

A ROMAN TILE-KILN AND AN ASSOCIATED THIRD-CENTURY HOARD OF SESTERTII AT BIRCHOLT FARM, BRABOURNE

ERNEST BLACK

with contributions by Ian Betts and David Rudling

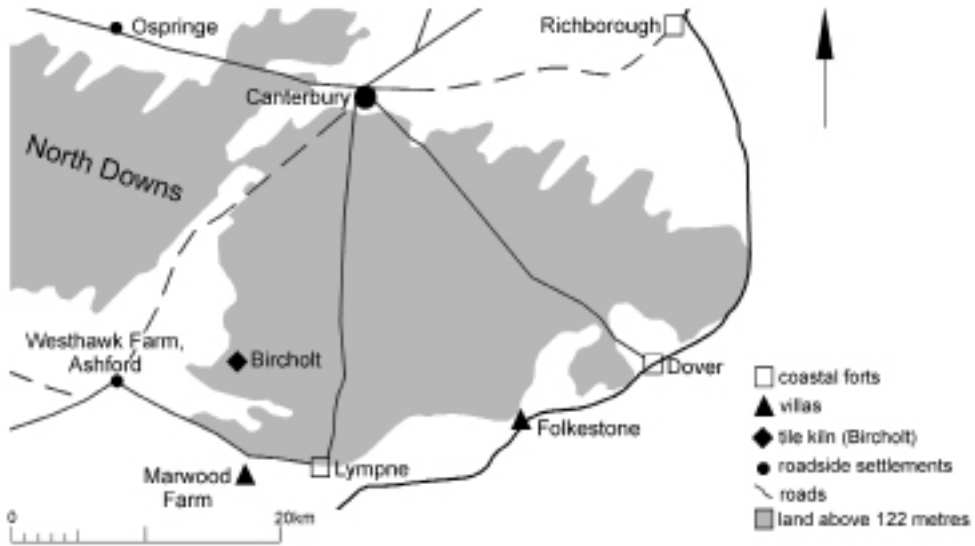
In the summer of 2018 the author contacted the Secretary of the Ashford Archaeological and Historical Society in an attempt to discover material relating to the excavation of a Roman tile-kiln at Bircholt in 1983. The kiln was not listed in the Historic Environment Record at Maidstone nor was any information recorded by Historic England except for an unpublished 1984 report on the fabric of some tiles and a clay sample from the kiln by Dr David Williams as part of the Ceramic Petrology Project of the Department of the Environment.

John Hammon, the then president of the Ashford society, was contacted who confirmed that the excavation had been directed by the late Jim Bradshaw. He added that the material (finds and perhaps also records and plans) from the excavation had been stored in a shed at Bircholt Farm and were lost when this was destroyed.

Very fortunately, however, two sources of information do survive and form the basis of this paper. One is a small number of tiles which had been given to the author on his visit to the site in 1983 recently examined by Dr Ian Betts (MOLA) and compared with known fabrics in the MOLA fabric series for Roman Ceramic Building Material.

The second source is a series of photographs taken by Mr Eddie Garrett during the excavation which were made available to the author recently. The most informative are reproduced below by kind permission of Mr Garrett. Apart from details of the structure of the kiln and its products, one of them shows five coins whose dates suggest that this particular kiln probably ceased production c.AD 265-75; another photo allows the location of the kiln to be pinpointed.

Brabourne is midway between Ashford and Folkestone in south-east Kent (Map 1). Bircholt is in the northern part of the parish. Hammon described the tile-kiln as located 'about 3-4 hundred yards north-east of Bircholt Farm House, say half way between the farm and the road'. Bircholt Farm House is marked on the 6-inch Ordnance Survey map as Bircholt Court (TR 075 412). One of the surviving



Map 1 Map showing the location of the Bircholt kiln and other sites mentioned in the text (drawn by E. Holloway).

photographs is helpful as it shows the excavated kiln beyond which is a boundary with an angle in it where it changes direction away from the kiln (**Fig. 1**). Behind the boundary line are trees. This setting seemed to locate the site of the tile-kiln in a field immediately south of Bircholt Wood and this was confirmed to the writer by Mr Peter Joules who currently farms the field. The Google Earth photo for 1990 shows the boundary of Bircholt Wood as it appears in the photograph. However, in the Google Earth photo taken in 1960 the wood is shown extending south-south-west of this boundary along approximately the western third of the field where Mr Garrett's photograph shows that the kiln is located. This part of the wood was therefore removed at some point between 1960 and 1983 when the pulling out of tree-stumps led to the discovery of the kiln at a point towards the eastern side of the cleared area. The site of the kiln can be given as approximately at TR 0771 4160 and lies about 425m north-north-east of Bircholt farmhouse and about 275m south-west of the road that runs west-north-west from Bircholt Forstal, acceptably close to the estimated location recalled by Hammon.

The photographic evidence

This section provides a commentary on Mr Garrett's photographs which enables a fairly clear picture to be constructed of the original form and structure of the kiln although precise measurements are not possible and some details remain uncertain. The terminology used in the description follows that in Alan McWhirr's introduction to his gazetteer of tile-kilns in Roman Britain (McWhirr 1979, 98).

Fig. 1. The photograph was taken after heavy rain had destroyed part of the wall



Fig. 1 The Bircholt kiln (E. Garrett).
Scales: 1m.



Fig. 2 The stoke-hole and surviving arch
of the kiln (E. Garrett).

of the main flue and caused the collapse of one of the piers supporting an arch that originally spanned the flue (to the left of the vertical ranging-rod). In the background is a field boundary lined with trees and this has enabled the site to be located. The kiln was aligned roughly north-south with its stoke-hole to the north. The one-metre scales show that the depth of the main flue was c.600-700mm from the top of the side-walls and the width between the walls at this point c.600mm. The interior width of the kiln between the outer edges of the arch-piers immediately in front of the horizontal ranging-rod can be estimated at c.1.3-1.4m. If the grid-pegs shown here and in **Fig. 2** were spaced at three metres apart, this allows the length of the kiln and the stoke-hole area combined to be estimated at c.6m and the length of the kiln itself at c.3.5m. The section at the rear of the trench seems to be cut through a feature filled with dark soil at the back of the stoke-hole. This may be an unexcavated part of the stoking-area or a distinct feature. Areas of the field-surface behind the trench also seem to have a dark appearance.

Fig. 2. This is a view towards the surviving arch spanning the main flue with the filling left in place below it to prevent it collapsing. In front of the arch is the stoke-hole which has been sectioned and the outer part removed (shown filled with water). This seems to show that the northern limit of the stoke-hole was located and that the dark fill visible in the section in Fig.1 was a distinct feature. Part of the fill of the stoke-hole remains in place and is dark in colour, presumably incorporating much burnt material. It seems likely, however, that

most, if not all, of this was re-deposited material since stoking could not have been carried out if it was in place during the working of the kiln. No trace remains of the oven floor and combustion chamber which were evidently rectangular in form. The arch which survives, partly collapsed, next to the stoke-hole was one of a series which spanned the main flue. The base of another of the arches can be seen on the left edge of the main flue. The heated air was drawn along the main flue and rose through a series of vents between the arches to fire the tiles stacked on the oven floor above. No recognisable remains of the oven floor seem to have been located in the excavation. Mr Garrett reports that some of the tiles found in the kiln 'were only half baked' and at the time of the excavation it was thought that the kiln had been abandoned after the last firing had been interrupted in some way. He cannot recall seeing these tiles himself and does not know whether they were identifiable as particular tile types.

