Sussex Archaeological Collections **130** (1992), 147–163

THE SIXTEENTH-CENTURY FORGE AT BLACKWATER GREEN, WORTH, WEST SUSSEX: EXCAVATIONS 1988

by Christopher Place and Owen Bedwin

This report describes the rescue excavation of a late 16th-century forge at Blackwater Green, near Crawley, West Sussex. Although two well-preserved timber water-channels and an anvil base were found, recent stream erosion meant that little else connected with the operation of the forge had survived. The case is made for a short-lived forge, the site of which was comprehensively robbed-out and levelled after going out of use.

INTRODUCTION

The site of the water-powered forge at Blackwater Green lies in a broad valley on the south-eastern edge of modern Crawley, although in the parish of Worth, West Sussex (Fig. 1; NGR TQ 292 363). It is probably one of the two forges in Worth Forest, described as belonging to Lord Abergavenny in the 1574 list of Wealden furnaces and forges (Cattell 1979). There is little else in the way of documentary record, and the forge does not appear in any subsequent list.

On the ground, the position of the forge was indicated by a bay *c.* 150 metres long and up to 3 metres high, now used as a bridle path (Fig. 2; Maidenbower Lane). No hammerpond survived, though there was a small pond at the south end of the bay, thought to indicate a former spillway (Cleere and Crossley 1985). Behind the bay was an area thickly covered with scrub and trees; there were no visible indications of archaeological remains, apart from hammerscale in the banks of Gatwick Stream (Fig. 2).

Early in 1988, the Field Archaeology Unit (hereafter FAU) of the Institute of Archaeology, University College London, was notified of proposals for large-scale residential development in the area, likely to cause considerable damage to the forge site. In March 1988, an evaluation of the degree of survival of archaeological deposits was carried out by the FAU, under the direction of Christopher Place. This took the form of three trial pits (shown in Fig. 2), plus a resistivity survey. One of the trial pits (TP2) located a substantial waterlogged timber, apparently *in situ* at the edge of Gatwick Stream. The resistivity survey identified three areas of high resistivity, indicative of timber and/or masonry structures. This implied good survival of at least some of the main features of a Wealden forge. This assessment of the site's potential was accepted by the development consortium, Taylor Woodrow Homes Ltd., Bryant Homes Ltd. and Wimpey Homes Ltd. Because the development would cause unavoidable damage, the consortium agreed to fund fully both the excavation of the site and the post-excavation work necessary to produce this report.

Large-scale excavation was therefore carried out during August to November 1988 by the FAU, under the direction of Christopher Place. Following his departure to a post with Wiltshire County Council, this report has been prepared by Owen Bedwin, with the assistance of staff within Essex County Council Archaeology Section.

EXCAVATION

After removal of dense scrub and a few mature trees from behind the bay, Gatwick Stream was temporarily diverted, and excavation proceeded as follows. There was large-scale machine clearance of humic topsoil over an area *c.* 25 metres east–west by a maximum of 20 metres north–south, straddling the former stream bed (Fig. 2). This revealed an extensive spread of charcoal-rich soil containing forge bottoms, but in which there were no visible archaeological features. (All subsequent excavation was by hand.) Next, a series of test pits measuring 2 metres by 1 metre were dug down through the charcoal-rich deposit to the orangey-brown clay subsoil. When these failed to locate any structural features, a larger area was opened up, starting from the edge of the former stream bed, and this located the northern water-channel.

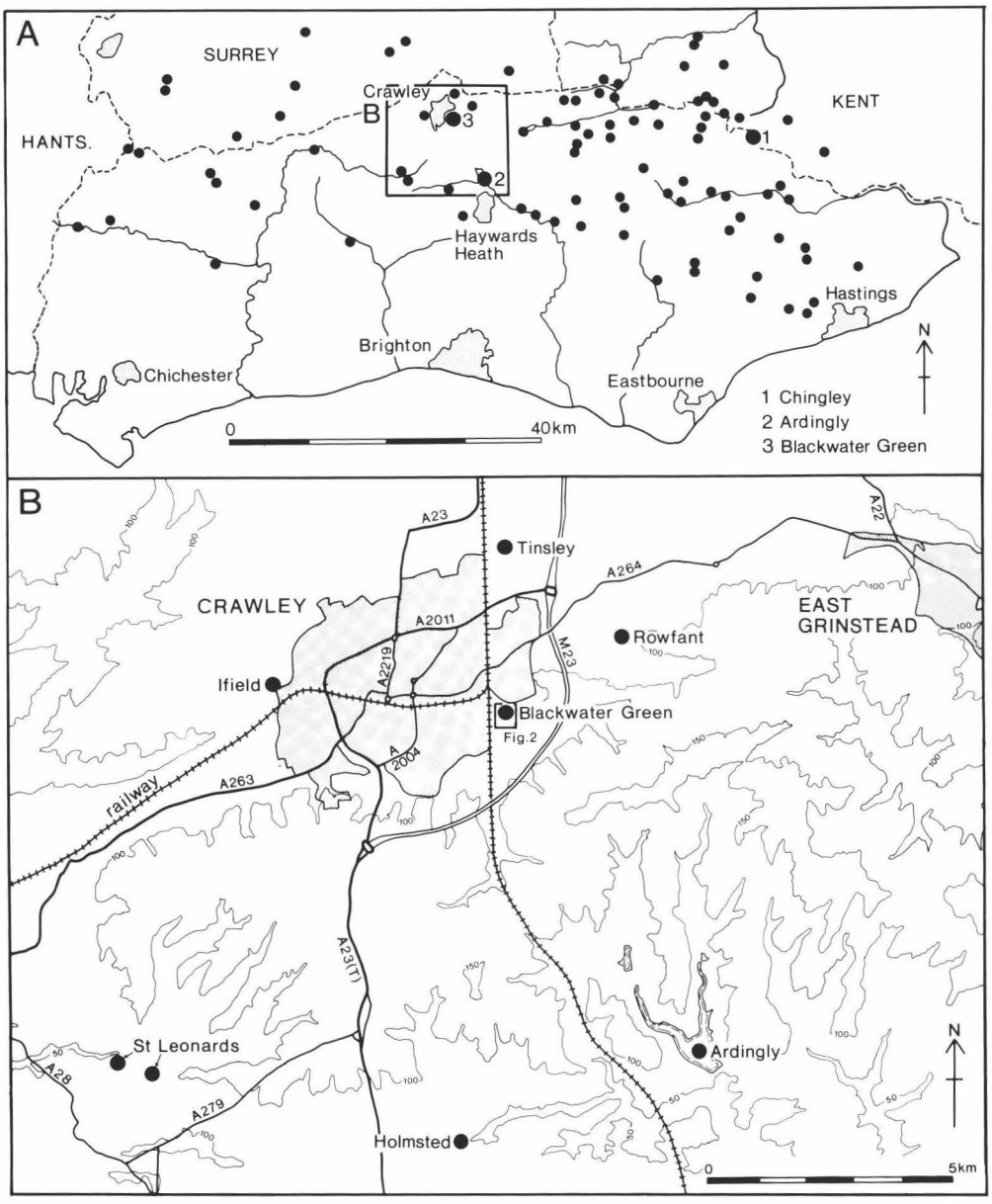

Fig. 1. Blackwater Green 1988. Top: distribution of Wealden forges (after Cleere and Crossley 1985), showing the three excavated examples. Bottom: site location, showing Blackwater Green and other nearby forges. Contours in metres O.D.

Working back from this, the anvil base and the southern channel were also exposed and fully excavated. The good condition of the timber was due to waterlogging. The area between the two channels and the areas to their immediate north and south were excavated down to the natural subsoil.

