

THE EXCAVATION OF A ROMANO-BRITISH IRON WORKING SITE AT BROADFIELD, CRAWLEY, WEST SUSSEX

Excavated by the late John Gibson-Hill and edited for publication by Caroline Cartwright with contributions by D. S. Butler, S. D. Hamilton, C. Johns, P. J. Ovenden and D. R. Rudling

Broadfield, the most north-westerly of the known early Wealden iron sites, was excavated from 1970–1975 (Fig. 1). The site consisted of ore-workings (mine-pits) extending for several kilometres along an outcrop of clay ironstone and associated industrial and domestic areas. There is some possible evidence of agriculture being practised here before or during the late Iron Age. By that time a settlement was established at Goffs Park, the inhabitants using Eastern Atrabatic pottery and manufacturing iron in cylindrical shaft furnaces (to date the earliest examples to be found in Britain, with radiocarbon dates of 60 b.c. and 190 b.c.). Shortly after 43 A.D. the settlement at Goffs Park was abandoned and a new site founded in the vale of Broadfield.

This new site consisted of a rectangular enclosure with several rectangular domestic buildings. To the south of this area on the adjacent bank of the River Mole, iron was smelted in what appear to have been free-standing cylindrical shaft furnaces and then consolidated in a stone-lined forge.

The ironworks and reservoir covered an area of roughly the same dimensions as that occupied by the domestic site. The need for deforested land on which to erect more furnaces, and possible localised pollution, were factors that brought about the demolition of the settlement and a move of quarters to Site 4. Industrial activity continued on Site 1 and was expanded north of the Mole to Site 2.

There followed (early 2nd century A.D.) at least one other major change to the site when the domestic settlement in the vale was closed in favour of a new establishment on the Weald clay and sandstone ridge to the north (Southgate West). Iron working continued at Broadfield until the 3rd century, if not later.

The site lacks uniform vertical stratification, with most of the remains consisting of features cut into the Weald clay, and with ploughing and

erosion having removed all other traces of occupation. This, and the detrimental effects on small finds of an acidic soil and conditions prevalent on iron working sites, made it impossible to date this settlement precisely using conventional techniques. Consequently, the sequence described above is based on two absolute dating processes: Carbon 14 and archaeomagnetism. The results obtained from features representative of each phase were corroborated by the more general date indicated by the pottery sequence.

Background

John Gibson-Hill started excavating the Romano-British industrial site centred on Broadfield south-west of Crawley in 1970, in advance of a series of building developments. Excavations continued into 1975, after which he started the preparation of the report intended for publication. His untimely death occurred before the report was completed.

Unfortunately the nature and state of the surviving site documentation is patchy and incomplete in a number of key aspects. It has been almost impossible to match contextual information relating to material with contextual information on the plans, sections (where present), site sketches and interpretation. The collator has therefore had to present, as closely as possible, John Gibson-Hill's actual descriptions, text and interpretation, fully recognising that such work (carried out in the mid and late 1970s) must of necessity be evaluated in the light of much subsequent research and excavation in the Wealden area. The reader is therefore strongly urged to consult the work of Henry Cleere, David Crossley, Fred Tebbutt and members of the Wealden Iron Research Group (especially Cleere and Crossley 1985) when considering the Broadfield report. On the same principle, in order to preserve 'impartiality', the decision has been made to respect John Gibson-Hill's

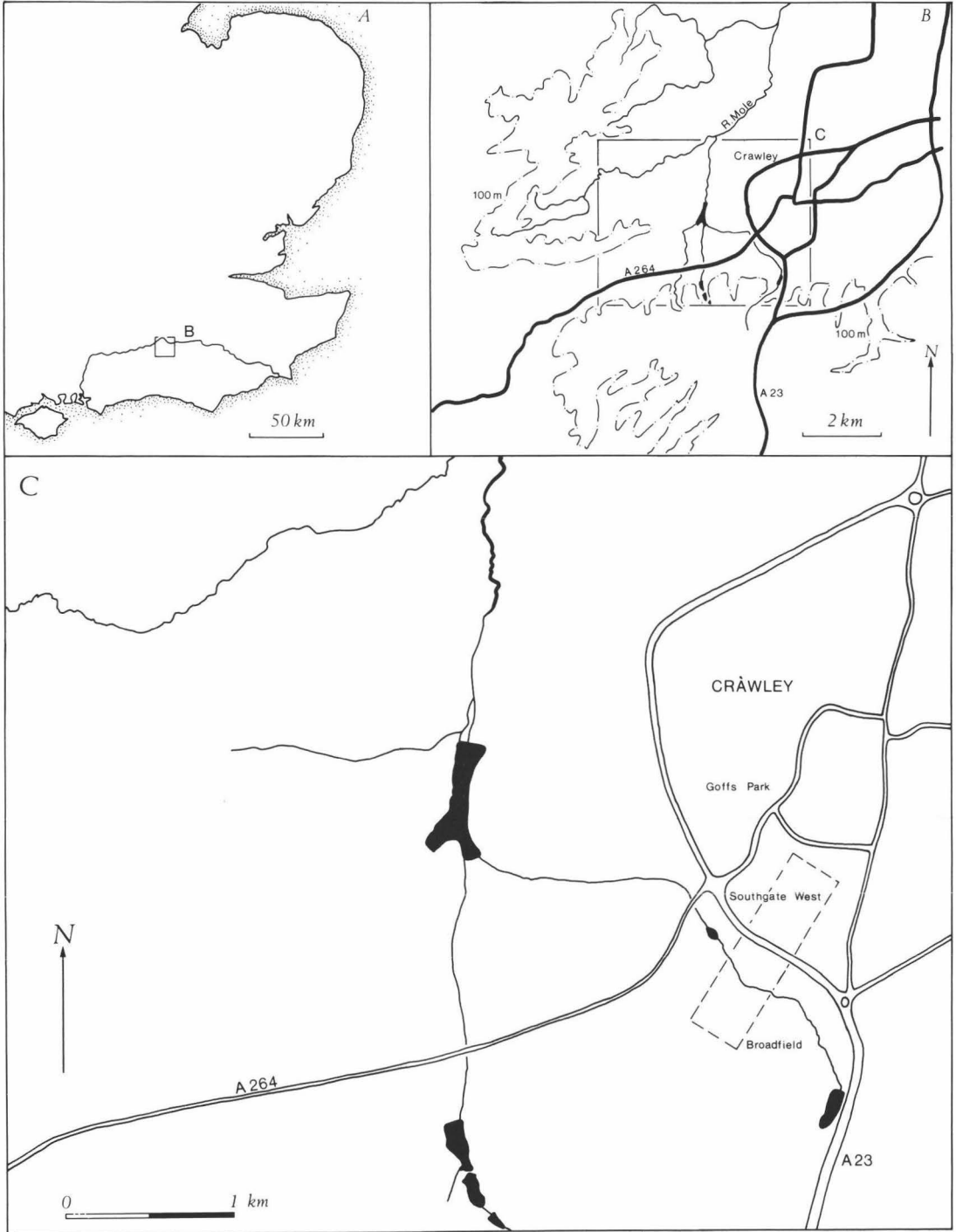


Fig. 1. Broadfield, Crawley. Site Location.

intentions to present the report according to the available documentation and material, and not be influenced by personal recollection by other individuals without the material evidence to corroborate any changes.

On the subject of material evidence, again it must be stated that a great deal of material was unavailable for study. Originally John Gibson-Hill had planned to present chapters in his report devoted to the finds including pottery, tile, possible crucible fragments, tuyeres, metalwork, flint and other stone, clay pipes and glass. His draft, as received by the collator, did not contain any written documentation on any aspect of the finds. Consequently, much time has been expended searching for the material to attempt a substitute series of analyses. Such material as was available had been stored in an extremely haphazard fashion on the top floor of Iford Mill, Crawley. Much time was spent by the collator, ably assisted by Pat Bracher, Jeremy Hodgkinson and members of the Wealden Iron Research Group, in an effort to restore some order to the assorted finds. Owing to the methods of storage of this material, any attempt to specify archaeological context and locate it on site documentation was beset by enormous difficulties.

Where context information could be established and cross-checked with site documentation, artefactual material has been used as a basis for a number of up-to-date reports (see Rudling and Hamilton below). However, there are many instances where we have to record a certain amount of material as present, but we are aware from the site records that there should be a great deal more, precise details of the material being absent. Almost all of the more important pottery vessels, metalwork (including coins), tuyeres etc. are missing and thus not available for study. It has therefore been necessary to find suitable groups of reasonably-documented available material to substitute, e.g. the Goffs Park assemblage from a site adjacent to the main Broadfield areas (see Sue Hamilton's report below).

A certain number of (presumably residual) flint flakes was present, but their contextual location and relationship was unclear. There are some iron nails and fragments of iron, but the

bulk of the metalwork was not present at Iford Mill and could therefore not be included in a finds report. Some tuyere fragments were available for study, but John Gibson-Hill's report includes their relevant characteristics and further examination was deemed superfluous at the present time.

Some geological material was available for examination. The fragments mostly derive from the thin limestone layers in the Wadhurst Clay formerly known as 'Cyrena' limestone. (The limestone contains small bivalve shells of the genus *Nemiodon*.) Fragments of calcareous shelly ironstone (from an adjacent source) are also present. Fragments of clay ironstone nodules, ferruginous sandstone, and greensand seemed to have occurred regularly across the excavation areas.

A small amount of bone was available for examination, mostly cattle and sheep, but due to poor contextual information no further analysis was attempted. Glass and clay pipe fragments may relate to subsequent utilisation of the site.

The available site documentation has been archived and as much of the material at Iford Mill as possible has been cleaned, repackaged, assigned accurate contextual designation and re-boxed. Much remains undesignated, having been separated from its original label during storage, or having suffered through disintegration of paper labels in conjunction with damp finds inadequately packaged.

All finds have been deposited at Crawley Museum.

BROADFIELD, SITE 1 (Figs. 2, 3 and 4)
Separated from Site 2 by former marshland and a stream, this area was used for industrial activity for the duration of the occupation (Fig. 2).

PHASE III

The first evidence of occupation is roughly contemporary with Phase III and consisted of 12 shaft-type smelting furnaces and a forge.

Furnace No. 1. Circular area of light grey burnt clay with slag base and slag-impregnated clay lining present on the southern side. As with all the other furnaces this was surrounded by burnt natural clay.