Fig. 3. This shows a slot across the fill of the stoke-hole beside the surviving arch. The arch seems to have been displaced from its supporting piers, most clearly seen on the right side of the photograph. The wall of the flue is seen on the left, with the vertical ranging-rod resting on the surviving top of the wall. The fill of the main flue shows stones immediately below the tiles of the collapsed arch and resting on top of a band of dark soil. Below this, pieces of tile are present in the dark soil. Behind the arch is a concentrated spread of tile fragments and some stones. The arch is constructed of tile fragments of varying thicknesses



Fig. 3 Close-up of the surviving arch (E. Garrett). Scales: 1m and 2m.

and therefore of different tile types. The tiles in the arch do not seem to have been mortared and they were presumably held in place by clay packed between them. The horizontal ranging-rod indicates that the width of the arch will have been *c.* 1.5m or slightly less. Some of the tile fragments behind the arch seem to be pitched at an angle in a similar way to those forming the surviving arch and among them are stones similar to those seen immediately below the tiles of the arch. It is tentatively suggested that this material is all re-deposited to form a hard surface to consolidate the fill of the flue beneath it. It is further suggested that, rather than being brought from elsewhere, the stones may have come from a footing for a clay wall forming the outer wall of the kiln of which no trace seems to have been found in the excavation.

Fig. 4. This view is taken from the end of the main flue looking back towards the arch adjoining the stoke-hole. The filling of the flue in front of the arch and below the uppermost dark fill capped by the spread of stones and tile fragments is largely light in colour and contains frequent tile fragments. This could be clay from the oven floor and other structural elements of the kiln. The lowest part of the fill seen in the section is dark in contrast to the lighter deposit above it and slopes downwards at an angle from right to left (i.e. from east to west). This presumably contained much burnt material. The base of the main flue seems not to have been fully cleared and the material remaining is also dark in colour, suggesting that the layer seen in the section extended along the full length of the main flue. About half-way along the bottom of the flue, a deposit of what seem



Fig. 4 The main flue of the kiln (E. Garrett).

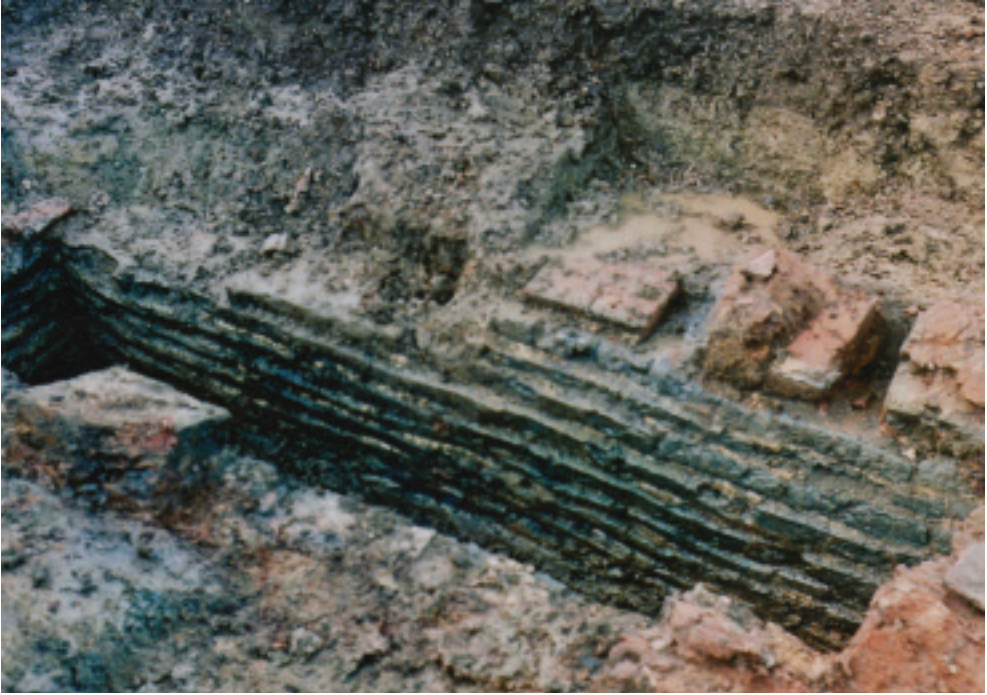


Fig. 5 Arch bases and the tile wall of the main flue (E. Garrett).

to be large tile fragments is visible and may represent part of a collapsed arch. The sides of the main flue are lined with rectangular tiles, probably largely flat lydion tiles. Resting on top of this lining are settings of tiles set at an angle and forming the bases of arches that spanned the main flue and supported the oven floor. The tiles seen here (and in Fig. 5) seem to vary in size and some seem to be rectangular rather than square, indicating that they are not complete bessalis tiles, the type used to form pilae stacks in hypocausts, but more probably other types of tile that have been trimmed to the approximate size required. Two such bases can be seen on the edge of the flue on the right of the picture. The spacing of the latter illustrates the narrow width of the channels between them for the passage of heated air from the main flue.

The succession of layers seen in the section of the main flue supports the theory attributed to Jim Bradshaw by Mr Garrett that the kiln may have been abandoned after a misfiring. It seems unlikely that the deposit of burnt material visible in section and at the bottom of the main flue would have been allowed to accumulate during the normal operation of the kiln and the uneven depth of the material within the flue with a much greater volume on its right (eastern) side may suggest that the firing of the kiln had gone awry. What would be more usual is seen at the early second-century tile-kiln at Great Cansiron Farm, Hartfield, in Sussex where a layer of ash and charcoal, consistently 50mm in thickness, extended from the stoke-hole along the whole length of the main flue (Rudling 1986, 196 and fig. 5, section A-B).

Fig. 5. This shows the main flue with a total of nine or ten courses of tiles visible in the lining. A tile lining is also present at the inner end of the flue to the left of the picture. It is difficult to be sure how many tiles are present in each course in the photograph. Lydion tiles have a thickness of *c.*40mm, a length of *c.*400mm, and a width of *c.*280mm (Brodrigg 1987, 142). If seven lydion tiles were set lengthwise in each course, this would give a length of *c.*2.8m for the part of the flue shown here between the end wall and the section in front of the surviving arch. However, it is necessary to bear in mind that some tiles may have been set with their shorter edges facing the flue or parts of tiles of unknown length may have been used and such detailed information is just not available. The bases of the arches spanning the main flue are also visible and the narrow width of the channels between them can be clearly seen. Clay seems to have been used to bond the tiles forming the bases and was presumably also used between the courses of tiles in the side-walls of the flue. What is missing is any sign of the cross-walls that were a usual feature in the combustion chambers of Romano-British kilns and would be expected to continue the line of the arches. The section behind the bases of the arches shows an apparently uniform layer of light soil, presumably clay, without any indication of the presence of cross-walls. It is possible that the cross-walls were constructed solely of clay and that what were originally the cross-flues were filled with this material at the time the kiln was demolished. It is more likely that cross-walls and cross-flues did not exist in the Bircholt kiln. (For further discussion see below). Although it is difficult to be certain, it seems that the arch-bases were set on the top of the tile-lining of the main flue and that the channels between them therefore had flat bases. Judging by the spacing of the three arch bases on the right of the picture, a total of six or seven arches may once have existed spanning the main flue although none survived towards its southern end.