However, apart from the water-channels and the anvil base, little else survived that could confidently be assigned to the time when the

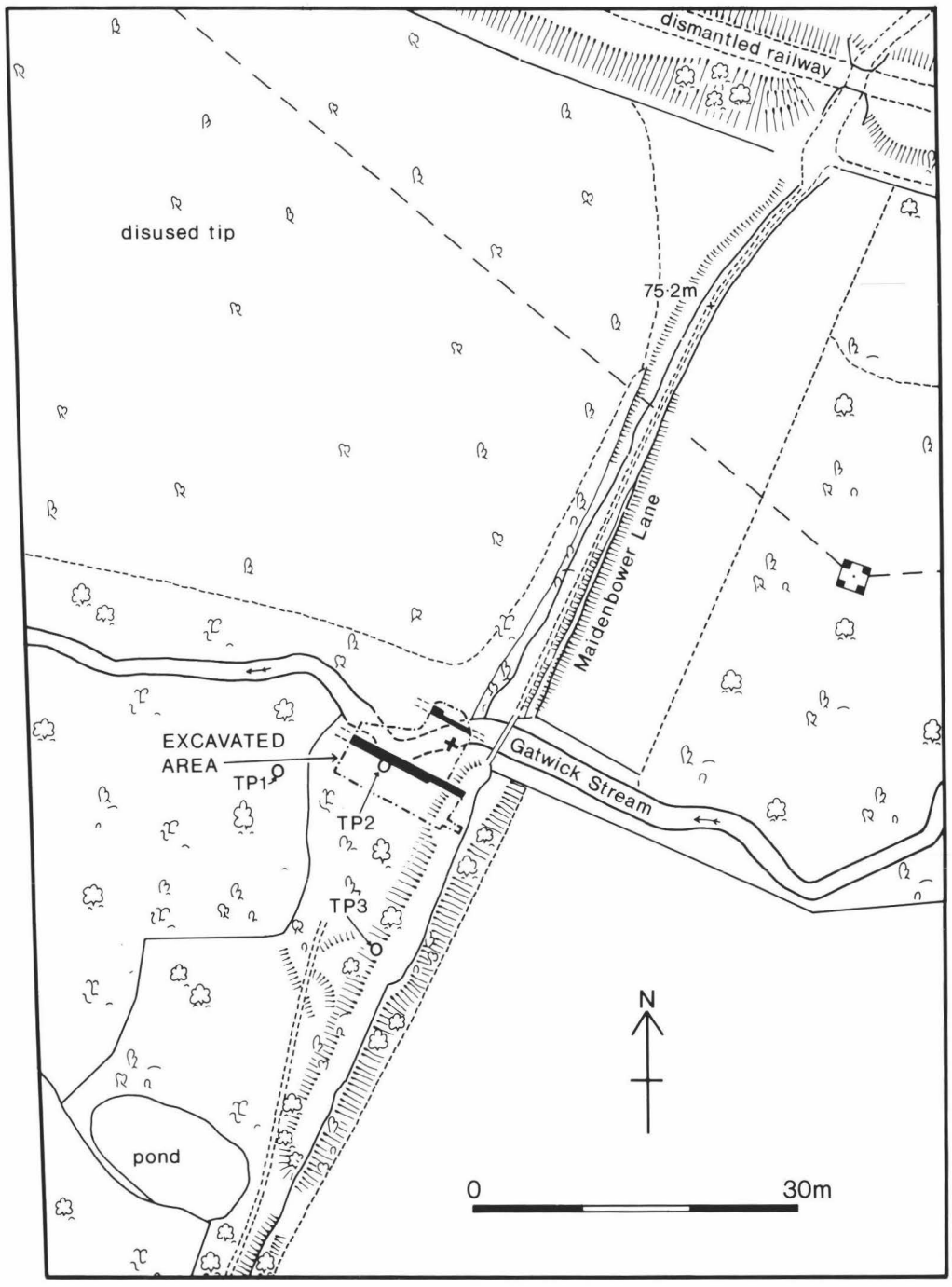

Fig. 2. Blackwater Green 1988. Location of excavation, with major timber features shown in black, and location of trial pits, TP 1–3.

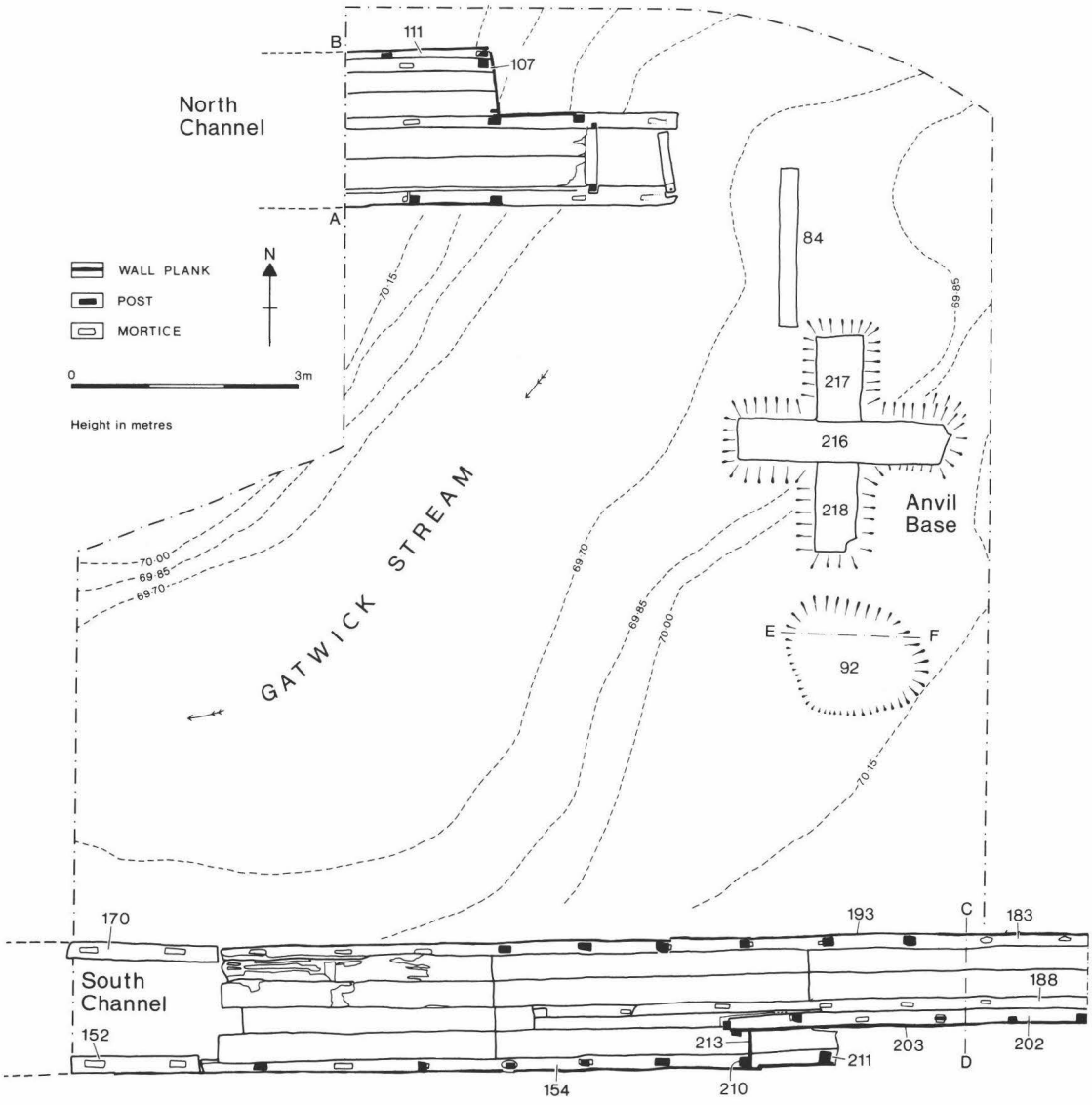

Fig. 3. Blackwater Green 1988. General site plan showing major timber features. Erosion due to Gatwick Stream (temporarily diverted during the excavation) is indicated by the contours (in metres O.D.) corresponding to the sloping sides of the stream.

forge was in operation. Pit, context 92 (Fig. 3), is thought to be related to the forge; it contained much slag and charcoal, but could not be linked stratigraphically to any of the other forge features. There was no sign of any building housing the hammer, unless timber 84 (Fig. 3) is interpreted as part of such a structure. Nor was there any indication of finery or chafery hearths. Much damage will have been done by erosion as the course of Gatwick Stream meandered across the centre of the site (Figs 2 and 3), but there was evidence too for robbing out (see below).