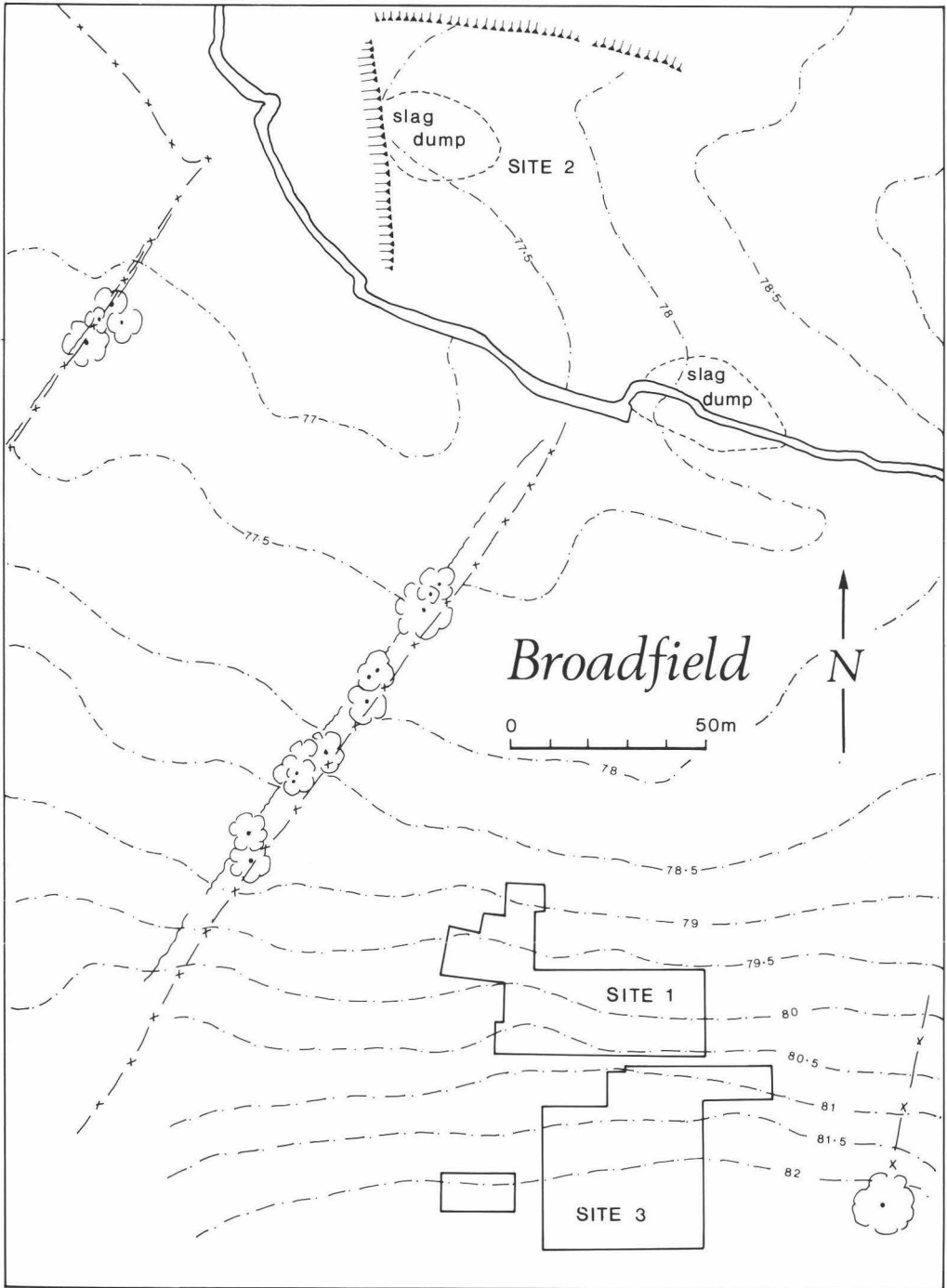


Fig. 2. Location of Sites 1, 2 and 3. Contours in metres O.D.

Furnace No. 3. Circular area of grey burnt clay (61 cm. in diameter), showing in section several re-linings. On the north side there was a large oval depression 1.22 metres long and 76 cm. wide filled with a mixture of tap-slag and charcoal fragments. This probable slag-tapping hollow was 69 cm. wide at the junction with the front arch and 76 mm. deep.

Furnace No. 4. Oval area of grey burnt clay cut into on the western side by Furnace No. 6.

Furnace No. 5. North-west of this furnace were two roughly circular depressions filled with tap-slag and charcoal fragments.

Furnace No. 6. Oval area of grey burnt clay (76 cm. in diameter) showing several re-linings replacing and post-dating Furnace No. 4.

Furnace No. 8. Circular area of grey burnt clay (46 cm. in diameter) surrounded by and on top of red burnt natural clay. A slight depression extends south towards the ditch. This and Furnaces Nos. 1, 9, 11 and 13 appear to have their slag tapping hollows oriented towards the ditch. Below the base and separated by a thin lens of charcoal was another area of burnt clay, thought to represent the original lining.

Furnace No. 9. Circular area of grey burnt clay. There was clear evidence of re-lining, the original base being 53 cm. in diameter with a 50 mm. thick lining of puddled clay and separated from the second lining by a 121 mm. thick layer of burnt red clay.

Furnace No. 10. Circular area of burnt grey clay 46 cm. in diameter with no evidence of re-lining.

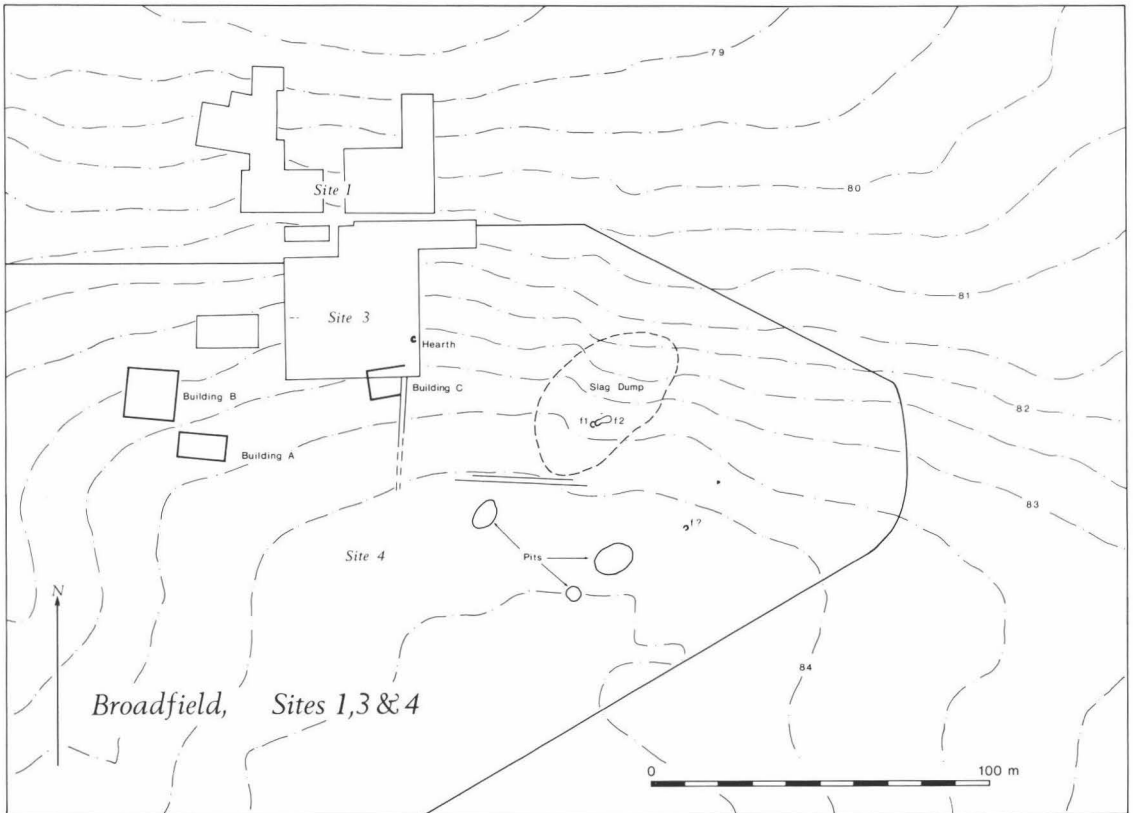


Fig. 3. Location of Sites 1, 3 and 4. Contours in metres O.D.

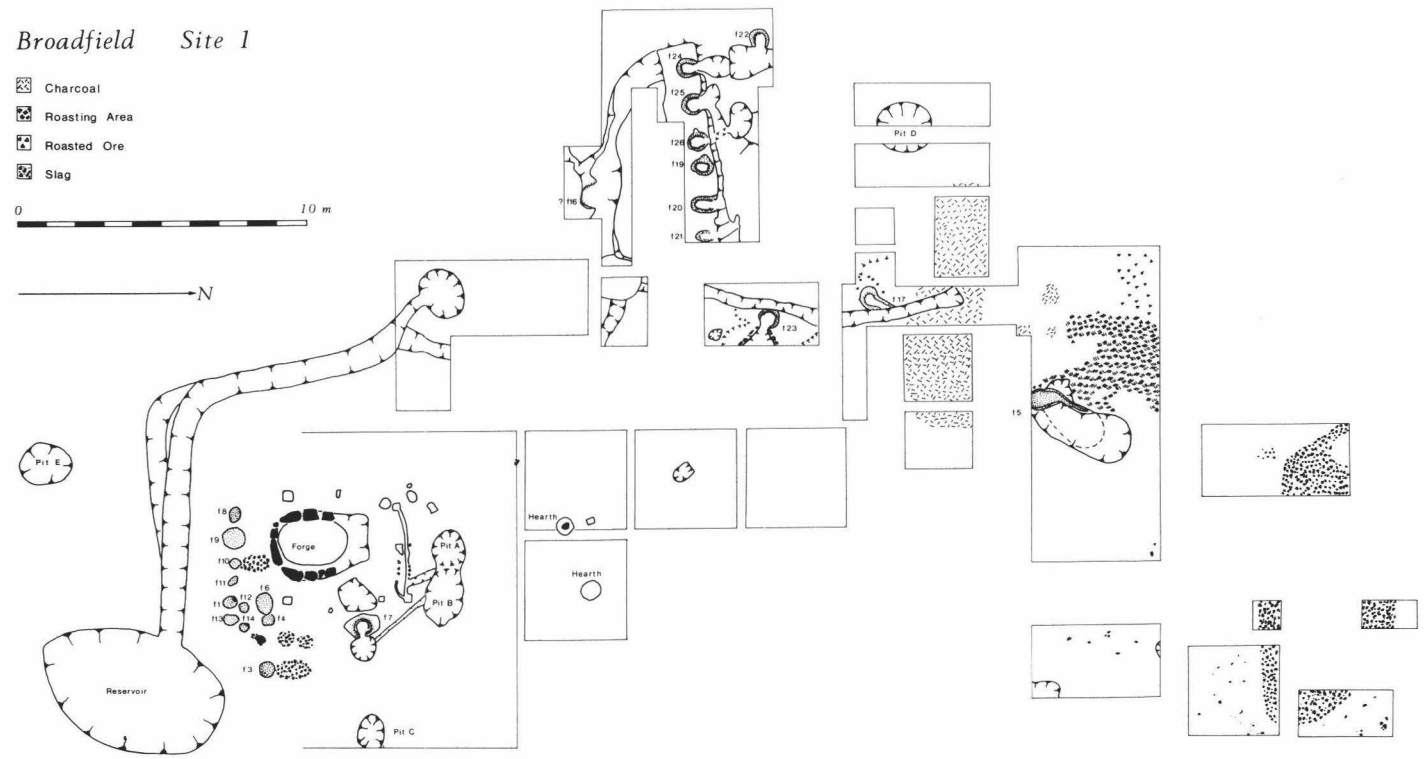


Fig. 4. Site 1.