Fig. 6. The photograph shows the junction between the southern end wall of the main flue and its eastern side wall. The tile-courses forming the east wall of the flue had the inner edges scorched by heat and, like those in the west wall



Fig. 6 The south-east corner of the main flue (E. Garrett).

seen in Figs 4 and 5, they were not set directly one on top of another to form a vertical face but each course was recessed slightly back from the one below. At the junction of the two walls a slot has been excavated down to the level of the fourth course of tiles forming the east wall. The soil left in place below this level contains a single projecting fragment of tile with another left in place at the base of the slot but there is no continuation of the tile courses in the lower part of the wall beside it. It seems likely that there was a feature here which the archaeological slot was designed to examine. The dark fill of the unexcavated lower part of the slot resembles the lowest dark fill of the main flue, though the section at the east end of the slot shows the vertical edge of a feature with a grey filling. The detailed interpretation of this is uncertain but the location of the slot at one of the corners of the main flue furthest from the stoke-hole raises the possibility that a vent or chimney once existed here and was designed to draw the heated air along the main flue from the stoke-hole. A possible parallel is known from the kiln at St Stephen's Road, Canterbury (Jenkins 1956, 41-2 figs 1 and 2). This kiln was probably very similar to that at Bircholt but no traces of arch-bases or any of the superstructure survived. However at the opposite end of the main flue from the stoke-hole and at right angles to the flue, one on each side, were two vents. These sloped upwards from a point just above the floor of the main flue and were presumably intended to draw the heated air along the flue.

A large fragment of flat tile is seen in front of the stack of tiles lining the main flue and presumably formed part of a tiled floor in the flue. Further, less distinct, flooring-tiles can be seen towards the bottom of the photograph and at the foot of the wall at the end of the flue.

Fig. 7. The photograph again shows the end of the main flue but taken from the opposite side looking west. When it was taken much less of the flue had been cleared than is seen in Fig. 4. The section on the right of the photograph is the same as that seen in Fig. 6 and shows a thick layer of black, presumably burnt, debris at the base of the flue with large fragments of what seem to be burnt tile projecting close to the junction with the west wall of the flue. These may represent a similar deposit to the burnt tiles seen at the base of the flue in Fig. 4 and, like them, probably represent material from one of the arches that spanned the flue. Above the dark deposit a large part of the fill is made up of a yellow soil with an admixture of small stones, perhaps derived from the superstructure of the kiln. This is capped by a layer of larger stones which may represent an attempt to consolidate the fill, also probably seen in the area of the surviving arch (Fig. 3). As suggested above, these stones may originally have formed a footing for an outer clay wall of the kiln. The tile-lining seems to have survived to a greater height on the eastern side of the flue than on the western side and the western side may have lacked the feature inferred in the slot on the eastern side at the junction of the side wall and end wall.

Fig. 8. The photograph shows one wall of the main flue constructed of tiles and fronted by rectangular tiles flooring the flue. These seem to be of varying size and their surfaces show evidence of burning. They seem to be set at a slight angle to the line of the wall. It is uncertain what part of the flue appears in the photograph. There seems to be a junction, either with the end wall or with a section across the flue, on the left side of the photograph. If the former is the



Fig. 7 The south-west corner of the main flue (E. Garrett).

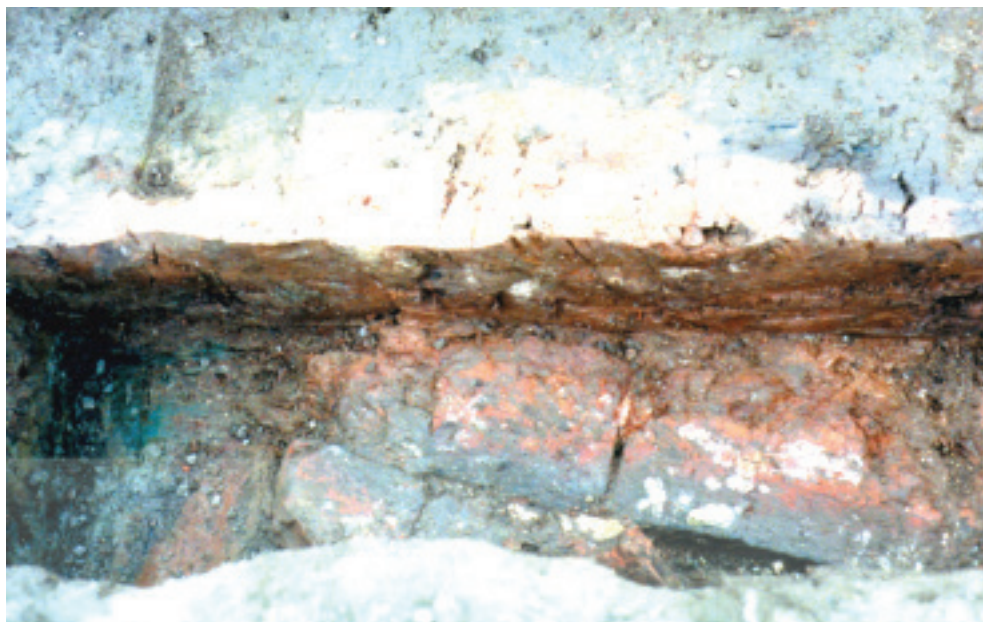


Fig. 8 The floor of the main flue (E. Garrett).



Fig. 9 Finds from the 1983 excavation (E. Garrett).

case, then the wall in the photograph will be the western wall of the flue; if the latter, it will be the eastern wall.

Fig. 9. The photograph shows a selection of finds from the excavation. Part of the upper half of a quern-stone and an iron object, thought at the time of excavation to be the iron cutting edge fitted onto a wooden spade, are shown and Mr Garrett has informed the writer that both were found in the stoking-area where he himself was working. They are resting on top of two tegulae. Part of an imbrex is set over the edge of one of these tegulae and of another tile which is part of a third tegula. With the imbrex is a fragment of tile with its upper broken edge forming a semi-circle. There are two fragments of combed tile. That to the left of the quern-stone seems to have three bands of combing and may be the same fragment seen in Fig. 1 resting against the arch base on the right in front of the horizontal ranging-rod. Here it partly rests on a newspaper on which are laid about a dozen pottery fragments. To the right of the pottery is a complete base or top of a combed voussoir tile with combing in the form of a St Andrew's Cross and done with a comb of four or five teeth. Behind this tile and resting on a fragment of tegula is a small book on which are placed five coins. It seems likely that the fragments of combed tile were used in the arch bases that formed part of the structure of the kiln and the tegulae and imbrex tiles may also have been used in structural features of the kiln (see below).

Fig. 10. The photograph is a closer view of the tegulae and some of the other finds seen in Fig. 9. One of the tegulae can be seen to be complete with a single groove semi-circular 'signature' at its lower end and that next to its long side



Fig. 10 Close-up of tiles from the 1983 excavation (E. Garrett).

has been cut or broken longitudinally to a straight edge and is just over half-complete. This too has a semi-circular 'signature' but with what appear to be three finger grooves. The tile fragment lying on the second tegula seems to have two straight edges forming a corner and a broken edge shaped to a semi-circle. It could be the top right corner of a tegula base. The tegula above and to the left of the book bearing the coins originally matched the size of the complete tegula but about half of it has been removed with a broken edge extending diagonally across the tile. It is unfortunate that there is no scale in the photograph. The size of the complete tegula can only be estimated very approximately from the coins. Four of these are second century sestertii (see below) with a diameter in the range *c.*30-33mm. Since the coins are worn, they are here assigned an approximate diameter of 30mm. On this basis, the length of the complete tegula can be estimated at *c.*402mm and its greater (upper) width at *c.*264mm. At Lime Street in London tegulae of very similar size were found associated with the construction of a major town house or public building (Building F/G) dated to the mid-late second century (Hartle 2017, 39).