The three main timber structures are now described in more detail:

The northern water-channel (Fig. 4)

A 4.5 metre length was exposed (Fig. 3), but this was clearly incomplete. The channel must have extended further to the east where the wheel-pit housing the wheel which powered the hammer must have been (due north of the anvil base; Fig. 3), but this had been entirely eroded away by the stream. In fact, much of the exposed 4.5 metre stretch lay in the stream bed, and it would have been merely a matter of time before it too disappeared. The channel also extended further west, but this stretch lay beneath an unexcavated baulk (Fig. 3).

Only the channel floor survived, with just the base of one or two uprights and a little side-planking. The main longitudinal members and cross beams were in good condition. There were signs of wear on the floor planks and exposed parts of the longitudinal members. Whether this resulted from scouring during the operation of the forge or subsequent erosion by Gatwick Stream, or both, is not clear. All the timber in this channel was oak.

The uprights were set into the longitudinal beams by simple mortice and tenon joints. The cross beams were jointed at each end by identical pegged mortice and tenons. There were neat rectangular grooves in the inner edges of the longitudinal members to accommodate the floor planking, which was nailed in position.

The dimensions of the channel and its main components were as follows:

Initial width:	1.2 metres
Width at offset:	2.2 metres (2.0 metres before adding timber 111, Fig. 3)
Longitudinal members:	*c.* 25 cm. square
Cross beams:	*c.* 12–15 cm. square
Uprights:	*c.* 15 by 11 cm.
Planking:	*c.* 30–35 cm. wide by 3–4 cm. thick

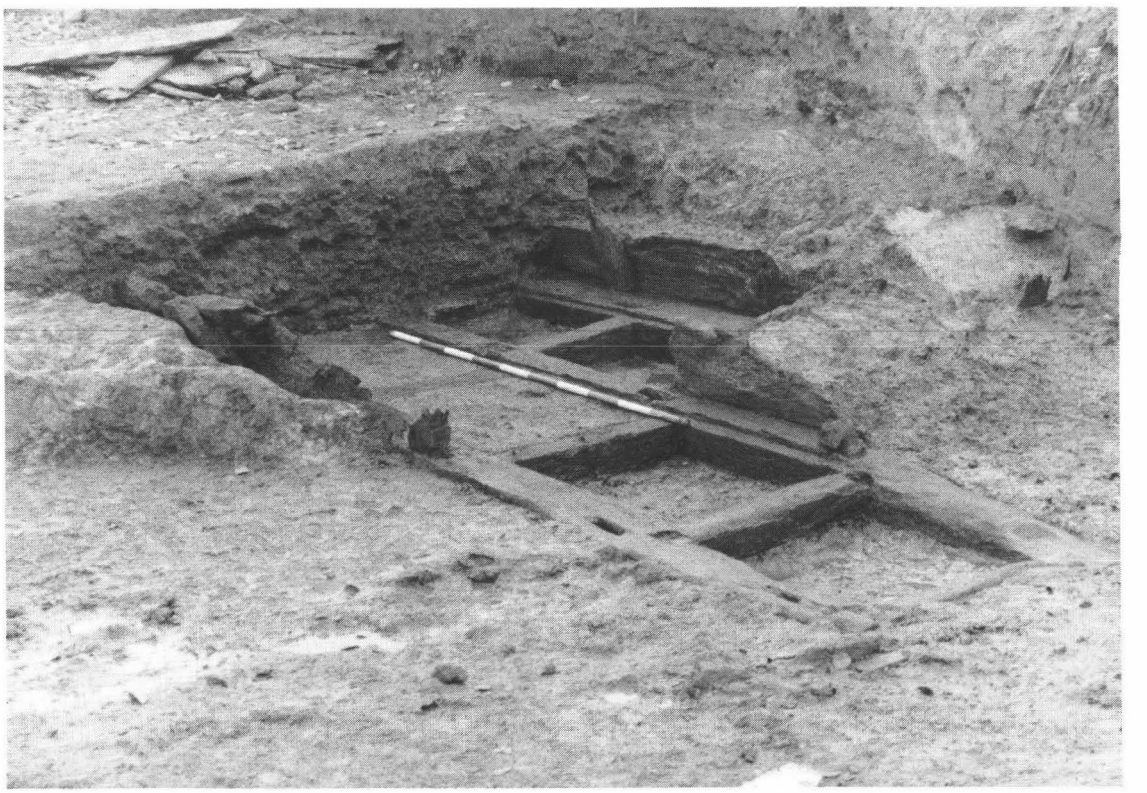

Fig. 4. Blackwater Green 1988. The floor of the northern channel with planks removed to show cross-beams; from the south-east. Scale 2 metres. Photo: G. McDonnell.

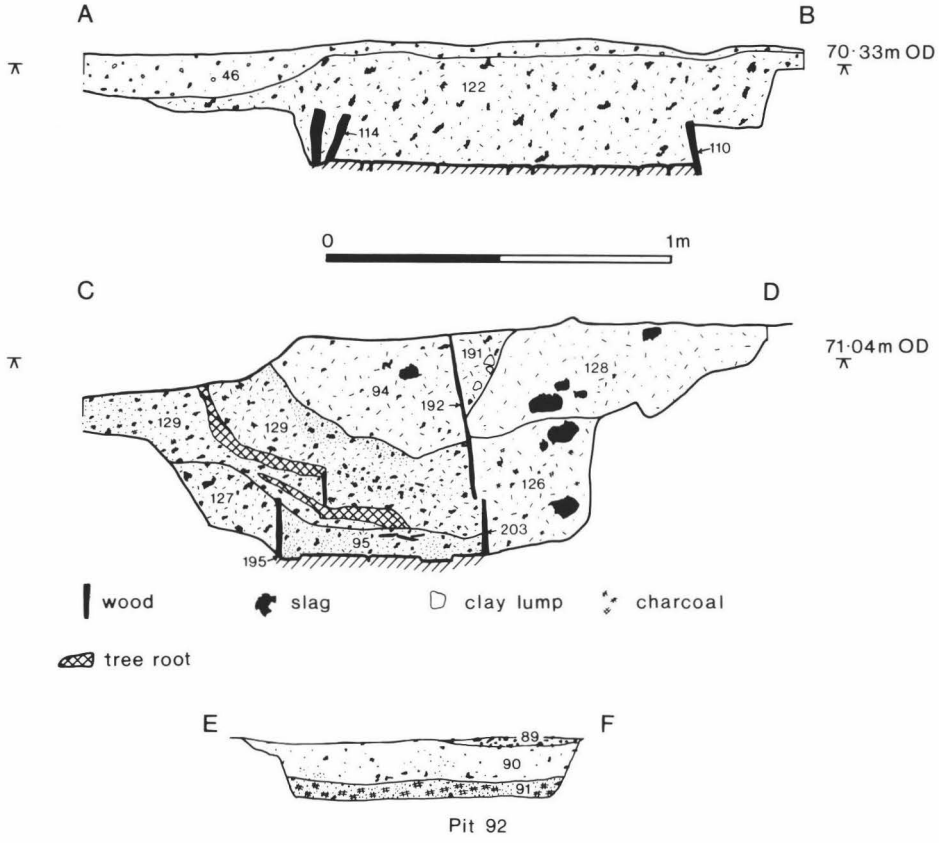

Fig. 5. Blackwater Green 1988. Sections across the northern and southern channels and pit 92. (Refer to Fig. 3 for their positions.) Note that in section CD, the position of timber 192 in the backfill is purely fortuitous; it is not structural.