To the north there was a shallow depression containing tap-slag and charcoal.

Furnace No. 11. Circular area of light grey burnt clay surrounded by burnt red clay and charcoal.

Furnace No. 12. Circular area of grey burnt clay 38 cm. in diameter. No obvious signs of re-lining.

Furnace No. 13. Oval shaped area of grey burnt clay 53 cm. in diameter. No obvious signs of re-lining. The shape of the remains in this area result from contractors' machinery grading to make a level platform and are therefore not truly representative of the original shape or dimensions of a furnace base.

Furnace No. 14. Circular area of grey burnt clay with a slag-impregnated lining. The base was intact. Evidence for a slag-tapping hollow was lacking but 60 cm. north-east of this a slight depression filled with large pieces of tap-slag was found (Table II on microfiche).

Servicing this furnace group was a large forge where blooms were consolidated. A shelter to cover the forge and associated working area is indicated by a series of post-holes outlining in plan a rectangular area measuring 4.57 metres \times 3.66 metres.

Forging Hearth (Fig. 4, 'Forge'). An oval depression 2.3 metres long and 1.30 metres wide, surrounded on three sides by large Tunbridge Wells sandstone blocks, each showing evidence of burning at high temperature. These blocks were set into an irregular shaped hollow that enclosed the pit. The natural clay for some distance around the forge had been burnt a dark red colour. Strewn around this working surface were pieces of forge-slag, hammer scale, rust and charcoal.

The structure covering the forge area was probably larger than shown on Fig. 4, as the southern end was disturbed by road construction work. What remains indicates a building open to the elements on three sides, the northern side being enclosed behind a screen of wattle, represented by two parallel rows of holes between post-holes 7 and 8 (see microfiche).

South-east of the furnace group, a large oval pit (6.5 metres long and 3.66 metres wide)

possibly served as a reservoir during this phase. It was connected via a ditch (16.5 metres long and 90 cm. wide) to a small pit. Surplus water was carried away in a gully leading to another small pit (reservoir) and ditch system. The exact purpose of this complex layout is far from clear. It is possible that the reservoirs provided a convenient supply for quenching during the forging process although there is no evidence for the production of steel. Pits A and B are both associated with this phase and were probably dug for clay to be used in the construction of furnaces.

At the end of this phase the hearth and building were demolished and levelled, resulting in charcoal and industrial debris (from 50 mm. thick) being sealed by a layer of burnt clay and furnace superstructure approximately 23 cm. thick covering an area 10 metres long and 8 metres wide.

PHASE IV-V (Fig. 4)

The forge continued in use for some time, servicing several newly constructed furnaces; the products finished off in two small hearths. These hearths were 1.75 metres apart, the largest was oval in plan 69 cm. \times 61 cm. with a base formed by a slightly concave depression coated with green silica and with vitrified clay. The smaller hearth (61 cm.) was circular in plan. In this case the inner surface was covered with black and white vitrified clay, and slag was found adhering to the centre of the base.

Furnace No. 23 (Type A). The remains of a furnace base 48 cm. in diameter and some slag impregnated superstructure were found *in situ*. Below and surrounding was a grey burnt clay lining approximately 50 mm. thick resting on an earlier lining. On the eastern side there was a gap in the structure approximately 28 cm. wide, leading into the slag-tapping hollow. The shaft contained a 50 mm. thick layer of charcoal covered by an 89 mm. thick deposit consisting of slagged lining, burnt clay lumps and charcoal.

The slag-tapping hollow was unusual in that it had nearly vertical sides defined by large pieces of tap slag and furnace superstructure. A large piece of tap slag 44 mm. thick had fused with the clay at the base of the hollow, covering an area extending 43 cm. from the front arch.

Furnace No. 7. The slag-impregnated lining of the interior of the furnace survived to a height of 26 cm., rising vertically from the 15 mm. thick slag base, adhering to a 50 mm. thick lining of grey burnt clay. These two layers represent a re-lining; the primary surface is represented by hard black burnt clay 10 cm. thick surrounded by a 76 mm. thick band of red-burnt clay. The original interior was quite small (38 cm. in diameter) and reduced by the re-lining to a 25 cm. internal diameter. The slag-tapping hollow was oval in plan 91 cm. × 84 cm. with a channel (15 cm. × 22 cm. × 6 cm. deep) on its western side leading towards the furnace. The slag-tapping hollow contained a fill of charcoal and tap-slag, sealed by collapsed fragments of furnace superstructure. A tuyere was recovered from below the debris of the front arch.

The truncated base of the shaft measuring 1.22 m. × 84 cm. in plan was separated from the underlying clay by an 8 mm. thick layer of charcoal and soil.

Furnace No. 17. This furnace, although damaged by ploughing, still showed in plan the characteristic alternate bands of burnt clay, covering an area approximately 80 cm. in diameter. The grey burnt clay lining upon which a broken slag base stood was found *in situ*. Slag tapping facilities were provided by a gully that extended south-east into the adjacent ditch. Its grey puddled clay surface comprised wood strips running diagonally across the hollow. A flagon neck discovered during the excavation of this feature may have been used as a tuyere.

A group of small holes (50 mm. in diameter and 55 mm. deep) around the furnace may indicate some form of temporary cover, placed over the furnace when not in use.

Furnace No. 5. Badly damaged base and slag-tapping hollow, consisting of an irregular shaped area of black/grey burnt clay 2.13 metres long and 46 cm. wide. Three circular pits (C, D and E) were apparently dug for clay and back filled with smelting refuse.

To the north of the furnaces an area of charcoal 15 cm. thick would seem to represent the residue of a fuel dump. Nearby there was an area of burnt clay resembling the ore-roasting

feature found below the western slag dump on Site 2. Associated with this burnt clay were fragments and ore fines; most were red-purple but some were blue-black in colour. Immediately north-west of this area the remains of a pile of roasted ore were found.

During the early part of this phase the reservoir and ditch system was gradually back-filled. In the main tap-slag was used but several lenses of domestic refuse were located in the ditches. The filling of Pits A and B was completed at the same time.

Soon after the ditches had been back-filled a group of six furnaces was constructed in a row adjacent to each other. The clay insert to the north of Furnaces Nos. 26, 27, 28 and 29 falls away abruptly into the slag-tapping hollow which contained a fill of brown soil and charcoal containing a large quantity of red and orange burnt clay fragments derived from the collapsed furnace superstructure. Sherds were also present, some of which were incorporated into the clay of the southern slope of the hollow. Below this layer a deposit of furnace superstructure and burnt clay occurred sealing a 63 mm. thick layer of soil mixed with charcoal, rusty? metallic lumps, tap-slag and roasted ore fragments.

At the base of the slag-tapping hollow the insert of prepared clay was only 25 mm. thick, separated from natural clay by an intermittent layer of charcoal 50 mm. thick. Fragments of double tuyeres were found near the front arch area of these furnaces in the burnt clay debris.

Furnace No. 19. Roughly circular in plan with an internal diameter of 38 cm. The slag lining in comparison with the other furnaces in the groups was quite thick (53 cm.).

Furnace No. 20. An oval in plan whose long axis measured 81 cm. × 60 cm. The internal dimensions of the shaft had narrowed, through relinings and a thick coating of slag, to 30 cm. in diameter. A large pair of tongs was recovered from the slag-tapping hollow opposite the front arch of this furnace.

Furnace No. 21. Circular in plan and similar to Furnace No. 19. However, the slag lining was absent, leaving an internal diameter of 61 cm.

Furnace No. 22. Plough-damaged base of a shaft furnace consisting of a slag base 38 cm. in diameter, surrounded by several alternate bands of clay connected to an irregularly shaped pit that served as the slag-tapping hollow (1 metre \times 1.9 metres \times 30 cm.). Two large slag bases and fragments of double tuyeres were found in its fill. The furnace was unusual in that the cylindrical shaft was constructed on a levelled base of crushed tap-slag fragments.

Furnace No. 24. Oval in plan, measuring 43 cm. \times 38 cm. The insert, extended for a second time, cut through the back-filled ditch of Phase III. The shaft was not quite as deep as the initial group, but deeper than Furnace No. 25 at 56 cm. The slag base (50 mm. thick) and lining remained *in situ*. Unlike the others in the group, this

furnace had a separate tapping hollow; unfortunately the fill of this was disturbed during the construction of Furnace No. 22.

Furnace No. 25. Circular in plan, slagging had been removed, together with two thirds of the grey lining.