Fig. 11. The photograph is a close-up of the five coins. All five show the obverse with the heads of emperors or other imperial personages. All are abraded, some severely, and there is no information about the designs of the reverses. According to Mr Garrett the coins were found close together as if they had been contained in a purse but he does not know where in the kiln this was. A detailed report on these coins by Dr David Rudling follows.



Fig. 11 The coins from the 1983 excavation (E. Garrett).

Fig. 12. The photograph shows a close-up view of about 22 or 23 potsherds, some teeth and bone fragments and what seems to be an iron nail with a circular head from the kiln. A corner of the adjacent piece of combed tile also seen in



Fig. 12 The pottery from the 1983 excavation (E. Garrett).

Fig. 9 can be seen to have two curving bands of combing done using a comb of six teeth. The photograph was shown to Dr Matt Loughton of the Colchester Archaeological Trust who was able to recognise a sherd of grey folded beaker with one surviving indentation and with raised dimples on the surface to each side. Two or possibly three sherds of black burnished ware or of imitation black burnished ware were also identified. Dr Loughton (pers. comm.) considers that a third-century date would be feasible for this assemblage.

A hoard of sestertii from the tile-kiln at Bircholt Farm, Brabourne *by Dr D. Rudling*

As reported above, finds from the excavations at Bircholt in 1983 included five Roman coins, all being brass sestertii (Fig. 11). Whilst the current location of these coins is unknown, their obverses were fortunately photographed. This report is based on observations of scans of these images. More precise identifications are impossible due to the quality of the images and the absence of any reverse images.

Top left: Probably a coin of Antoninus Pius (AD 138-61). Legend illegible; laureate bust right.

Top right: Postumus (AD 260-69: i.e. the dating proposed by Drinkwater (1987, 24 and 34-5)). Legend: VIRTVS] POSTVMI [AVG; helmeted bust left, holding shield and spear. Mint of Lugdunum. Dr Sam Moorhead of the Portable Antiquities Scheme of the British Museum has informed me that the BM has two coins (*RIC* 133 and *RIC* 171) with helmeted busts facing left, both of which appear to share the same die as the coin from Bircholt. Dr Moorhead also states that the BM does not have examples of two other types of Postumus sestertius with helmeted left busts (*RIC* 108 and *RIC* 145) and that the Bircholt coin is a scarce type. Postumus struck sestertii during the first two years of his reign, i.e. 260-262 (Bland 2018, 64).

Middle left: Trajan (98-117). Legend illegible; laureate bust right.

Middle right: Antoninus Pius (138-161). Legend illegible; laureate bust right.

Bottom: Marcus Aurelius (161-180). Legend: M ANTO]NINVS AVG [ARM] PARTH [MAX; laureate bust right. This coin was issued in 165-9.

In view of Mr Garrett's statement that the five sestertii were found close together, it is reasonable to assume that they represent a small hoard. In the absence of an obvious container, any such item may have been made of organic material, perhaps leather, cloth or wood, which has not survived. The period of issue of the coins spans the period from Trajan (AD 98-117) to Postumus (AD 260-69), and the four earliest coins are very worn. The sestertius of Postumus, which also shows signs of wear, is especially interesting as sestertii of this Gallic Empire ruler were the last minting of this coin denomination. From the 270s (Abdy 2002, 39) these and earlier issues of sestertii and their divisions (asses and dupondii) went out of use when the antoninianus, a coin of officially greater value than the sestertius, became little more than a small bronze coin and therefore intrinsically much less valuable than the considerably larger sestertius made of brass. The date of deposition of the Bircholt coins is thus likely to have been *c.*AD 265-275. The purpose of the hoard is likely to have been votive, a 'rite of termination' when the tile-kiln went

out of use (Merrifield 1987, 49-50) rather than as a wealth or savings deposit, or a casual loss or losses or deposited after such coins were demonetised following the 260s. The composition of the hoard, being mainly very worn coins of the second century, indicates that the coins were obtained from those in circulation in the mid third century (Bland 2018, 59). The long tradition of making coin or metal votive offerings during both later prehistory and Roman times in Britain is now well documented (e.g. see Moorhead *et al.* 2010; Rudling 2014, 69).

Anne Robertson (2000) in her Inventory of Romano-British Coin hoards lists three other coin hoards found in Kent which end with a coin or coins of Postumus. The earliest such discovery was made during ploughing in 1777 at Stowting. About 400 'large brass Roman Medals' (i.e. coins) were found in 'an Oakan Box'. The emperor list begins with Vespasian (AD 69-79) and ends with Postumus (a coin 'so worn as not to have a legible letter'). The other two hoards were both found in 1969. One was discovered 'whilst digging for worm bait' at Leysdown, Isle of Sheppey. This comprised a total of 492 sestertii and eight cast copies (one sestertius and seven asses). The emperor list begins with seven coins of Titus (AD 79-81) and ends with two issues of Postumus. No traces of a container were found. The other hoard of sestertii found in 1969 was discovered whilst laying gas-pipes at Ramsgate. Twenty-seven of a possible thirty-four sestertii were recovered and recorded. The earliest were two coins of Hadrian (AD 117-38) and the most recent a single coin of Postumus. Again, no traces of a container were observed.

The Tile Fabrics – Initial investigation by Dr Williams in 1984

Bircholt is situated on Lower Greensand and Gault deposits with Lower Chalk nearby (Smart *et al.* 1966). Dr Williams identified four of the five tiles submitted to him (see Introduction) as belonging to a fabric comprising 'a groundmass of subangular quartz grains, average size below 0.10mm, with a few slightly larger grains, flecks of mica, iron ore, a little argillaceous material and the odd piece of ferruginous sandstone and grain of plagioclase feldspar and ?glauconite/cellophane' (Williams 1984). The fabric of the fifth tile is described as: 'similar to the above group, but with more frequent large quartz grains (up to 1mm across) scattered throughout the clay matrix'. The clay sample came from material forming a capping to the main flue of the kiln and had presumably been taken from close to the tile arch over the flue seen in Figs 2 and 3. It is described as 'coarser than the tile samples from the site, but composed basically of the same range and size of inclusions. There is a groundmass of subangular quartz grains below 0.10mm in size, a scatter of larger quartz grains, iron ore, mica and argillaceous material. The latter inclusions are larger and more frequent than those in the tile samples, suggesting less preparation of the clay before use'.

Dr Williams concluded: 'the textural similarity of the Bircholt tile samples with the clay sample from the structure of the kiln suggests that a local clay at no great distance from the site was utilised. In view of the possibility of glauconite/cellophane inclusions, this was probably either obtained from the Folkestone Beds, or perhaps more likely from the Gault'.