The original depth of the channel is uncertain because of the considerable stream erosion. The section (A–B in Fig. 5) is thus not very informative and shows the channel at this point backfilled entirely with a compact slag-rich fill (context 122 in Fig. 5).

The southern water-channel (Fig. 6)

A length of 14 metres was excavated, though the head of the channel was not defined (Fig. 3). As with the northern channel, there was an offset chamber, and the basic construction of the floor was very similar. There was better survival of both side-planking and uprights (the latter to a height of up to 45 cm.) in the southern channel; however, this clearly did not represent the full height of the channel. Since this channel had not been subjected to stream erosion to anything like the same degree as the northern channel, the missing uprights almost certainly indicate robbing-out. The structure of this channel was basically the same as the northern channel, with the same system of joints. An isometric reconstruction of the southern channel is shown in Fig. 7; this is necessarily incomplete due to the lack of surviving evidence. The side-planking in this channel was simply set in position (not nailed or pegged) behind the uprights. This had been suspected in the northern channel, but poorer survival made this difficult to prove. The dimensions of this channel and its main components were as follows:

Initial width at eastern end; 1.2 metres
Initial width implied by timber 188; 1.0 metre
Width at offset; 1.7 metres
Longitudinal members; *c.* 20–25 cm. square
Cross beams; 15 cm. square

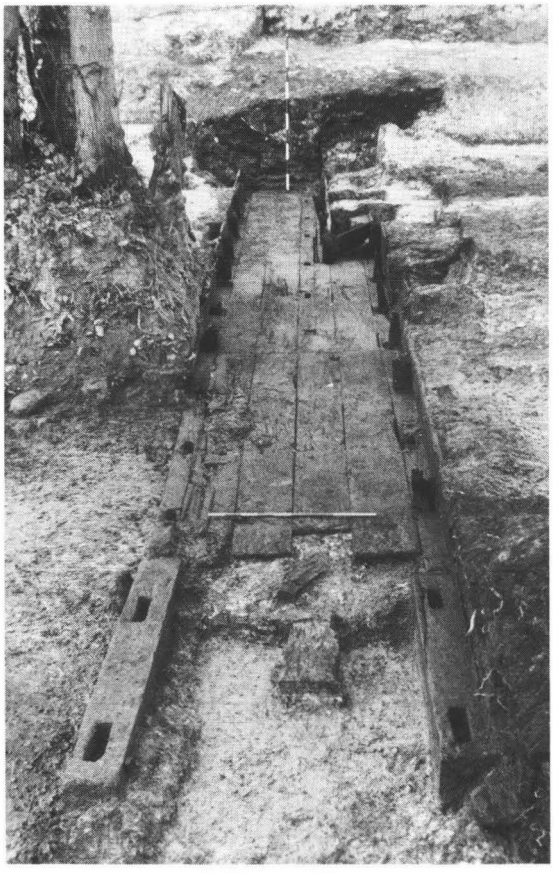

Fig. 6. Blackwater Green 1988. The southern channel from the western end. Horizontal scale 1 metre; vertical scale 2 metres. Photo: G. McDonnell.

Uprights; *c.* 15 by 12 cm.
Planking (side and floor); *c.* 30–35 cm. wide by 3–4 cm. thick.

Again, virtually all the timbers were of oak, though the one upright sampled was of ash, as was one of the planks towards the western end of the channel. If the length of the middle set of planks in the southern channel are a guide to the length of the first (easternmost) set, then the channel extended about 1 metre further east.

The sections across the southern channel were not very informative (a typical one is shown in Fig. 5). It had clearly been totally backfilled with slag-dump deposits (contexts 95 and 129 in Fig. 5).

The anvil base (Figs. 8 and 9)

This consisted of three substantial oak timbers laid in the form of a cross, set in a cross-shaped pit (Fig. 3; timbers 216, 217 and 218). Timber 216 was 2.8 metres long, with a cross-section 0.6 metre square. Timbers 217 and 218 (simply butted to 216) were each 1.2 metres long with cross-sections 0.6 metre square. There were clear signs of wear in the centre, caused by repeated hammering on the anvil above (best seen in Fig. 8). There were no signs of the anvil itself or the hammer-helve.

Other features can be summarily dealt with. Only the single straight unjointed beam, timber 84, set into the subsoil, and the pit, context 92, cut into the subsoil, are identified with the forge. Pit, 92, was an irregular, rounded shape, *c.* 1.60 metres by 1.45 metres across at the top, and cut *c.* 45 cm. into the subsoil (Figs. 3 and 5). It had a flat bottom and almost vertical sides. It contained a loose, root-disturbed, silty clay fill, with some charcoal, slag and a few fragments of burnt clay. Lacking any stratigraphic relationship with the nearby anvil base, and lacking anything, such as pottery, to date it more precisely, this pit can only be cautiously considered part of the forge. The section E–F (Fig. 5) argues against it having been left open to silt up naturally, and it was probably backfilled, like the channels, when the site was cleared. It is interpreted, very tentatively, as a quenching pit. The only other features were a series of shallow, slag-filled ruts, presumably caused by carts running north–south across the centre of the site (not shown in Fig. 3 for the sake of clarity). These clearly post-dated the abandonment of the forge.

Finds were limited. There were 183 potsherds; the few which came from a context contemporary with the forge's operation provide the only archaeological dating evidence (report below). There were 144 iron objects (of which 108 were nails), 50 fragments of waterlogged leather (some of which were very small), 17 pieces of struck flint (all residual) and three fragments of clay tobacco pipe. Of almost as much significance as the presence of these finds was the total absence of any building debris. There were five fragments of brick and one roof tile, plus some discarded pieces of timber in the channels. Finally, from context 95, the lower fill of the

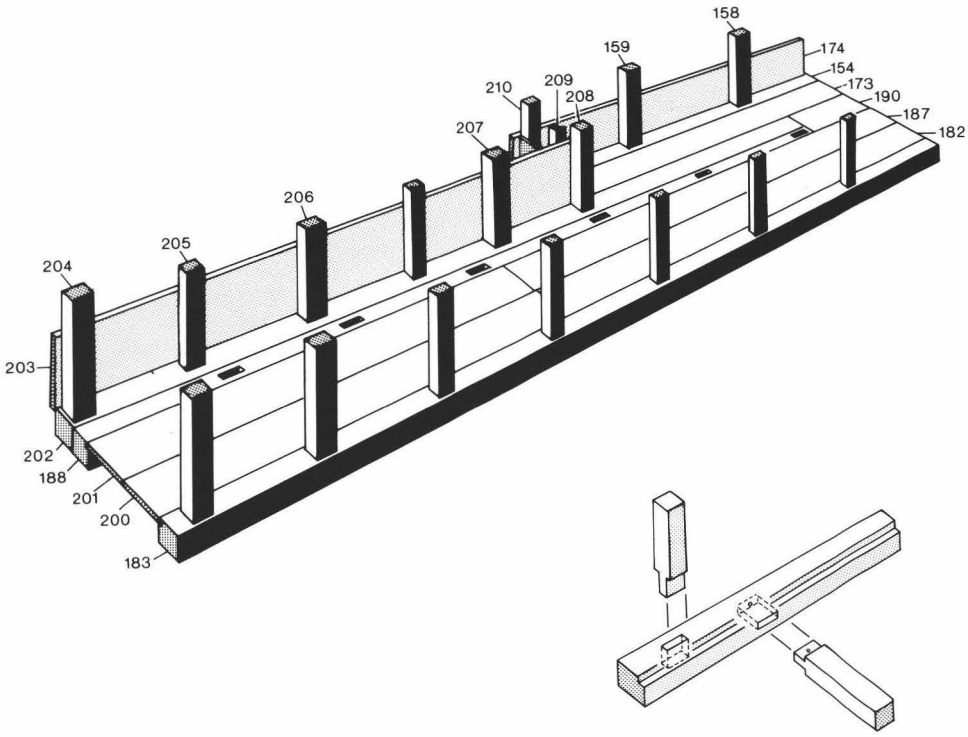

Fig. 7. Blackwater Green 1988. Top: three-dimensional reconstruction of the southern channel, viewed from the north-west. The upper part of the framework is not shown for lack of evidence. Also the side planking on the near side is omitted for clarity. Bottom: detail of the jointing (identical with the northern channel).

southern channel (Fig. 5), came a pile of four rectangular wooden boards, typically 48 by 17 by 2.5 cm. These were chamfered along one edge and were almost certainly bucket boards from a water wheel. There were also a number of fragmentary timbers of similar appearance.