Furnace No. 26. Very similar to Furnace No. 19 except in this case the outside diameter is 82 cm. This furnace seems to have been a late addition to the group and although the insert was extended to incorporate it, the shaft was not cut as deeply as the others, its remains attaining the height of 46 cm. Most of the shaft was filled with burnt clay debris, but near the base there was an 88 mm. thick layer of charcoal with roasted ore, tap and furnace slag inclusions. (Similar fills

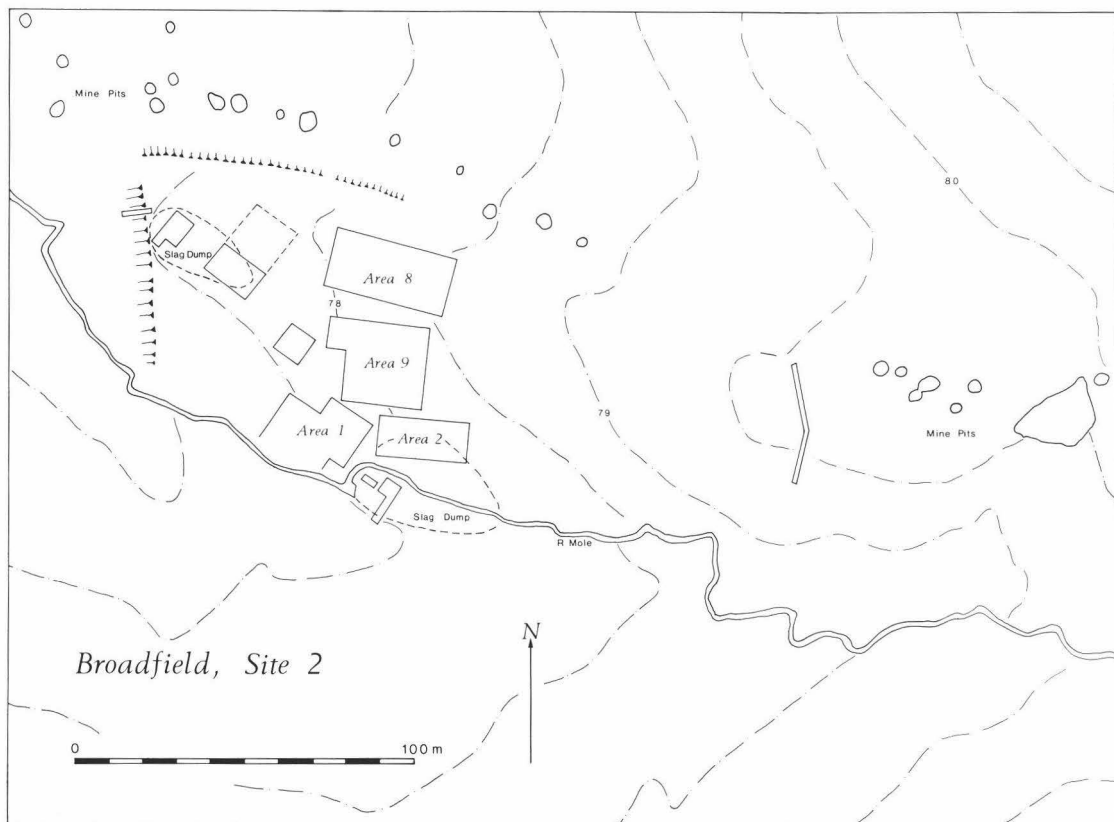


Fig. 5. Site 2. Excavated areas.

were found in the other furnaces.) The furnace base 76 mm. thick was found in situ. The width of the front arch was estimated to be 38 cm.

BROADFIELD SITE 2

PHASE I

Area 1 (Figs 5 and 6): Evidence for Phase I activity includes a series of marks cut into the natural clay. In plan they take the form of a square framework of criss-cross lines. Although they cover a limited area, they were sealed from later disturbance by three layers: (a) a thin soil horizon; (b) the remains of a pile of roasted ore lumps, possibly the residue of the last charge used in Furnace No. 4; and (c) a layer of compacted burnt clay representing the collapsed superstructure of that furnace. As these were cut through by the tapping hollows of Furnaces Nos. 2 and 5, the marks predate all 1st and 2nd century industrial activity on the site. If associated with agricultural ploughing they are, to date, the earliest distinct evidence of arable farming in the Weald.

PHASE II

Area 1: Evidence for the earliest industrial activity at Broadfield is provided by two shaft-type smelting furnaces, dated to the 1st and 2nd centuries b.c. (Furnace No. 2: 2010 ± 60 b.p. [60 b.c.]; Furnace No. 5: 2140 ± 80 b.p. [190 b.c.]). Carbon 14 dating results are given in Table 1.

Furnace No. 2 (Figs 6 and 7). The remains consist of a shallow depression occupied in part by fragments of a slag-furnace base approximately 53 cm. in diameter, also several fragments of tap-slag were found adhering to the bottom of the slag-tapping hollow.

Furnace No. 5 (Figs 6 and 7). Slightly smaller than Furnace No. 2, 46 cm. in diameter but basically similar. In this case the slag furnace base had been completely removed, although some of the slag lining to the interior of the shaft was still *in situ*. Two sandstone blocks were found within the furnace, an unusual feature, both showing signs of burning at high temperature. These were probably an integral part of the structure providing support for the

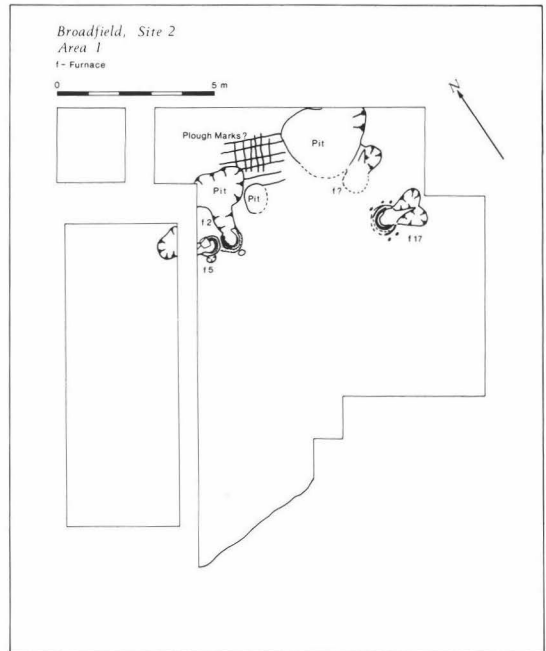


Fig. 6. Site 2, Area 1. Phases I and II.

front arch. Closely associated with the above furnace and partly sealed by its collapsed superstructure were two post-holes filled with charcoal.

Furnace No. 17. Shaft-type smelting furnace with fan-shaped tapping hollow. The shaft and tapping hollow had apparently been cleared of slag lining and smelting debris prior to demolition and back-filled with orange and red burnt clay lumps. The remaining base and rear wall was made up of several alternate bands of grey blocks and red burnt clay. A series of small stake holes surrounded the furnace.

One metre north of this furnace there were two connecting depressions. The ridges separating them had a burnt grey clay coating, strongly resembling the tapping hollow of a furnace. The remaining features dated to this phase are two pits. The larger (2.60 metres \times 2.30 metres \times 46 cm. deep), was kidney-shaped in plan and contained charcoal interspersed with lenses of clay. The second, oval in plan (88 cm. \times 69 cm. \times 61 cm.) also contained charcoal, some tap-slag and fragments of double tuyere.

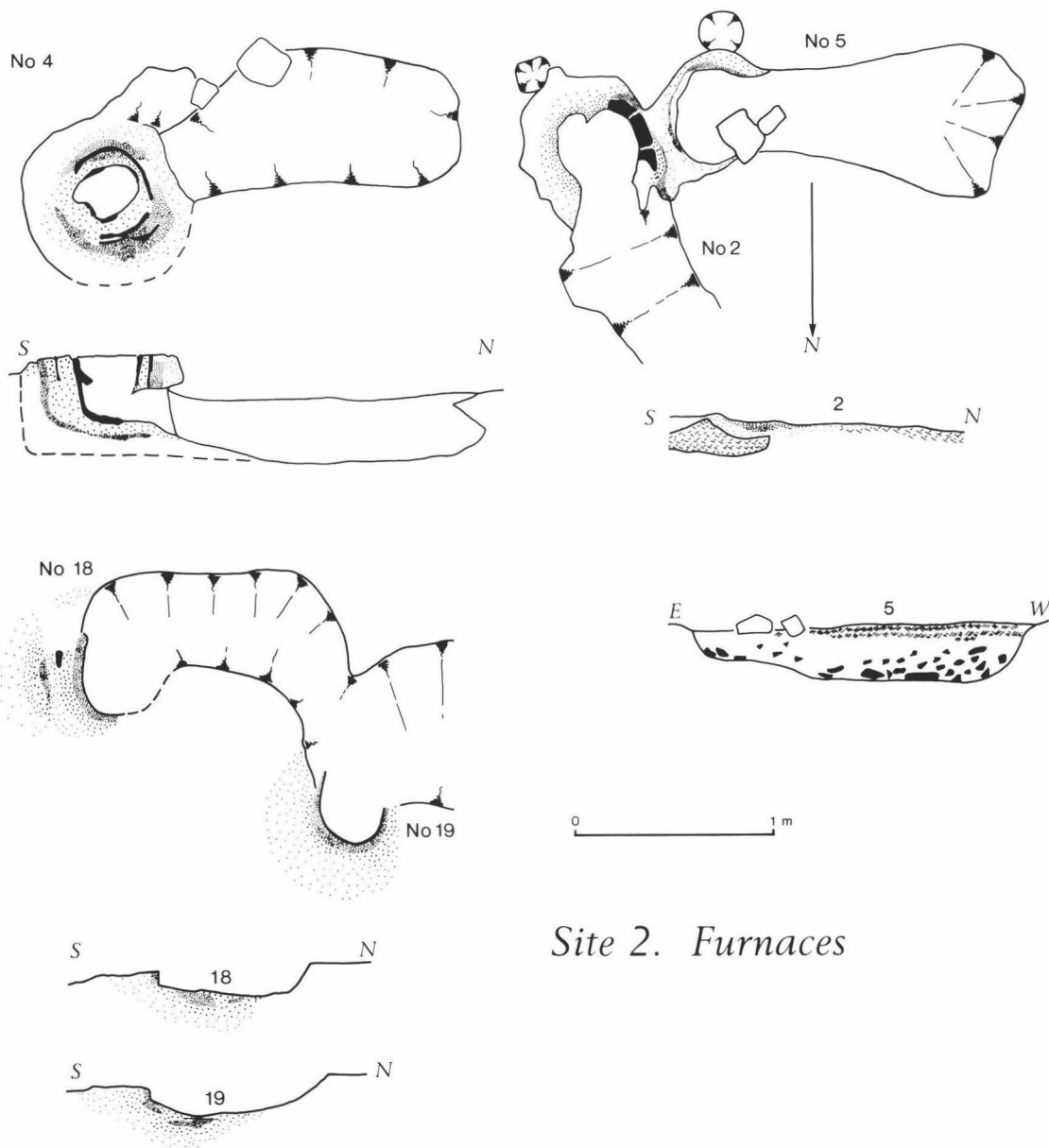


Fig. 7. Site 2. Furnaces nos. 2, 4, 5, 18 and 19.