The tile fragments from Bircholt in Black's possession were submitted to Ian Betts in 2018 so that they could be assigned to the MOLA fabric series with the

potential to facilitate comparison with assemblages of tile from excavated sites and to plot the distribution of the Bircholt products. When he obtained the tiles in 1983, the author marked each of them with its provenance and the year of excavation followed by an individual number for each tile, e.g. ‘Bircholt, Brabourne 1983 (7)’. These are the numbers given to the tiles in Dr Betts’ report below. One of the imbrex fragments (no. 3) has been retained in the MOLA reference collection and the other tiles have been deposited in Ashford Borough Museum. In May 2019 Mr Garrett provided four additional tile fragments (samples 8-11) which he had collected from the vicinity of the kiln in 1983 and these were also examined by Dr Betts. These tiles remain in Mr Garrett’s possession.

Report on the Bircholt Fabrics 2018 *by Dr I.M. Betts*

All are finished products rather than kiln waste material. They can be placed into four fabric groups. Most of the tiles are orange or light brown in colour and some have a grey core. Normal size moulding sand (with the majority of quartz up to 0.8mm) is attached to the bases and sides.

Fabric 1: MOLA fabric group 2815 (individual fabric 2452); Kent fabric K6
A fine fabric with occasional quartz (up to 0.2mm), occasional dark red and black iron oxide (up to 1mm) and cream silty inclusions (up to 0.8mm) and small thin cream silty lenses.

Sample 1 (tegula): (**Fig. 13, A**) part of a tegula measuring 17mm in thickness (excluding flanged area). The tegula is orange-brown with a grey core and has part of a semi-circular three finger signature mark in the top surface. The corner has MOLA cutaway type B (Warry type: C); external height of

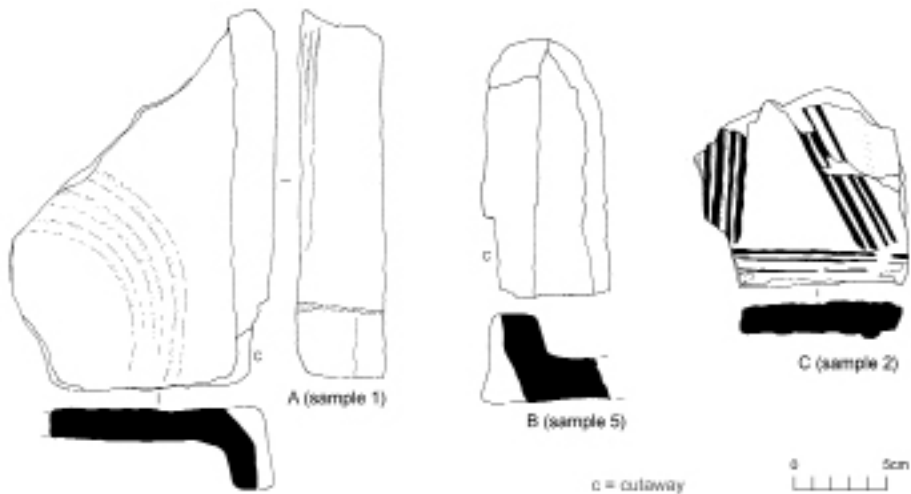


Fig. 13 A: tegula (sample 1). B: tegula (sample 5). C: box-tile (sample 2)
(drawn by E. Holloway).

flange 45mm. There is a slight groove at the junction of base and flange. Its thickness would suggest that the tile is a smaller tegula type, indicating a probable mid-second century or later date.

Sample 3 (imbrex): orange with grey core.

Sample 4 (brick): a corner fragment 39/40mm in thickness with part of a curving 'signature'; orange with part of a grey core. The thickness suggests it is of square bessalis or rectangular lydion type. The top surface has what appears to be the bottom of a four-finger semi-circular signature mark.

Sample 6 (imbrex): light orange-brown with grey core.

Sample 8 (imbrex): orange surface with grey core.

Sample 9 (tegula): part of a tegula base measuring 17/18mm in thickness. The surface colour is light orange-brown with a grey core. The external height of the attached flange is 43/45mm. There is a groove c.15mm wide at the junction of base and flange. As with sample 1, the thickness suggests a mid-second century or later date.

Sample 10 (tegula): part of a tegula base measuring 17/18mm in thickness. The surface colour is orange with a grey core. The external height of the attached flange measures c.44mm. There is a prominent groove c.15mm wide at 15mm from the junction of base and flange. As with samples 1 and 9, the thickness suggests a mid-second century or later date.

Sample 11 (box-tile): the tile has two intersecting bands of straight combing using a comb of at least five teeth measuring c.26/27 mm across. It has a thickness of 15-20 mm and the surface colour is light brown with a grey core. On the sanded inner surface are shallow impressions of three lines. One is straight and a second is roughly parallel to it but curves away towards one end. They are c.20 mm apart. The third line crosses them at approximately ninety degrees. Since it is on the inner surface of the tile, this marking was presumably formed before the clay was shaped to form the box-tile. It seems most likely to have occurred when the clay was laid onto a surface on which this pattern was protruding.

Fabric 2: MOLA fabric group 2815 (individual fabric 3006); Kent fabric K7
Fairly common quartz (up to 0.8mm) with a scatter of red and black iron oxide (up to 1mm).

Sample 7 (box-tile or voussoir): a small fragment of tile with part of a band of combed keying measuring c.15mm across three surviving tooth-marks; the surface colour is light brown; the thickness incomplete.

Fabric 3: MOLA fabric group 2815 (individual fabric 3004); Kent fabric K67
Sandy fabric with frequent quartz (up to 0.8mm) with occasional dark reddish-brown iron oxide (up to 2mm), cream silty inclusions and a possible rock fragment (up to 1.5mm). The clay matrix has a scatter of very small black iron oxide (up to 0.01mm) with occasional white calcium carbonate (?chalk, up to 0.4mm).

Sample 5 (tegula) (Fig. 13, B): part of an orange and cream tegula measuring 23mm in thickness (excluding flange area) with MOLA cutaway type B

(Warry type: C); external height of flange 45mm. There is no groove at the junction of base and flange. Based on the thickness, the tile can be tentatively dated to the first to early/mid second century.

Fabric 4: MOLA fabric 3025 with certain similarities to Kent fabric K39. The fabric is similar to Fabric 1 but includes a scatter of thin cream silty lenses with occasional cream silty inclusions (up to 0.5mm). It may be a variant of the local clay. It has a finer background clay matrix than fabric K39.

Sample 2 (box-tile or voussoir) (Fig. 13, C): the tile is orange-brown in colour and keyed with a four-tooth comb measuring 21/22mm across. Part of a band of combing lies close to one edge of the fragment. A second band is approximately at right angles to this. A third band lies at an angle to the first two bands resembling the hypotenuse of a right-angled triangle. The complete pattern may have involved a St Andrew's Cross framed and bisected by further bands of combing. The thickness is 14/15mm and this suggests that the fragment was from a box-tile rather than a voussoir.

Comparison with fabric types identified by thin-section analysis

Williams (1984) undertook thin-section petrology on five samples of fired ceramic Roman building material from the Bircholt kiln, plus a thin-section of a clay sample from the kiln structure which was found capping the main flue. The writer has not seen the actual thin-sections, so this comparison is based on written descriptions of each fabric in Williams' unpublished report (see above).

The majority of tiles in Betts' fabric 1 (MOLA fabric 2452) have relatively few inclusions present and in this respect they resemble the petrology of the four tiles in Williams' first fabric group obtained through thin-section analysis. The tile types belonging to Williams' first fabric group were a combed box-tile / voussoir, imbrex, brick and tegula, all of which match tile types in Betts' *fabric group 1*. The tile in Betts' *fabric 2*, which has more frequent quartz, may match Williams' fabric group 2.