SPECIALIST REPORTS

Post-medieval pottery (by Helen Walker)

The pottery comprised 183 sherds, weighing *c.* 2.8 kg. With the exception of a single sherd, all the material was post-medieval.

Method

As the pottery belongs to the post-medieval period, when pottery-making became more uniform, it has been possible to use the classification devised for Essex pottery (Cunningham 1985). However, for the earthenwares, Streeten's (1979) fabric descriptions for the Hartfield area of Sussex have been used.

The fabrics

These were classified as follows:

Red and grey sand-tempered ware (Streeten 1979)

Post-medieval earthenware; this was by far the commonest fabric type. It has been classified as Streeten's type E (iv)—'other hard-fired, smooth-surfaced earthenwares', although some contexts produced a distinctive but unattributed type of earthenware, described in the text. Black-glazed wares are also included as post-medieval earthenware.

Raeren stoneware (Hurst *et al.* 1986)

Frechen stoneware (Hurst *et al.* 1986)

Southern white ware (or Surrey-Hampshire border ware) (Holling 1971)

English tin-glazed earthenware (Draper 1984)

Fig. 8. Blackwater Green 1988. The anvil base from the south-east. Note the wear caused by the forge hammer in the centre. Scale 1 metre. Photo: G. McDonnell.

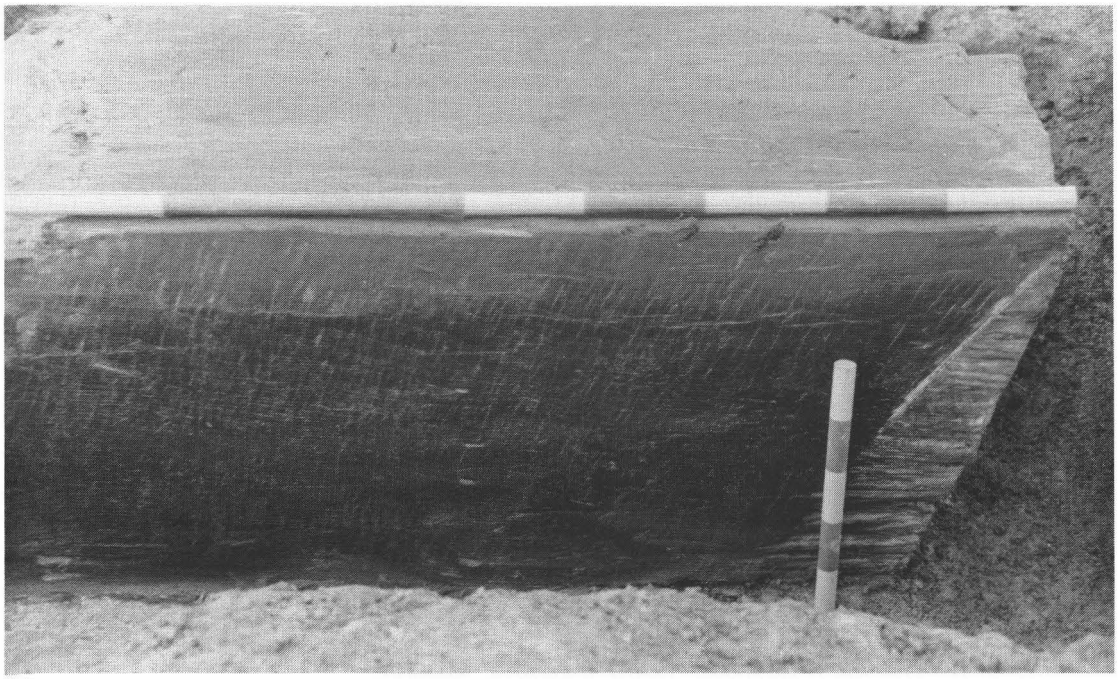

Fig. 9. Blackwater Green 1988. Detail of tool marks on the side of the anvil base. Vertical scale 25 cm. Photo: G. McDonnell.

Nottingham/Derby stoneware (Draper 1984)
English stoneware (Draper 1984)
English porcelain (Draper 1984)
Staffordshire ironstone types
Late kitchen earthenwares

Pottery contemporary with the working of the forge

Because of the damage done by stream erosion (Fig. 3), hardly any contexts remained which could confidently be linked with the operation of the forge. Of these, only one produced any pottery; context 76, a charcoal spread at the outside upper edge of the northern channel. The pottery consisted of two sherds of Southern white ware and a fragment of post-medieval earthenware in a creamy orange fabric with occasional veins of lighter coloured clay and with darker surfaces. The texture is smooth with no obvious added tempering. The sherd has an internal lead glaze and is iron-stained. (There was also a residual medieval sherd in red and grey sand-tempered ware.) The presence of the Southern white ware would date the deposit to not before the late 16th century. The distinctive post-medieval earthenware is not so easy to date (but see discussion of jar rim from context 95, below).

Pottery from backfill in the southern channel

Sections across both channels tell the same story; rapid and extensive backfilling with slag-rich material. Only deposits in the southern channel yielded pottery; contexts 95 (Fig. 5; CD) and contexts 69, 75, 77 and 78 (not shown in section). Context 95 produced an earthenware jar rim (Fig. 10.1) in the unusual fabric described above. It is paralleled by a vessel found at the Lower Parrock kiln, but is not a product of that kiln (Freke 1979), and has been classified by Freke as 'alien' local ware. However, it is likely to have been contemporary with the pottery made at Lower Parrock, giving an early 16th-century date for the jar. Context 95 also produced sherds of Southern white ware and one sherd of Frechen stoneware with a mottled tiger ware salt glaze. The remaining pottery is all post-medieval earthenware. Three rims are present (Fig. 10.2–4), comprising a flanged ?dish rim, collared rim perhaps from a jar, and a triangular beaded rim of unidentified form. The latest pottery from this group is the mottled Frechen stoneware dating from the late 16th to the late 17th century. The Southern white ware fits in with this, and the flanged dish rim is a similar shape to those found on Metropolitan slipwares of the 17th century. Only the jar (Fig. 10.1) could be earlier, but then it could be a long-lived form.

The other contexts (69, 75, 77 and 78) produced only two types of ware; German stonewares and post-medieval earthenware. Part of a Raeren globular drinking jug with all over external brown glaze came from context 78. Also in this context were stoneware sherds with a slightly mottled brown salt glaze; they belong to the upper part of a narrow-necked jug and may be Frechen products. In context 69 was a flat stoneware base showing concentric arcs on the underside where wire was used to remove the pot from the wheel. This is diagnostic of Frechen stoneware.

As for the earthenwares, many seem to be of the distinctive fabric noted above. Forms comprise two very similar glazed jugs with flared rims and grooved handles where the groove tapers to a point as it meets the handle (e.g. Fig. 10.5). Of the other earthenwares, a black-glazed tyg base (Fig. 10.6) was found in context 77. All the earthenwares are iron-stained and there are cross fits between the earthenwares in all four of the contexts (see table in Archive).

The dating of this group of pottery from backfill deposits may not be very much later than that from context 76, contemporary with the forge. The Raeren stoneware jug is dated to the first half of the 16th century (Hurst *et al.* 1986), but may have been old when discarded; it is unlikely to have been residual because of the large size of the fragment (*c.* 20 per cent of the pot). The tyg (Fig. 10.6) has a broader date range, as black-glazed wares were introduced into other parts of the country from the early 16th to the 17th centuries (Jennings 1981). The flanged dish (Fig. 10.2) may suggest a 17th-century date.