TABLE 1
Carbon 14 Results

No.	Harwell Ref.	Sample Type	Age b.p. Years	b.p. 1950	M.A.S.C.A. Corrected Date	Furnace No.	Site No.
1	HAR-559	Charcoal	1900 ± 60	a.d. 50	70 A.D.	7	2
2	HAR-970	Charcoal	2010 ± 60	60 b.c.	60–10 B.C.	2	2
3	HAR-971	Charcoal	2140 ± 80	190 b.c.	370–210 B.C.	5	2
4	HAR-972	Charcoal	1840 ± 80	a.d. 110	130–140 A.D.	3	2
5	HAR-973	Charcoal	1920 ± 70	a.d. 30	60 A.D.	16	2
6	HAR-974	Charcoal	1920 ± 70	a.d. 30	60 A.D.	8	2
7	HAR-975	Charcoal	1920 ± 70	a.d. 30	60 A.D.	Hearth	2

PHASE III

During this period an area measuring 82 metres × 98 metres was enclosed by a ditch and upcast bank (Figs 5 and 13). The interior was occupied by several domestic buildings, and a hard-standing feature. The western side of this settlement was disturbed by the construction of an access road in 1973 which unearthed four stone walls. Unfortunately no plans of these features have been located. Each, orientated to the east-west ditch, comprised several courses of faced Tunbridge Wells sandstone blocks set in a foundation trench. The survival of these short sections of wall is probably due to the protection against the effects of deep ploughing by a thick deposit of material from the western slag dump. Similarly beam slots were found below this dump but could not be traced beyond its boundary, nor did they occur elsewhere in the enclosure.

Area 9

The V-shaped ditch, thought to have served as the eastern perimeter to the enclosure of the primary settlement, was regularly sectioned along its length (Fig. 13). Post holes 1–3 (Fig. 8) may represent the remains of some form of revetment or palisading, but this seems unlikely as only these three were found on the entire western bank.

To the west of the ditch 26 post pits were located, from which it was possible to recognise the remains of a rectangular building measuring 15 × 7 metres, outlined in plan by post pits nos. 1–18 (Fig. 8, Building II). All show remarkable uniformity in that they are 76 cm. in diameter and 84 cm. deep, generally cylindrical in shape. Each post, apparently square in section, was positioned on a base made of large pieces of

tap-slag and supported by a packing consisting of several alternate layers of clay and slag.

Two metres south of Building II, a series of post pits lay parallel to the long axis of Building I and could be a composite part of that structure; alternatively they may represent the remains of another less substantial building (Fig. 8, Building 1). With the exception of post-pits numbers 19 and 20 they vary in size and method of construction. The floor and walls of these buildings were probably destroyed by later Roman industrial activity and more recent ploughing in the area, making it quite impossible to ascertain their original function. However, this phase is not associated with any iron-working within the enclosure and the better preserved remains of building No. III indicate a dwelling and associated domestic activity.

Areas 8 and 9

Aligned to the northern side of Building I and extending into Area 8 is a large rectangular feature 27 metres × 21 metres comprising slag and fragments of furnace debris (Fig. 8). This metallised area appears to have served as a hard-standing for vehicles. The hard-standing showed signs of both wear and repair, with the deeper ruts and holes being filled with any material available, including sandstone blocks, slagged furnace lining and domestic rubbish.

Area I

Building III (Fig. 9): The clearest evidence of domestic occupation (although fragmentary) takes the form of a small rectangular building 15.25 metres long and 7.92 metres wide, delineated by 14 post pits. The pits differed from those mentioned above in that they were square

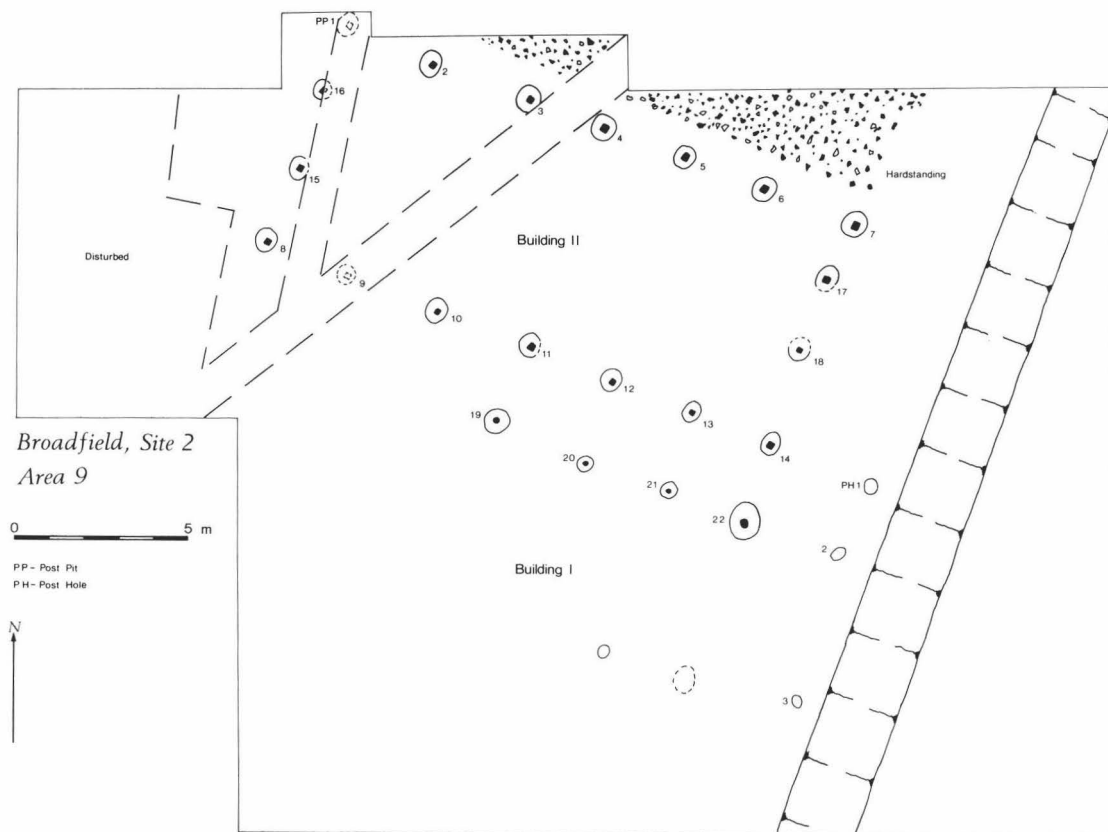


Fig. 8. Site 2, Area 9. Phase III.

in plan, measuring 91 cm. × 91 cm. × 61 cm. deep. The packing would appear to be similar to that used in Building I, i.e. alternate layers of slag and clay, but in this case there was no slag base for the post to rest on, thus compressing the clay. The resulting rectangular depression (457 mm. × 415 mm.) should reflect the dimensions of the timber in section.

The floor of the building was made up of several alternate layers of burnt and natural beaten clay, each between 2 and 4 cm. thick. Set into this floor was an oven constructed in the characteristic pear or horse-shoe shape. The base of the oven was covered with a layer of charcoal, containing small fragments of calcined bone. This was sealed by a deposit of soil and red-burnt clay.

A verandah or some form of covered corridor was probably constructed on the north side of the building, supported by a row of

stake-holes. Horizontal timber or wattle was laid in a shallow depression, terminating in an oval post hole, the stake-holes having been sited on alternate sides of the depression to secure horizontal infilling. Each of these stake-holes contained a charcoal fill. The depression was filled with dirty yellow clay, and several fragments of carbonised wood were found lying horizontally at its base.

At the end of this phase the buildings were demolished and the eastern perimeter ditch back-filled (possibly to create further space for the industrial activity of the following phase). Domestic occupation of Site II lasted 20 to 30 years following the Roman invasion of 43 A.D.

PHASE IVa

Area 9 (Figs. 5 and 10)

During this phase a trapezoidal pit was filled



Fig. 9. Site 2, Area 1. Phase III showing Building III.

with burnt clay lumps and fragments of furnace superstructure. The gully remained in use for a short time. Some attempt to back-fill was made by the dumping of tap-slag, but this was eventually abandoned allowing the remaining portion to infill naturally.

Furnace No. 14. This was constructed on a prepared clay base in a pit cut into the fill of the trapezoidal pit. The remains consist of the rear wall and clay insert forming the D shape in plan. The rest of the furnace and most of the slag-tapping hollow had been demolished to make way for Furnace No. 7.

PHASE IV

Area 9 (Fig. 10)

Several shaft smelting furnaces were constructed in this area over the levelled remains of the domestic settlement. In Area 9 the phase is

represented by the plough-damaged remains of smelting furnaces and associated post pits.

Furnace No. 12 (Fig. 10). Type A. Showed signs of at least one re-lining. In all other respects it resembles closely other furnaces of this type. It clearly post-dated Building No. I as the superstructure had partly sealed post pit no. 10. Near to the rear wall and contemporary with Furnace no. 12 was a single post pit (A). This was a cylindrical pit dug to accommodate a post held in position by a packing of clay.