Betts' Fabric 3, the coarser fabric tegula, may be similar to the clay sample from the kiln structure examined by Williams, although it is difficult to be sure without seeing the actual thin-section and clay sample. The clay sample was different from the tiles he examined, suggesting that the clay may well have been used not for tile-making but for another purpose, such as bonding the tiles making up the kiln structure.

There is no fabric match for Betts' Fabric 4 in Williams' report but this could be a variant of the local clay used to produce fabrics 1 and 2 and the tile in Fabric 4 is probably also a product of the Bircholt kiln.

Discussion of fabric comparisons

If the four types examined by both Betts and Dr Williams were produced at the tiler's at Bircholt Farm this was producing the standard range of tiles, namely tegula and imbrex roofing tiles, bricks and either box-flue or voussoir tiles,

probably a mixture of both. However, a *caveat* is necessary here since none of the tile fragments examined can be identified as a waster and some might represent material made elsewhere that was brought to the site of the kiln (e.g. sample 5, see below).

The cessation of production may be dated by the group of five coins from an unknown context in the 1983 excavation (see above). Keying of tiles using standard size combs seems to have been introduced into the London area sometime around the beginning of the second century. Combed keying is found in the late first century but this is undertaken with much larger combs such as those used on tiles in the so-called 'London-Sussex' tile group (Betts *et al.* 1997, 10). A clearer indication of dating is the presence of a thinner, smaller sized tegula (samples 1, 9 and 10). These are generally a late Roman type. In London smaller sized tegulae first appear around the mid second century. The Bircholt kiln is therefore probably mid second century or later in date.

One puzzle is the thicker tegula (sample 5) which is more likely to be of earlier date. This is in fabric 3 and does not match any of the other samples examined or any of those thin-sectioned by Williams so that there must be some doubt as to whether this tile was actually made at the Bircholt kiln. Tiles may have been required initially to cover various buildings associated with the running of the tile-kiln, such as a drying-shed and perhaps accommodation for the tile-makers, before the first firing of the kiln. These tiles would have had to be obtained from another kiln elsewhere and, if the use of the Bircholt kiln was confined to a period in the third quarter of the third century, perhaps involved re-use from an earlier building. Chemical analysis may establish if the tile was indeed made at another tiler.

More work is required to establish where the products of the Bircholt kiln were distributed. Unfortunately, the majority of the tiles examined are in common non-diagnostic fabrics so it may require chemical analysis to confirm any definite link with ceramic building material from elsewhere.

GENERAL DISCUSSION AND CONCLUSIONS

Only approximate dimensions can be given for the Bircholt kiln. The length of the main flue was perhaps *c.*3.5m, its width *c.*0.6m and its depth *c.*0.6-0.7m; the span of the surviving arch was estimated at *c.*1.5m or slightly less and the distance between the outer edges of opposing arch piers at *c.*1.3-1.4m. The lining of the main flue seems to have been made up of nine or ten courses of flat tiles (probably lydion tiles) but there is no detailed information about whether these were laid side-on or end-on or if they were all complete tiles. They probably had clay packing laid between the tiles in each course and those in the course above.

The Bircholt kiln can be assigned to Type II in McWhirr's classification of Romano-British tile-kilns. This corresponds to Type IIE.ii in Le Ny's classification of Gallo-Roman tile-kilns (Le Ny 1988, 41 and 43-4 figs 22b and 23). Kilns of this type have cross-flues with flat bases opening from and level with the top of the main flue and cross-walls continuing the line of the arches spanning the main flue are absent. Only three Romano-British kilns of this type were known to McWhirr: Arbury 1 in Warwickshire; Colchester 7 in Essex; Wiston in Sussex (McWhirr 1979, 98-99). In the case of Colchester 7 and Wiston the depth of the main flue

is comparatively slight (*c.*300 and *c.*350mm respectively) but at Arbury 1 it is 900mm (McWhirr 1979, figs 6.8, 6.27 and 6.29). The depth of the main flue at Bircholt, estimated at *c.*600-700mm, falls between these two measurements.

It was noted above that the bases of the arches that crossed the main flue at Bircholt seemed to be composed of tile fragments bonded in clay, like the surviving arch adjoining the stoke-hole. No cross-walls seem to have been present continuing from these bases to the limits of the combustion chamber. Since cross-walls are lacking, the arches spanning the main flue were the only supports for the floor of the firing chamber and presumably the width of the latter would correspond to the width of the arches, estimated on the basis of Fig. 1 to have been *c.*1.3-1.4m. The Colchester 7 kiln seems to have such an arrangement with its arch piers (*c.*300mm square) set directly against the outer walls of the combustion chamber. No trace of walls enclosing the combustion chamber and the firing chamber above it was found *in situ* at Bircholt. It is possible that these were constructed of clay blocks and that they were demolished and used to back-fill the kiln at the end of its productive life. The 'half-baked tiles' that were noted in the fill of the kiln at the time of excavation may have been part of this material and it was suggested above that the larger stones seen in the sections across the fill of the main flue may originally have formed a footing for such walling. On this basis the width of the combustion chamber is estimated at *c.*1.35m and its length is taken as *c.*3.5m. The area of the combustion chamber would have been *c.*4.7m² which would place it in the lower level of the size-range of Romano-British tile-kilns. McWhirr (1979, 104-107 table 6.1) lists ten kilns with an internal width of less than 2m, one of which is Colchester 7 with a width of 1.4m which is very close to that suggested for the Bircholt kiln.

The tegulae and the imbrex seen in Fig. 9 do not appear to be wasters and it is possible that they were used in structural features associated with the working of the kiln. At Ashted in Surrey an earlier tile-kiln was replaced at a higher level by a new kiln probably in the late second century and certain features of the older kiln were preserved. These included a box-like structure built of tegulae set on end in front of the stoke-hole of the main flue. Access to the flue was limited to a small gap in the outer wall of the box. If the box had been roofed, the gap in its outer wall could have been blocked or kept open as required to regulate the supply of air to the kiln during each firing (Bird 2016, 319, fig. 2; 321-2, figs 6 and 7). The tegulae from Bircholt seen in Figs 9 and 10 may have been used with others to form a simple structure or may simply have been set at the mouth of the stoke-hole with the same purpose. It is tempting to identify the partial tegula base with its curved broken edge as deliberately shaped to fit immediately under the stoke-hole arch but, apart from the shaping of the tile, there is no support for this suggestion. Nothing is known of the context(s) in which the tiles seen in Figs 9 and 10 were found.

At the opposite (inner) end of the Ashted kiln, close to the south-west corner, a gap through the kiln-wall was lined with imbrices; it is possible that a similar feature had once existed at the north-west corner but had not survived (Bird 2016, 319, fig. 2; 322-3, fig. 8). The excavator suggested that the purpose of the vent (or vents), like that of the vents at St Stephen's Road, Canterbury discussed above, was to draw the fire right through the kiln. We have seen in the discussion of Fig. 6

that a vent with a similar purpose may have existed in the south-east corner of the Bircholt kiln. If so, it is possible that the imbrex seen in Fig. 9 may have been used in lining this vent. It must be stressed that this, just like the use suggested here for the tegulae in Fig. 9, is speculative since the disappearance of any record made of their context(s) in 1983 has robbed us of any relevant evidence.

Had evidence for the arches above the main flue not survived at Bircholt, all that would have remained of the kiln would have been the main flue and the stoke-hole. This is precisely what is found at a number of sites noted by McWhirr (1979, 101). It seems possible that at least some of these were kilns of the Bircholt type where traces of the arches spanning the main flue did not survive.