Pottery from other post-abandonment contexts

The slag dumps and other slag-rich deposits produced pottery ranging from the 16th to the 20th century. This material is fully recorded in

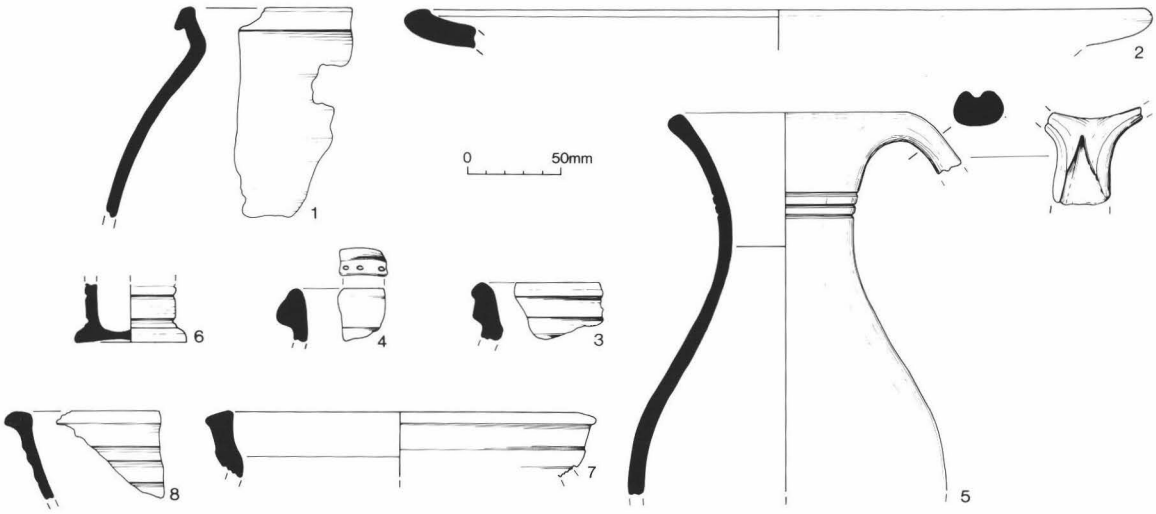

Fig. 10. Blackwater Green 1988. Post-medieval pottery.

the Archive, but does not merit detailed publication. Two sherds are worth noting; a lid-sealed jar rim in post-medieval earthenware (Fig. 10.7), and a Southern white ware bowl rim (Fig. 10.8).

Catalogue (Fig. 10)

1. Jar rim: post-medieval earthenware; all over internal dark brown glaze, splashes of glaze externally; some iron staining. *Context 95* (Fig. 5; CD).
2. Dish rim: post-medieval earthenware; internal plain lead glaze; abraded. *Context 95.*
3. Jar rim: post-medieval earthenware; rough abraded surfaces; oxidised but with a grey core in places. *Context 95.*
4. Rim: post-medieval earthenware; thick pale grey core, buff-orange margins and external surfaces; internal decayed green glaze extending over rim; impressed dimples on rim. *Context 95.*
5. Jug: post-medieval earthenware; partial external plain lead glaze with glaze extending to inside of neck; incised horizontal lines around neck; heavily iron stained, especially internally. *Contexts 75 and 77.*
6. Tyg base: post-medieval earthenware; all over black manganese glaze; iron stained. *Context 77.*
7. Lid-seated jar rim: post-medieval earthenware; internal very dark green glaze; some iron staining. *Context 46.*
8. Bowl rim: Southern white ware; internal apple-green glaze. *Context 61.*

The ironwork (by Hilary Major)

A total of 144 pieces of iron were examined, of which 108 were nails. These latter are considered separately below; of the remaining 36 pieces, nearly half came from context 95, a slag-rich fill in the lower part of the southern channel (Fig. 5; CD).

The assemblage is notable for the almost complete absence of the 'domestic' ironwork normally found on archaeological sites—objects such as knives, small personal items, and door and furniture fittings. A number of pieces of sheet iron and strip fragments were found, but all were broken and may have been scrap, apart from a perforated plate from context 95 (Fig. 12.9). Some of the other iron may also have been scrap metal, e.g. a cylindrical object from context 78 (Fig. 12.11), and the bars from context 95. Most of the actual objects present would have been associated with iron-working, including wedges, punches, spikes and a possible chisel. The chisel (context 169; Fig. 13.14) and some of the wedges appear to have been damaged before they were discarded, suggesting that they too might be regarded as scrap metal. The small range of object types at Blackwater Green may be contrasted with the Bewl Valley ironworks, where tools such as wedges were common, but a wide range of other object types was also present.

Context 95 contained several roughly rectangular blocks (Fig. 11.2–5), which may have been blanks for making wedges.

The nails

Of the 108 examined, 69 were complete. Only four contexts (45, 75, 77 and 95) contained more than 10 nails, the largest group being from context 95 (37 samples). Preservation was generally good. In depth analysis was not considered worthwhile because of the small size of the assemblage, but some comments may be made.

The nails were fairly uniform in size and shape. Two thirds were between 50 mm. and 70 mm. long; the average length was 63 mm. The length range was 28–137 mm. but only 3 nails were over 90 mm. long. Heavy nails for use in structural timber are thus virtually absent. Head shapes were varied—round, square or rectangular, but most commonly oval (41 per cent of examples). The majority had flat heads, but three distinctive head types were noted and have been illustrated (Fig. 13.15–17):

Type A: The head had four facets; the shape of the head was variable; round, oval, square or rectangular. The head shape may not be significant. A group of nine type A nails from context 95 contained both square and oval heads. (18 examples)

Type B: oval or rectangular head, with chamfered corners. (13 examples)

Type C: a rectangular head with four facets forming a longitudinal ridge. (1 example)

Definition of these nail types was made possible by the good preservation of the iron. Some of the other nails may have had similar heads, but are too heavily corroded to be identified.

Catalogue of illustrated pieces (Figs 11–13)

1. Spike with square section, becoming rectangular towards the point. The top is slightly angled. Good condition. L 157 mm; section of head 16 × 15 mm. *Context 46.*
2. Block with slightly rounded ends. 100 × 29 × 27 mm. *Context 95.*
3. Block with irregular ends. 209 × 60 × 14 mm. *Context 95.*
4. Block, slightly curved and tapering. 95 × 24 × 19 mm. *Context 95.*
5. Block; slightly curved. 110 × 58 × 42 mm. *Context 95.*
6. Wedge, damaged at both ends. 102 × 50 mm., maximum thickness 18 mm. *Context 95.*
7. A thin wedge; the thicker end has a slight flange, probably caused by hammering, and the point is irregular. 160 × 63 mm., maximum thickness 12 mm. *Context 95.*
8. Rather crudely shaped small wedge. 97 × 26 × 7 mm. *Context 95.*
9. Triangular plate with a single circular perforation. Probably the end of a hinge strap or similar fitting. 88 × 2 mm., maximum width 40 mm. Diameter of perforation 6 mm. *Context 95.*
10. Spike with slightly expanded head. L 107 m., maximum section 24 × 17 mm. *Context 95.*
11. Solid cylinder, slightly bent, with a flattened oval head and a hollowed base. This is probably an artefact, although the irregularity of its shape suggests it might be scrap metal or processing waste. L 79 mm., diameter *c.* 24 mm., head 39 × 30 mm. The hollow in the base is *c.* 3 mm deep. *Context 78.*
12. Circular sectioned rod, pointed at one end and broken at the other. Slightly bent 100 mm. from the point. L 354 mm., diameter 18 mm. *Context 90.*
13. Wedge, or possibly a broken pick-head, with a constriction towards the thicker end. L 100 mm., maximum section 25 × 13 mm. *Context 95.*
14. Tapering bar, flattened at one end. This may be a chisel, but the point is broken. L 70 mm., maximum section 12 × 9 mm. *Context 169.*
15. Nail, example of type A. *Context 95.*
16. Nail, example of type B. *Context 95.*
17. Nail, example of type C. *Context 95.*

Summary of unillustrated iron

This included further bars or bar fragments, sheet and strip fragments and spikes. The Archive contains a fuller description.

