only to strengthen the vulnerable corners of the kiln but also to counteract the kiln's tendency to 'lift'. This lifting movement is due to expansion of the side walls where they are exposed to the internal heat of the fire, the heat being fiercest at the firing-pit end of the kiln.

Summary and discussion

It is believed that the two tile-kilns built successively at Bexley on the same foundations had a working period of possibly forty years. It would not be practicable to build a third tile-kiln above the ruins of the second one as its firing-pit and tunnels would be too near ground level, thus making it difficult to control with the varying wind directions. The probability is that when the second kiln in its turn became unusable another kiln was built elsewhere on the tiliary site. It is perhaps during this third phase of activity on the site that the horseshoe-shaped kiln was made. The ruins of the abandoned tile-kiln provided a convenient site for building a sand-drying kiln. The north-west buttress offered all the materials required and faced on to a ready-made firing-pit from which its fire-hole could be stoked. The position of the chalk

⁴ E. Dobson, *Bricks and Tiles*, London, 1877, 18.

blocks, previously noted as lying across the width of the firing-pit and a late feature, suggests, significantly, that it may have served as a foundation wall on which some makeshift wind-break was erected in front of the sand-drying kiln. Finally, it is interesting to note that twin-tunnelled up-draught kilns of the type described in this paper appear to have been used for tile burning with little change in design from the early fourteenth century until the nineteenth century. Then from this latter period the 'Scotch' kiln with its multi-side fire-holes, using coal as a fuel, came into prominence only to give way to circular and more efficient forms of kiln.



The Kiln viewed from the North-east.

P.J.T.



Small Kiln or Oven.

P.J.T.