The fortunate recording of the small hoard of five coins from the Bircholt kiln has enabled Dr Rudling to propose a date of *c.*265 -275 for the end of tile production at the site. It seems likely that the coins represent a termination deposit, a thanks-offering to a god for the resources employed and the products manufactured there. However, if the final firing of the kiln had gone wrong, as the excavator deduced from the presence of half-baked tiles in the fill of the kiln, the coins may also have been a propitiatory offering to avert the supposed anger of the gods.

A date of 265-275 for the end of tile production at the kiln coincides with the end of high-status occupation of the villa at East Wear Bay, Folkestone, which is placed before *c.*270 (Richardson 2013, 58). It seems very unlikely that the Bircholt kiln would have been supplying tiles to the villa for new building in the period of decline that preceded this. Tiles in MOLA fabric 2452, the predominant fabric represented in the tiles surviving from the Bircholt kiln, are certainly present at Folkestone among the keyed tiles studied by the writer but some certainly, and perhaps all, can be assigned a date before the third quarter of the third century. The dating also raises issues in determining what tiles were products of the kiln. Dr Betts' identification of the fabrics of tiles retained from the excavation of 1983 has shown that most belong to a coherent group of fabrics (samples 1-4 and 6-11) which could have been products of a single kiln using closely similar deposits of clay (**Table 1**). One tegula fragment (sample 5) was in a different fabric and also had a thicker base than the other tegulae (samples 1, 9 and 10) belonging to the first group of fabrics. Sample 5 is likely to have been made in the late first or the first half of the second century while samples 1, 9 and 10 were made after *c.*150. Dr Betts suggested that sample 5 may have been manufactured elsewhere and used in a building pre-dating the construction of the kiln while the main group of fabrics might represent the tiles produced at the Bircholt kiln.

It is possible, however, that the matter is more complicated. Two fragments of box-flue tile among the main group of fabrics (samples 2 and 11) have a wall-thickness of 14/15mm and 15-20mm respectively. Work by the writer on the keyed tiles from the Folkestone villa indicates that this style of combing, which does not provide an overall keying to the surface of the tile but employs bands of combing to produce a simple pattern, seems to be used in the later second century and later. This fits the dating assigned to the later tegulae (samples 1, 9 and 10). However, the thickness of sample 2 at least is more appropriate for a box-tile made in the second century rather than in the third century when the thickness tends to be greater than 20mm. It is possible either that the tile-makers at Bircholt were still producing box-tiles with a thickness that had been the second-century norm in

TABLE 1. THE FABRIC TYPES OF THE ELEVEN SAMPLES FROM BIRCHOLT FARM

Sample	Product	MoLA Fabric Group	MoLA individual	CAT fabric	Comments
1	tegula	2815	2452 (K6)	1, 2	
2	box-tile or voussoir		3025 (c.K39)		wall-thickness 14-15m; 2nd- century?
3	imbrex	2815	2452 (K6)	1, 2	
4	brick	2815	2452 (K6)	1, 2	
5	tegula	2815	3004 (K67)	13	2nd-century
6	imbrex	2815	2452 (K6)	1, 2	
7	box-tile or voussoir	2815	3006 (K7)	3, 6	
8	imbrex	2815	2452 (K6)	1, 2	
9	tegula	2815	2452 (K6)	1, 2	
10	tegula	2815	2452 (K6)	1, 2	
11	box-tile	2815	2452 (K6)	1, 2	wall-thickness 15-20mm

the third quarter of the third century or that the box-tile fragments recorded here, like the tegula (sample 5), did indeed belong to an earlier period, perhaps deriving from an earlier phase of tile-making somewhere in the vicinity of the known kiln. It was noted that Dr Williams thought it likely that the clay that he examined from the structure of the kiln was similar to the fabric of the tiles found at the kiln and that these were likely to have been manufactured using clay from a local source. In view of this, it seems most likely that all the fabrics sampled except 3004 (sample 5) were products of the Bircholt kiln, or a possible predecessor. It is to be hoped that waster-material will eventually be recovered and its fabric(s) analysed to confirm this. [table here somewhere]

The Bircholt tile-kiln is situated *c.*8km east-north-east of the Roman roadside settlement at Westhawk Farm on the outskirts of Ashford. Excavations conducted there in 1998-9 showed that in the excavated area (Area B) large-scale occupation began soon after the Roman conquest and had ceased by *c.*AD 250 (Booth *et al.* 2008, 388-89). The publication includes a report on the tile found (Harrison 2008, 259-66). None of the tile had come from a building within the excavated area of the settlement but the presence of fragments of box-tile and voussoir in the assemblage suggested the existence of a bath-building somewhere in the vicinity. All of the tile recovered could have derived from such a building and there is no reason to suppose that any other building in the settlement employed tile in its construction. The assemblage, however, does include keyed tiles and tegulae of different dates and so probably indicates at least three structural periods in the history of a single bath-house rather than the existence of more than one such building.

The Westhawk Farm report uses the Canterbury Archaeological Trust (CAT) classification of fabrics and CAT fabrics 1-3 are well represented at the site by Phase 3 (AD 70-150) (Harrison 2008, 265, table 6.22). These are the same as MOLA

fabrics 2452 and 3006, both represented at Bircholt. It is therefore possible that tiles supplied to Westhawk Farm in this period were made at a kiln of earlier date in the vicinity of the known kiln at Bircholt. However, tiles in these fabrics could be the products of other kilns elsewhere and consideration of the Westhawk Farm assemblage as a whole makes this seem more likely.

A fragment of combed box-tile from Westhawk Farm, unfortunately not illustrated, is described as 10mm in thickness (Harrison 2008, 261 type 29). It was not possible to find this in a brief search of the Westhawk Farm tile assemblage held in store at Oxford in December 2018 but two joining fragments of a similar tile 11-12mm in thickness were located. These were from Context 8473 and the fabric has been identified as MOLA 3006 (Betts 2019). These can be recognised as fragments of 'thin-walled box-tile', a type in use in baths in the first century AD, usually with scored lattice keying (Black 1997, 60-61 and 64 illus. 1). The tiles from Westhawk Farm have combed keying and may attest a bath-house constructed in the early second century.

Other box-tiles from Westhawk Farm were also examined by Dr Betts in his study. A fragment of combed box-tile 15mm thick in MOLA fabric 3006 and another 15-16mm thick in MOLA fabric 3050 (both from Context 675) have a thickness that suggests a second-century date, the tile in fabric 3050 possibly made at the kiln at Reigate in Surrey which was supplying tiles to London in the period 140-230. Again of second-century date and probably made before 150, is a knife-scored box-tile 17-18mm thick from Context 417 in a fabric similar to MOLA 3238. A further example from Context 406 is illustrated in the Westhawk tile report and is assigned to CAT fabric 23 (Harrison 2008, 262 fig. 6.17 no. 2). It is clear that these tiles replaced the thin-walled box-tiles originally used in the Westhawk bath-building later in the second century but the number of different fabrics represented, and especially the presence of a tile that may have originated from Reigate, suggest that the box-tiles may have been supplied to the site from the stock of a builders' merchant rather than directly from a number of different local tileries.