Furnace No. 15. The truncated shaft was filled with a mixture of charcoal and cinder. Fragments of a tuyere (No. A54) were found in the front arch area and a further seven in the slag-tapping hollow (A83, 164, 165, 166, 167, 169 and 170). Several large pieces of tap-slag were also found in situ, some adhering to the base of

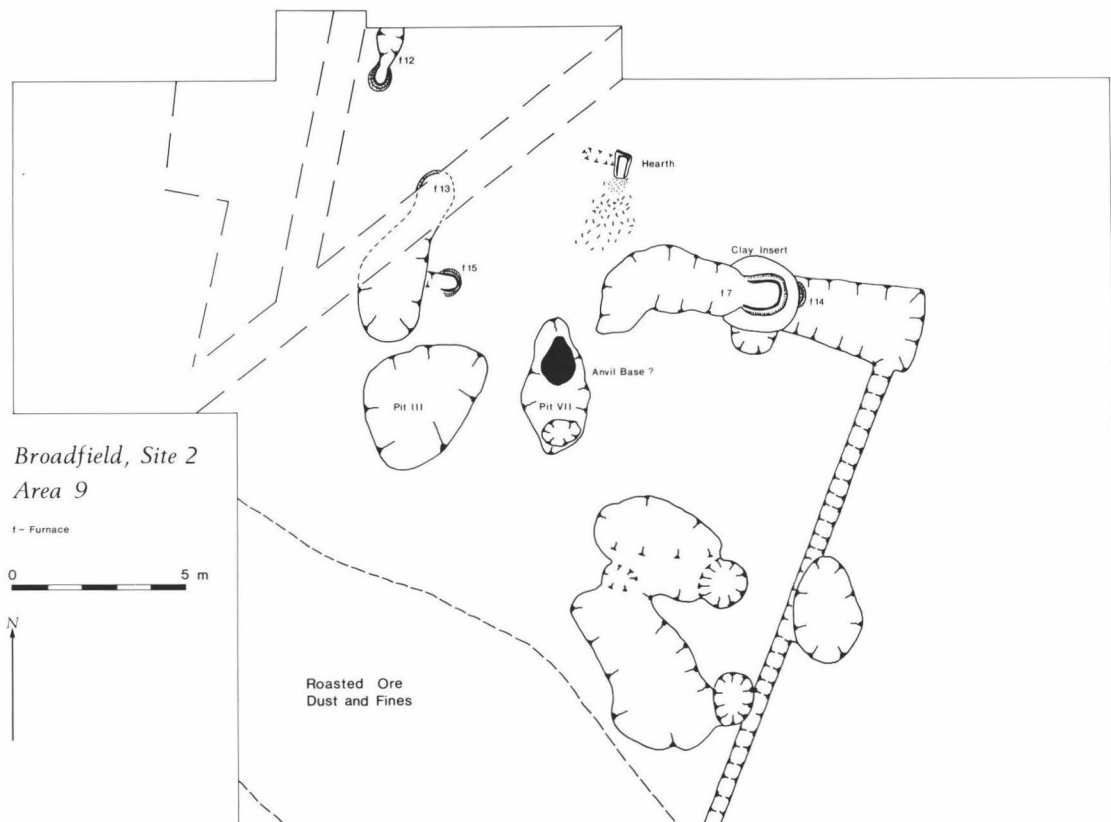


Fig. 10. Site 2, Area 9. Phase IVa, IV and V.

the slag-tapping hollow. Part of the hollow immediately opposite the front arch was lined with puddled clay. Post Pit B, similar to Post Pit A in construction, was filled with a mixture of dirty brown soil and clay. Another circular pit and two stake holes were also located. Cutting through post pits nos. 17 and 18 and therefore post-dating the building, a trapezoidal shaped pit was dug and connected via a gully to a shallow ditch in Area 2. This trapezoidal pit (5.18 metres \times 2.50 metres) may have served as a reservoir. The gully may have been plugged (possibly with turf) to regulate the release of water to suit immediate requirements in iron manufacturing. There was a similar, if more complicated, system used on Site 1.

Area 1 (Fig. 11)

Three shaft smelting furnaces (Furnaces Nos. 8, 9 and 16) were constructed in a row adjacent to one another and set into a 3.66 metre square, prepared clay, insert. All of them had, to varying degrees, been disturbed by the construction of a larger furnace during Phase V. However, the most northerly was nearly complete in plan and this assisted greatly in working out the dimensions of the others. The internal diameter varied from 34 to 46 cm., with a slag lining followed by a band of grey puddled clay. Tapping facilities were provided by a pit dug immediately east of the furnace into the clay insert. All the furnaces had been re-lined several times and the base was raised by adding and

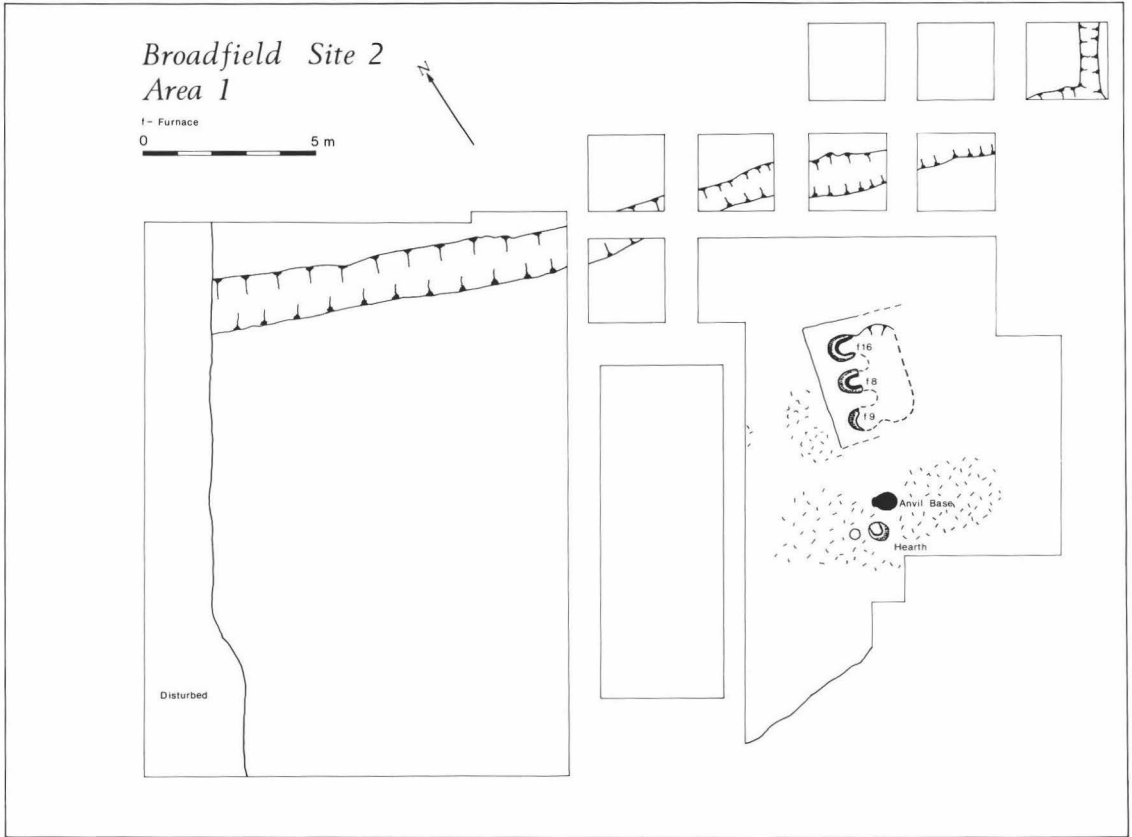


Fig. 11. Site 2, Area 1. Phase IV.

shaping a clay plug and lining. Charcoal samples taken from the base of the shafts of Furnaces Nos. 8 and 16 gave a C-14 date of 1920 ± 70 b.p. (a.d. 30).

To the south of the insert an oval area of furnace slag, hammer-scale and rust had cemented together forming a hard lump. The upper surface was concave and the components had been consolidated, giving the impression of an area frequently hit with a heavy object, suggesting its former use as an anvil base. Its proximity to the hearth and surrounding layer of hammer-scale and other smithing debris may support this view.

A smithing hearth 46 cm. away from the anvil base consisted of a circular depression 52 cm. in diameter cut into the natural clay. The interior was coated and impregnated with slag

50 mm. thick, adhering to a grey puddled clay lining 64 mm. thick. Surrounding this the clay had been burnt red forming a circle 60 cm. in diameter. Charcoal from the base of the hearth gave a C-14 date of 1920 ± 70 b.p. (a.d. 30).

A shallow V-shaped ditch was dug through the northern part of this area. It was joined by the contemporary gully running south from Area 9.

On the western side of the enclosure the building had been demolished and the area levelled as preparation for the construction of smelting furnaces. The ditch running north-south through the area had partially silted up, being eventually sealed by burnt clay debris probably derived from Furnaces Nos. 20 and 22 (Fig. 14).

Furnace No. 21. This smelting furnace consists of a circular depression and rear wall lined with

grey puddled clay. All slag and other debris had been cleared from the slag-tapping hollow to receive the insert of Furnace No. 20, but the slag furnace base was still in situ.

Furnace No. 22. The puddled grey lining was intact at the base of the shaft and covered the remains of the wall. Both the furnace base and most of the tapping hollow were cleared of debris to receive the insert of Furnace No. 23, leaving one large piece of tap-slag adhering to the base of the slag-tapping hollow.

Furnace No. 23. Replaced the above and consisted of a clay insert constructed on top of Furnace No. 22. There were no obvious signs of re-lining. The shaft contained a fill of charcoal and furnace slag sealed by a layer of burnt clay.

Furnace No. 20. Another insert furnace replacing Furnace No. 21. As with the others, the rear wall survived around approximately two thirds of its original circumference. In one place alternate bands of orange, light and dark grey indicated a re-lining. Two small fragments of slag-lining were found adhering to this. The remains of the shaft contained a thin layer of charcoal sealed by a deposit of burnt red clay.

At the southern end of this trench the remains of two smelting furnaces were found. The common slag-tapping hollow was destroyed by road construction just to the east of Furnace No. 19.

Furnace No. 18 (Fig. 7). Smelting furnace approximately 41 cm. in diameter, using common slag tapping facilities. There was clear evidence in the form of alternating black-grey-red bands of burnt clay for at least three re-linings.

Furnace No. 19 (Fig. 7). Smelting furnace approximately 33 cm. in diameter, using a common slag-tapping hollow. It had been re-lined on two separate occasions and was equipped with facilities of alternate tapping.

To the south of these furnaces a pit (Pit G), circular in plan, had been dug into the clay, presumably to obtain material for furnace construction, and back-filled with a mixture of charcoal and small fragments of tap-slag. Later,

large pieces of slag were dumped in this area sealing the pit beneath it.

PHASE V

Area 9 (Fig. 10)

Dominating the area during this phase are the remains of two large shaft smelting furnaces. One of these, Furnace No. 7, had been constructed in the area occupied by the slag-tapping hollow and front arch of Furnace No. 14. The other, Furnace No. 13, was clearly stratified above Furnace No. 15. Unfortunately, much of its superstructure and part of the slag-tapping hollow had been destroyed by the cutting of a service trench in 1973.