Leather (by Jon Wallis)

Fifty fragments of waterlogged leather were recovered; many were very small. Twenty one were shoe fragments and eight were part of straps or harness. This material does not merit detailed publication; a full description is to be found in the Archive.

Flintwork

A total of 17 humanly-struck flakes were recovered from nine contexts. All were residual and offer no scope for dating.

Clay pipe

Three small fragments were found, all in post-abandonment contexts. The size of the fragments precludes precise dating.

Building materials

These consisted of brick and tile, both in very small quantities. There were five fragments of brick and one of unglazed ridge tile. One of the

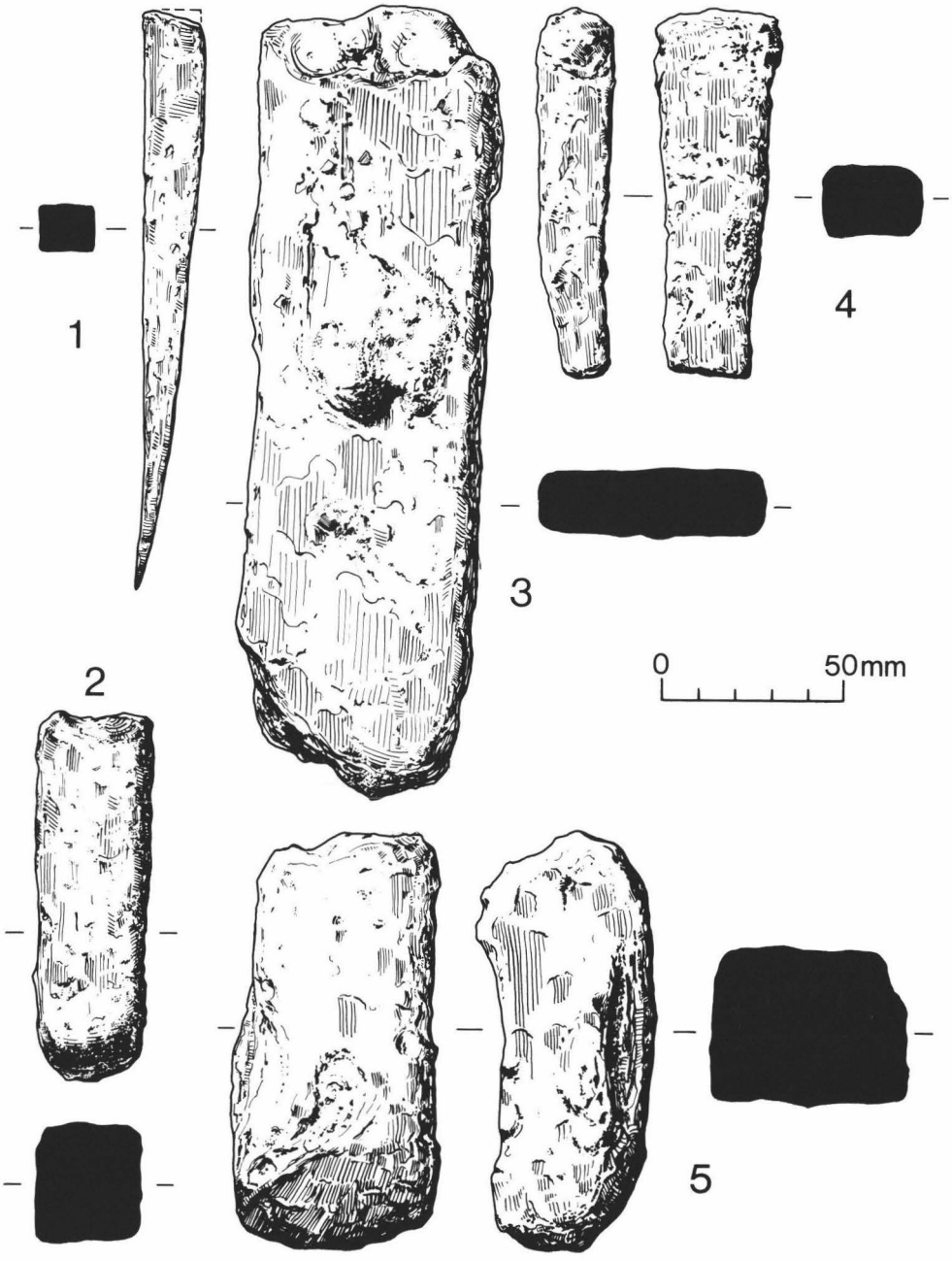

Fig. 11. Blackwater Green 1988. Iron objects.

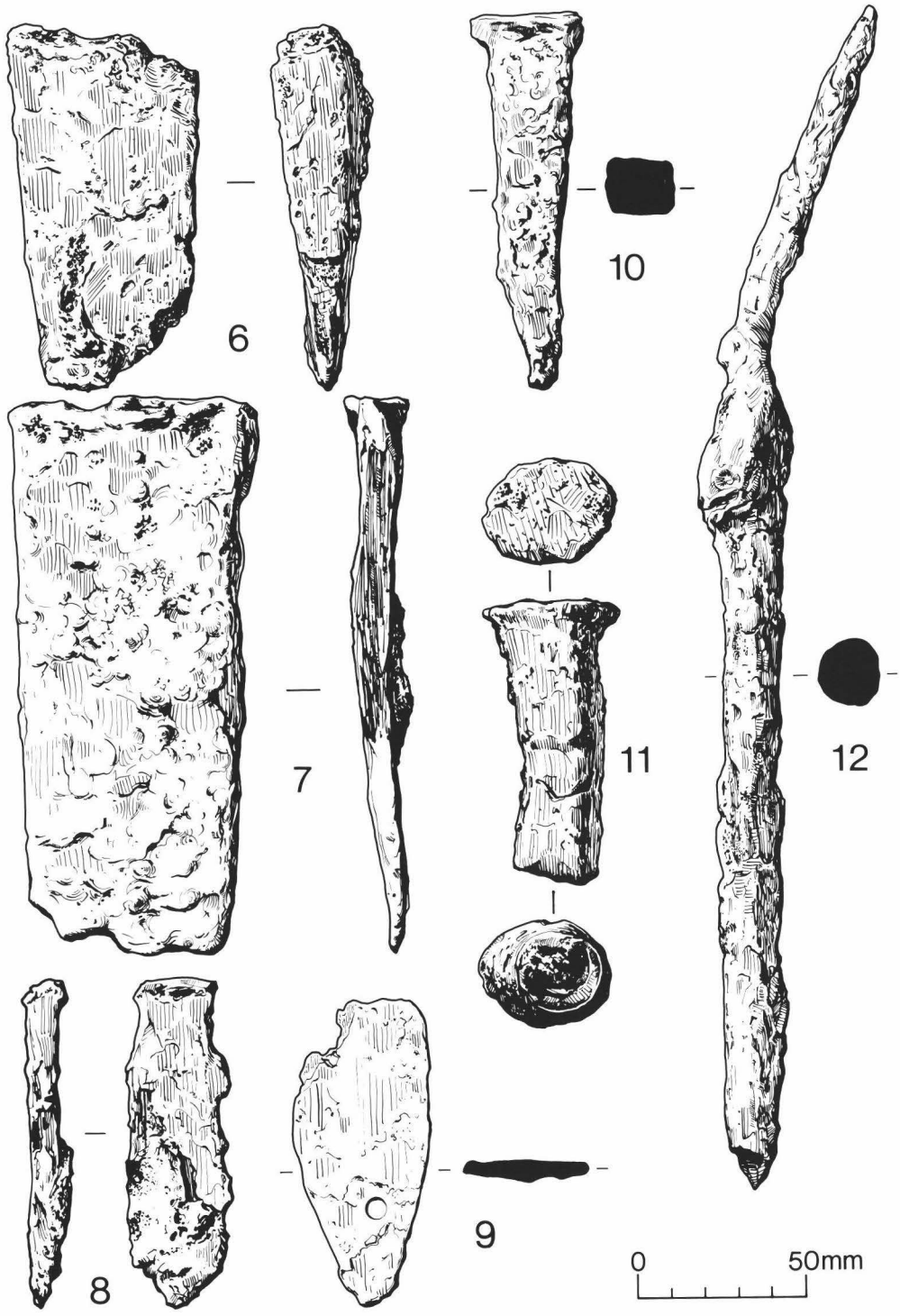

Fig. 12. Blackwater Green 1988. Iron objects.