The third phase of the Westhawk bath-house is represented by a group of tiles illustrated in the report and others examined by Dr Betts (Harrison 2008, 261-3, figs 6.17, nos 3-5 and 6.18, no. 6; Betts 2019). These have a thickness in the range of c.20-22mm and can be dated to the third century; none is in MOLA fabric 2452.

The most striking difference between the fabrics present at Westhawk Farm and those from the Bircholt kiln is the much wider range represented at the former site. This probably reflects the employment of builders' merchants to supply tiles that were sourced from several tileries for work in successive building phases of what was probably a bath-building intended for the use of personnel travelling on official business on behalf of the *civitas Cantiacorum* or the provincial governor. Given these circumstances, the proximity of the Bircholt kiln to the Westhawk Farm settlement may have been a less important factor than already-existing deals between the builders' merchants and their accustomed suppliers. While samples 2 and 5 from the Bircholt kiln are likely to have been manufactured in the second century long before the known kiln was in operation, samples 1, 3, 4 and 6-11 are in fabrics (MOLA 2452 and 3006) that could have been used for tiles being made at a single kiln and it seems most likely that they are products of the (later) excavated kiln at Bircholt.

It seems likely that the third-century tile-kiln at Bircholt was producing tiles for

use in a local villa or villas. At least some villas in east Kent were in decline or deserted during the third century, including those at East Wear Bay, Folkestone, and at Marwood Farm, Aldington (Map 1). Both of these villas lay close to the coast and their desertion has been attributed to the insecurity caused by piratical raids, perhaps linked to the effects of a wider economic decline in this period (Davies 2018, 275-77). The area may well have suffered in a general economic decline resulting from the closure of the bases of the *Classis Britannica* at Dover and Lympne in the early third century and the subsequent run-down of the Wealden iron-working industry that presumably affected agricultural production and services that had been dependent on these activities. The third-century desertion of the excavated area of the settlement at Westhawk Farm is explained in this way by the excavator (Booth *et al.* 2008, 394-96).

If the coins from the kiln do represent a termination / propitiatory deposit, we have seen that the kiln will have been in operation until sometime in the period c.265-275. The implication is that its products were required for new building preceding this period. The kiln seems to have had a limited capacity and this new building may not have been on a very large scale. Such new construction may have been a purely local initiative but it may indicate the beginnings of an economic recovery following the decline and desertion of sites in the area in the mid third century. It can be suggested that major building projects (defences at Richborough and Canterbury) provided a further stimulus to agricultural production in areas of east Kent that had begun under the Gallic Empire with investment in new buildings like those supplied with tiles from the Bircholt tile-kiln.

ACKNOWLEDGEMENTS

Thanks are due to Mrs Marion Pont and her fellow-members of the Ashford Archaeological and Historical Society, especially to Mr Eddie Garrett who, as noted in the introduction, provided much of the basic evidence on which this paper relies. In addition to their specialist contributions, Dr Ian Betts and Dr David Rudling have joined in discussion of the wider significance of the site and have contributed greatly to the ideas put forward in the paper. Dr Sam Moorhead of the Portable Antiquities Scheme at the British Museum gave generous assistance with the coins and Paul Booth of Oxford Archaeology South kindly arranged access to the tile assemblage from Westhawk Farm. Historic England gave permission to make use of Dr D.F. Williams' unpublished report on the fabrics of tiles from the Bircholt kiln and Mrs Emma Holloway of the Colchester Archaeological Trust provided the drawings in Fig. 13 and Map 1, as well as providing assistance with some technical aspects of its production. Dr Philip Crummy of the Colchester Archaeological Trust, assisted in locating the kiln in the landscape as it was in 1983 and Mr Peter Joules of Bircholt Farm provided confirmation of the proposed location.

BIBLIOGRAPHY

- Abdy, R. A., 2002, *Romano-British Coin Hoards*, Princes Risborough, Shire.
 Betts, I. M., 2019, *Roman building material from Westhawk Farm, Ashford, Kent (AWF99)*.

- Betts, I., Black, E.W. and Gower, J., 1997, 'A Corpus of Roman Relief-Patterned Tile in Britain', *Journal of Roman Pottery Studies*, 7, Oxford.
- Bird, D.G., 2016, 'Ashtead Common, Surrey (England): Roman Tileworks', *Rei Cretariae Romanae Fautorum Acta*, 44, 317-25.
- Black, E.W., 1997, 'Box Flue-Tiles in Britain: the Spread of Roman Bathing in the First and Second Centuries', *Archaeol. J.*, 153 (1996), 60-78.
- Bland, R.F., 2018, *Coin Hoards and Hoarding in Roman Britain AD 43-c.498*, British Numismatic Society Special Publication 13, London, Spink & Son.
- Booth, P., Bingham, A-M. and Lawrence, S., 2008, *The Roman Roadside Settlement at Westhawk Farm Ashford, Kent. Excavations 1998-9*, Oxford Archaeology.
- Brodribb, G., 1987, *Roman Brick and Tile*, Gloucester, Alan Sutton.
- Davies, M., 2018, 'A Roman Villa at Marwood Farm, Falconhurst, Aldington', *Archaeologia Cantiana*, cxxxix, 269-79.
- Drinkwater, J.F., 1987, *The Gallic Empire*, Historia Monograph 52, Stuttgart.
- Harrison, L., 2008, 'Roman Brick and Tile', in Booth, Bingham and Lawrence, 259-66.
- Hartle, R., 2017, 'Further evidence for development east of the Roman forum-basilica: excavations at Asia House, 31-33 Lime Street, EC3', *London Archaeologist*, 15, no. 2 (Autumn), 37-40.
- Jenkins, F., 1956, 'A Roman Tillery and Two Pottery-Kilns at Durovernum (Canterbury)', *Antiq. Journ.*, 36, 40-56.
- Le Ny, F., 1988, *Les fours de tuiliers gallo-romains*, Documents d'Archéologie Française, 12, Paris.
- McWhirr, A., 1979, 'Roman Tile-Kilns in Britain', in A. McWhirr (ed.) *Roman Brick and Tile*, BAR International Series 68.
- Merrifield, R., 1987, *The Archaeology of Ritual and Magic*, London, Guild Publishing.
- Moorhead, S., Bland, R. and Pett, D., 2010, 'Hoarding in Ancient Britain', *Current Archaeology*, 248, 12-15.
- RIC Webb, P.H., 1933, *The Roman Imperial Coinage*, Volume V, Part II, London, Spink & Son.
- Richardson, A., 2013, 'Late Roman and Anglo-Saxon Folkestone', in I. Coulson (ed.), *Folkestone to 1500: A Town Unearthed*, CAT, 55-76,
- Robertson, A.S., 2000, *An Inventory of Romano-British Coin Hoards*, Royal Numismatic Society Special Publication 29, London.
- Rudling, D., 1986, 'The Excavation of a Roman Tillery on Great Cansiron Farm, Hartfield, East Sussex', *Britannia* 17, 191-230.
- Rudling, D., 2014, 'Bullock Down Revisited: The Romano-British Farm', in M.J. Allen (ed.) *Eastbourne, aspects of archaeology, history and heritage*, Eastbourne Natural History and Archaeology Society, 64-75.
- Smart, J.G.O., Bisson, G. and Worssam, B.C., 1966, *Geology of the Country round Canterbury and Folkestone*, London, HMSO.
- Williams, D.F., 1984, 'Roman tile from the tile-kiln at Bircholt, Brabourne, Kent and from Ashtead Common villa, Surrey', unpubl. Ancient Monuments Laboratory Report 4436, December 1984.