To the south of these furnaces ten irregular-shaped pits were dug into the Weald Clay, the probable objective being to obtain clay for use in the construction of furnaces. The absence of silt, and the fact that the fill consisted entirely of smelting by-products and no other form of refuse or datable artefacts suggests that they were back-filled as soon as they had served their purpose. Pit III is an example of this process, here the tip-lines suggest filling from the north-east side—possibly from Furnace No. 7. The primary fill consists of broken fragments of tap-slag followed by a thin layer of slagged furnace lining. Clay (residue of re-lining?) and several other layers of similar material were also deposited, indicating other maintenance operations before more slag was used to complete the filling of the pit.

Pit VII. Oval shaped pit 3.76 metres long, 1.35 metres wide and 41 cm. deep. It differed from the other pits in the material used for backfilling:

Layer I: consists of an oval area of cemented forge slag, hammer-scale and partially reduced ore lumps surrounded by some broken pieces of tap and furnace slag. Such material is normally found near an anvil and smithy, and is a by-product of the forging process.

Layer II: dirty yellow clay with iron stains. 25 cm. thick.

Layer III: 13 cm. thick deposit of small fragments of roasted ore and fines, mostly purple but some black pieces were present, possibly the residue of screened material from the ore roasting pit, operating prior to and in the area occupied by Furnace No. 7.

Smithing Hearth. In plan it consists of a roughly rectangular-shaped pit filled with a mixture of charcoal and soil. It had been lined on three sides with puddled grey clay impregnated with slag on the inner side. There was clear evidence for one re-lining. Contemporary with the re-lining a hole was cut through the wall in the north-west corner of the hearth. This aperture led to a U-shaped depression. The aperture was sealed with puddled clay and may have served as the entry point for a forced draught, the bellows set near the rear of the depression. Immediately south of the hearth, hammer-scale had been trodden into the natural clay. Contemporary with Layer I, Pit VII.

Furnace No. 7 (Fig. 16). After Furnace No. 14 had been dismantled, an oval pit was dug through its tapping-hollow. In this area ore roasting was carried out, the residue was consolidated to provide a firm base upon which the new furnace could be erected. The remains of a prepared clay insert were set into an enlarged pit on a bedding of charcoal. The insert had been reinforced with several large sandstone blocks. A charcoal sample obtained from the construction level provided a C-14 date of 1900 ± 60 b.p. (a.d. 50). After the last firing, the slag base was removed and most of the superstructure demolished. Fortunately, parts of the slag lining survived on three sides of the shaft, preserving the finger-marks and evidence of re-lining.

The slag-tapping hollow was presumably cleared of slag and other material when the slag furnace base was removed. This would have been normal practice prior to re-lining.

Layer I: Dark brown soil with tap-slag fragments.

Layer II: Sandstone blocks resting on the spread of burnt clay from the shaft. These Tunbridge Wells sandstone blocks were used to reinforce the shaft.

Area 1 (Fig. 12)

The area was levelled prior to the construction of another furnace group. Several pits and a possible kiln complete the features of this phase.

Furnace No. 3. Large, single smelting furnace, built on the demolished remains of Furnaces Nos. 8, 9, 16, C-14 dated to 1840 ± 80 b.p. (a.d.

110). As with other furnaces of this type, a pre-construction phase took the form of an oval pit in which ore roasting was carried out. The base and sides of the pit had been burnt red and orange in several places. The pit fill comprised layers of roasted ore fines and yellow clay. The oval furnace base rested on these layers.

Furnace No. 4 (Fig. 7). Constructed north of Furnace No. 3, it had been re-lined on two occasions. The slag base and lining were found in situ along with the remains of the front arch, which had been reinforced with sandstone blocks. The shaft was filled with a mixture of charcoal, furnace slag and unreduced ore fragments. The slag-tapping hollow contained a mixed deposit of slagged furnace lining, furnace slag, tap-slag and charcoal.

Furnace No. 6. The south side was disturbed by roots, resulting in a D-shape. The slag furnace base survived at the rear of the shaft, but there was no evidence of re-lining. Another earlier tapping hollow ran parallel to the one serving this furnace. Unfortunately this earlier furnace had been totally destroyed by the construction of Furnace No. 6.

To the west of this furnace two irregular-shaped pits had been dug. Pit C was probably dug for clay to be used in furnace construction. It had been back-filled with layers of tap-slag, furnace debris and charcoal. This material was cemented together, covering the surface of the pit with an extremely hard deposit. A small channel linked this pit to another smaller one (Pit A). Pit D cut through both Pit C and the slag-tapping hollow of Furnace No. 6. Pit D, roughly rectangular in plan, was filled with charcoal interspersed with several lenses of clay. To the north of these pits a rectangular-shaped feature was cut into the clay. The clay was piled on the south side and levelled, sealing Pit A. When excavated, the trench contained a pair of forging tongs in a fill of charcoal and cemented forging debris. Contemporary with this deposit is a layer of cemented furnace slag, hammer-scale, ore fines and charcoal covering a circular area centred on this trench-like feature. This was connected to a large pit that had been dug for clay and back-filled with slag.

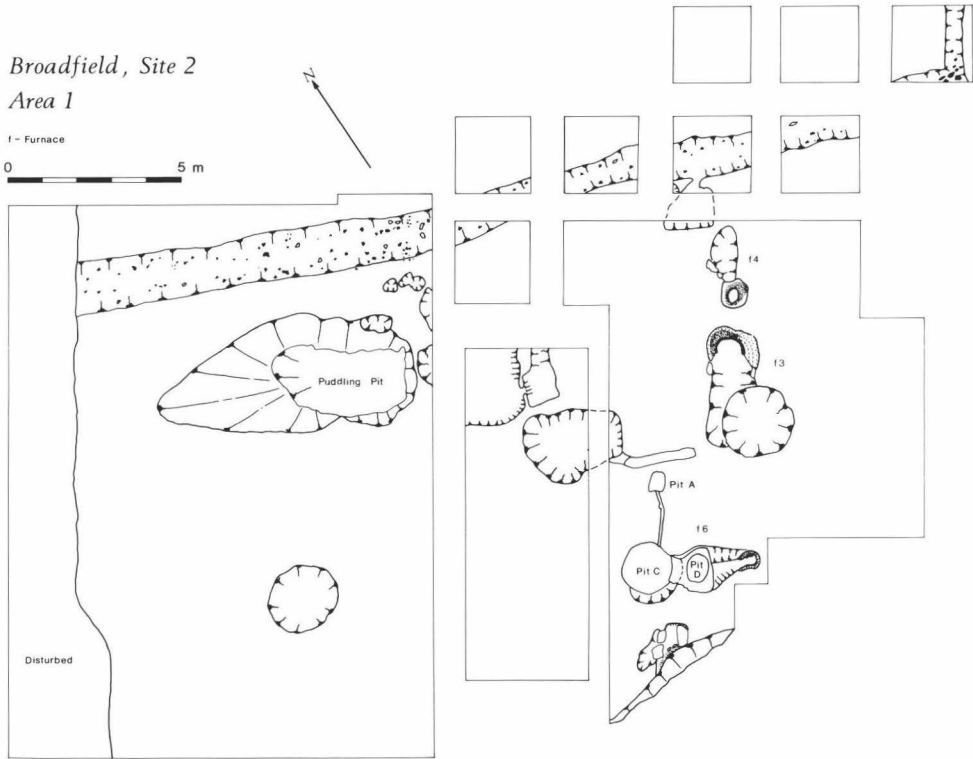


Fig. 12. Site 2, Area 1. Phase V.

Puddling pits. The preparation of clay for lining the furnace was carried out in two shallow pits connected via a gully to the ditch. Each pit had sloping sides tapering towards a flat base and was filled with two layers of grey clay.

A circular pit was back-filled with burnt clay lumps reminiscent of the clay bars used in pottery kilns. One of these objects was recovered from the lowest level of the eastern slag dump.

A circular depression cut through during the re-routing of the stream in 1973 was lined with burnt puddled clay 12 cm. thick and filled with a mixture of charcoal and soil. Encircling the top of the pit was a row of sandstone blocks, all burnt red and black. On the north side of this feature there was a wide gap in this row, leading to a shallow depression also covered with a coating of puddled clay and reinforced along each side with sandstone blocks. The function of this feature is far from clear. There is no obvious connection

with iron-production. It is, however, similar in plan to pottery kilns found elsewhere in Roman Britain.

On the south bank of the stream, exposed by recutting, a smelting furnace associated with this phase was revealed:

Furnace No. 26. Shaft smelting furnace, 63.5 cm. in diameter, set into a clay insert large enough to incorporate the slag-tapping hollow (5 metres long and 30 cm. thick). The slag-tapping hollow contained a fill of charcoal and tap-slag, sealed by a lens of dirty dark brown soil. While the shaft fill included furnace slag and charcoal, the interior of the shaft was coated with slag and there were several re-linings indicated by colour changes in the burnt clay surround.

Western Slag Dump (Figs 5 and 14). An oval area of burnt clay 12.88 metres long and 7.32 metres