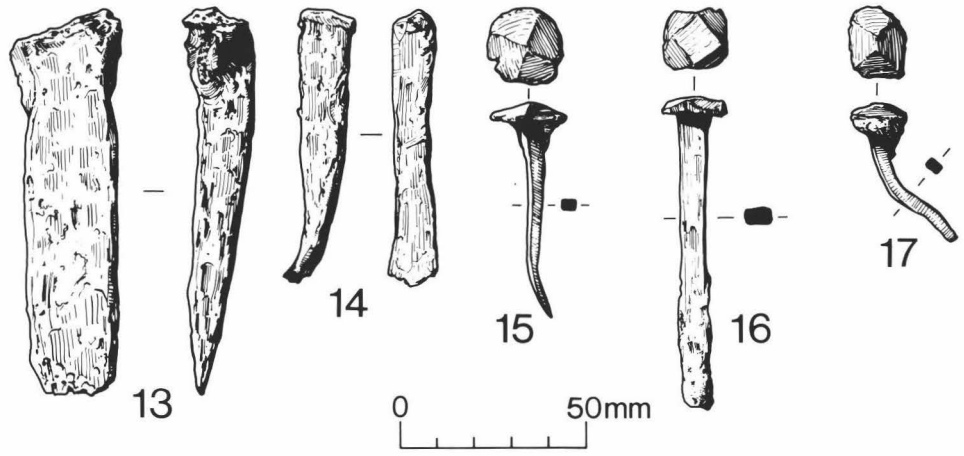

Fig. 13. Blackwater Green 1988. Iron objects.

brick fragments came from context 95 (Fig. 5, CD), and was very water worn.

DISCUSSION

Blackwater Green is the third Wealden forge to have been excavated, the other two being Chingley (Crossley 1975) and Ardingly (Bedwin 1976). It is therefore something of a disappointment that the survival of structures was poorer than these two previously excavated sites; this makes certain aspects of interpretation rather difficult.

The single documentary reference, the 1574 list, and the pottery contemporary with the operation of the forge are compatible. However, it is not entirely clear whether Blackwater Green was a long-lived forge or not. The evidence, such as it is, remains circumstantial rather than compelling. The non-appearance of Blackwater Green in subsequent lists is certainly indicative; nearby Tinsley Forge, for example, was also operating in 1574, but is noted in later lists up to 1717 (Cleere and Crossley 1985). Equally, the date range of the pottery contemporary with the forge need not be very different from that of the pottery recovered from the slaggy deposits dumped into the southern channel, implying a short life for the forge. However, since the two groups of pottery consist of only a few sherds, too much reliance should not be placed on this. Finally, the almost complete lack of those small metal items which normally build up on a long-lived site (e.g. door fittings, knives, etc.) is significant.

Against these observations, the evident re-modelling of both channels might be thought to suggest a fairly long life for the forge. The northern channel (Fig. 3), although largely of a single build, had been widened along its offset by the width of the longitudinal beam 111. The southern channel displays a more complicated sequence. It may have begun life as a simple channel with no offset, defined north and south by longitudinal beams 183 and 188, respectively (Fig. 3). The eastern end was widened by the width of beam 202, and the offset part of the channel added, though not necessarily simultaneously. In addition, the point at which the channel widened was shifted, with side plank 213 cutting off a short stretch to the east. There is no way of knowing whether these changes took place as a single episode or several, or over what period of time, or how they relate to the widening of the northern channel. It should be emphasised that the structural changes in the southern channel do not *inevitably* imply a long chronological sequence. The main structural

elements in a water channel are subject to considerable wear, especially in the wheel-pit area and may need regular replacement. However, the *widening* of a channel may indicate rather that design factors are involved, i.e. that the original configuration may not be working effectively and a new lay-out is needed. This, of course, could be the case after only a year or two of operation. On balance, the evidence summarised above suggesting a short lifespan for the forge may be thought the more convincing.

What happened after the forge stopped working is perhaps less ambiguous. The absence of any structural debris apart from a few bits of brick, tile and wood suggests that the forge was robbed of all materials which could be re-used elsewhere (even allowing for the destructive activity of Gatwick Stream after abandonment).

The complete backfilling of both channels with dumps of slag (Fig. 5) indicates levelling of the site using slag which accumulated during the operation of the forge. The fact that these slag deposits go right down to the floor planking in both channels implies little or no delay between the forge ceasing work and the backfilling, otherwise silty deposits would have begun to collect. The whole area subsequently became overgrown.

After considering the sequence of events at Blackwater Green itself, it is instructive to compare the lay-out here with Chingley and Ardingly. All three sites have two parallel channels, with forge operations taking place in the area between them. But at each of the three sites the configurations were different. At Ardingly (Bedwin 1976), one channel was the hammer race, the other (offset) was for chafery and finery. At Chingley (Crossley 1975), the hammer and finery wheels were set in tandem in the same channel, in spite of potential drawbacks (early phase). Later on, the hammer wheel was moved to the other channel, with the chafery wheel in an offset, while the finery wheel stayed in its original channel. Blackwater Green differs from these in that *both* its channels had offsets and it is therefore unfortunate that so little evidence survived between the channels to understand how the four water-wheels implied by this configuration operated. One can begin by identifying a wheel-pit (now lost by erosion) due north of the anvil base (Fig. 3) as housing the wheel driving the hammer, although the existence of timber 84, which seems to have been *in situ* when excavated, is hard to interpret, unless it was positioned beneath the floor of the putative wheel-pit. The remaining three wheels would have powered chafery and finery hearths, though because of the lack of evidence, it is impossible to say how these disposed.

It is also noteworthy that each of the three Wealden forges has demonstrated a different type of anvil base. At Chingley, a 1.7 metre length of oak tree-trunk was used, held in place by substantial radial timbers, the whole structure being set in a pit. At Ardingly, a 1.0 metre length of tree-trunk was set in the ground and held in position by a triangle of timbers. Both differ considerably from the substantial cross-shaped timber structure at Blackwater Green.

What emerges from these comparisons is that there was no uniform lay-out for the late 16th-century Wealden forge; the contrasts between Blackwater Green and Ardingly, both mentioned in the 1574 lists, and only a few miles apart, are considerable. It would seem that the local traditions of building water-powered sites either for the grinding of grain or for fulling were adapted with great versatility for the iron industry.

Acknowledgements

The authors are grateful to the development consortium of Taylor Woodrow Homes Ltd., Bryant Homes Ltd. and Wimpey Homes Ltd., for fully funding this project, through the good offices of Grove Consultants; to Crawley Borough Council for providing accommodation for site staff; to those taking part in the excavation (Lawrence Pontin, Rod O'Shea, Miles Russell, Greg McDonnell, Mark Hollow); to those specialists who have provided reports cited above; to Anne-Marie Bojko for *x*-raying the iron objects; and to Miranda Bedwin, Roger Massey-Ryan and Nick Nethercoat for the illustrations. The finds are in Horsham Museum (Accession no. 1989.701), along with a copy of the Archive. Further copies of the Archive are held in the West Sussex SMR in Chichester, and at the Institute of Archaeology, University College London.

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