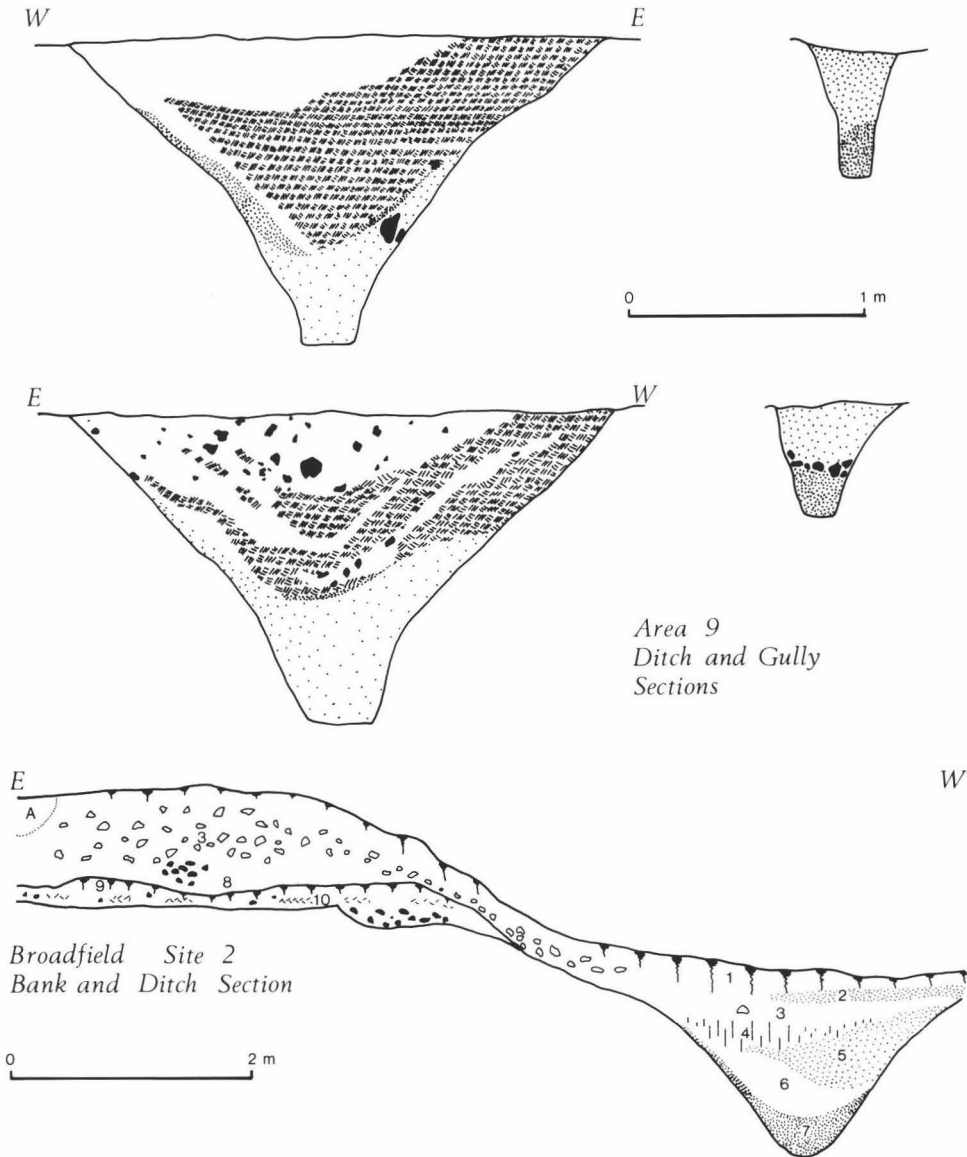


Fig. 13. Site 2. Area 9: ditch and gully sections. Main bank and ditch sections.

wide in a slight natural hollow. The variations in colour of the burnt clay are probably the result of numerous fires being repeatedly set in this depression. Separating this feature from the slag was a layer of ore fines up to 77 mm. thick. Apparently after roasting, the ore had been screened to exclude ore fragments greater than 7 mm. in size, leaving this residue to accumulate in

this area. The bulk of the fines would, however, have resulted from fragmentation of the ore during the roasting process. These fines were mostly reddish-purple in colour. Around the periphery of the hollow some unburnt nodules were found. Accumulation of debris would render this area of little value, so it was abandoned in advance of the encroaching slag dump.

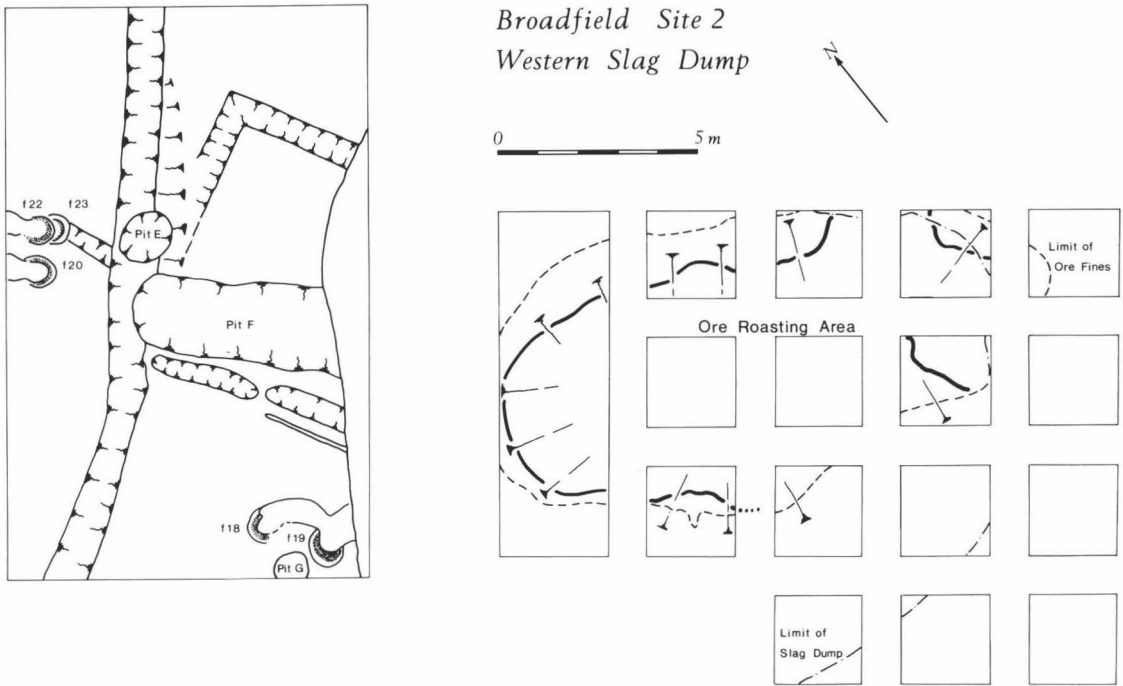


Fig. 14. Site 2. Western slag dumps and Furnace Nos. 18–20, 22 and 23.

Eastern Slag Dump (Fig. 5). Debris was first dumped in this area at the start of Phase V, the initial deposit of red burnt clay incorporating clay 'kiln' bars and covering in part the previously dumped pile of roasted ore fines. The dump was made up by small loads of smelting debris, mostly broken tap-slag fragments, smaller items such as fragments of charcoal and fines were carried to the lower levels by water percolating through the slag after a period of rainfall. Occasionally burnt clay or furnace superstructure were deposited forming distinct lenses in the dump. Numerous sherds of pottery were recovered from this area during the excavation and a study of these and their distribution confirmed the lack of stratification that would follow this method of dumping. On the south side of the stream the base of a smelting furnace was found constructed on a clay insert set into the slag. This furnace (Furnace No. 25) was lifted intact for examination in a laboratory and has subsequently been acquired by the Science Museum (Gibson-Hill 1974, 50–53, Figs 1 and 4).

In its final form the dump covers an oval area measuring approximately 45 metres by 30 metres

later to be spread across the eastern part of Area 1, affording some protection against ploughing.

Medieval and Post-Medieval Activity

The slag dumps found at Broadfield are very denuded and small compared with those found on several sites in East Sussex (Lower 1949, 169–220; Straker 1931). Although there are clear records of dumps in East Sussex being used as sources of raw material for construction in recent times, there is as yet little evidence for robbing at an earlier period. At Broadfield the western slag dump (Fig. 14) had numerous small depressions cut into it, frequently associated with medieval or post-medieval pottery, and similar finds were found elsewhere on the site.

BROADFIELD SITE 3 (Figs 3 and 15)

The first period of occupation in this area is represented by a small gully, probably circular in plan and V-shaped in section. Within the area delimited by the ditch and contemporary with it there was a square-section trench, irregular-

shaped in plan, which has been interpreted as a beam-slot. A group of four post pits was situated a short distance from this feature. The exact date of these features is not known, stratigraphically they could be no later than Phase IV–V.

PHASE IV–V

To the east of this area a small domestic hearth was discovered. This had been cut into a ditch that runs north–south through Sites 1, 3 and 4. It consists of a circular depression with a flat base and vertical sides. The superstructure had been demolished at the base of the hearth and back-filled with yellow clay. It is associated with a hearth and building on Site 4.

PHASE V–VI

The ditch located in Phase IV was V-shaped in section with sloping sides and started to accumulate silt during Phase V. Towards the end of this phase building materials, tiles, nails, sandstone and domestic rubbish were being deposited.

PHASE VI

After a short hiatus, the area was converted to industrial activity. The gully which had encircled the building was partly filled by silt when ore roasting operations were started near its southern bank. Soon the remainder of the ditch was filled with charcoal and roasted ore. The ore roasting feature was represented by an area of red, black and yellow burnt clay and covered with a thin layer of roasted ore fragments and fines.

An unusual series of smelting furnaces (Fig. 16) was constructed in the centre of the area previously occupied by the building described above.

Furnace No. 1. This elaborate smelting furnace was set into a pit 89 cm. deep. At the southern end the pit was lined with puddled clay and reinforced with several courses of sandstone blocks. The furnace had a flat base with an internal diameter of 80 cm. The remains of the shaft stood 76 cm. high.

Furnace No. 3. Furnace No. 1 was replaced by a more conventional smelting furnace, which was constructed on a raised clay base set into the

demolished remains. Dimensions of this furnace are difficult to estimate as the broken fragments of the slag furnace base give the appearance of a corner, suggesting a square bottom to the furnace. This slag furnace base was 76 mm. thick adhering to the grey puddled clay which was apparently a re-lining, as this was followed by a band of hard black burnt clay surrounded by the red burnt remains of the insert.

This was eventually levelled and ore roasting was carried out in a pit formed in the former slag-tapping hollow and front arch area. The feature consisted of an oval-shaped burnt clay depression measuring 1 metre long and 84 cm. wide, covered with a 10 cm. thick deposit of roasted ore fragments.

A subsequent alteration saw the construction on a prepared clay insert, set into the residue of ore left in the pit described above of another smelting furnace (No. 4) (Fig. 16). This had an internal diameter of 40 cm. The wall of the furnace survived to a height of 41 cm., leaving a ragged surface where the superstructure was broken off.

In its final form this furnace was modified by reducing its superstructure (probably to ground level) and sealing off the front arch with clay and sandstone blocks to create a forge, oval in plan (69 cm. × 43 cm. × 41 cm. deep). During its working life the slag lining increased to a maximum thickness of 23 cm. At the end of this phase the base of the forge (Furnace No. 6) was back-filled with burnt clay (Fig. 16).

Also in this phase were two more conventional furnaces. *Furnace No. 2* was constructed on the western side of the main ditch (which had fallen into disuse) within a shallow pit 61 cm. deep. The slag-coated (12 cm. thick) shaft was approximately 63 cm. in diameter and 53 cm. high. There was clear evidence of at least one re-lining. The superstructure above the front arch had collapsed inwards, the largest fragment 76 cm. long. This, added to the 53 cm. high subterranean portion would give an overall height for the remains of 1.29 m.

Furnace No. 5. This was situated due south of Furnace No. 1 and was cut through by a service trench at the start of excavation in this area. It consisted of an oval pit 1.37 m. in diameter and 43 cm. deep lined with alternate bands of burnt

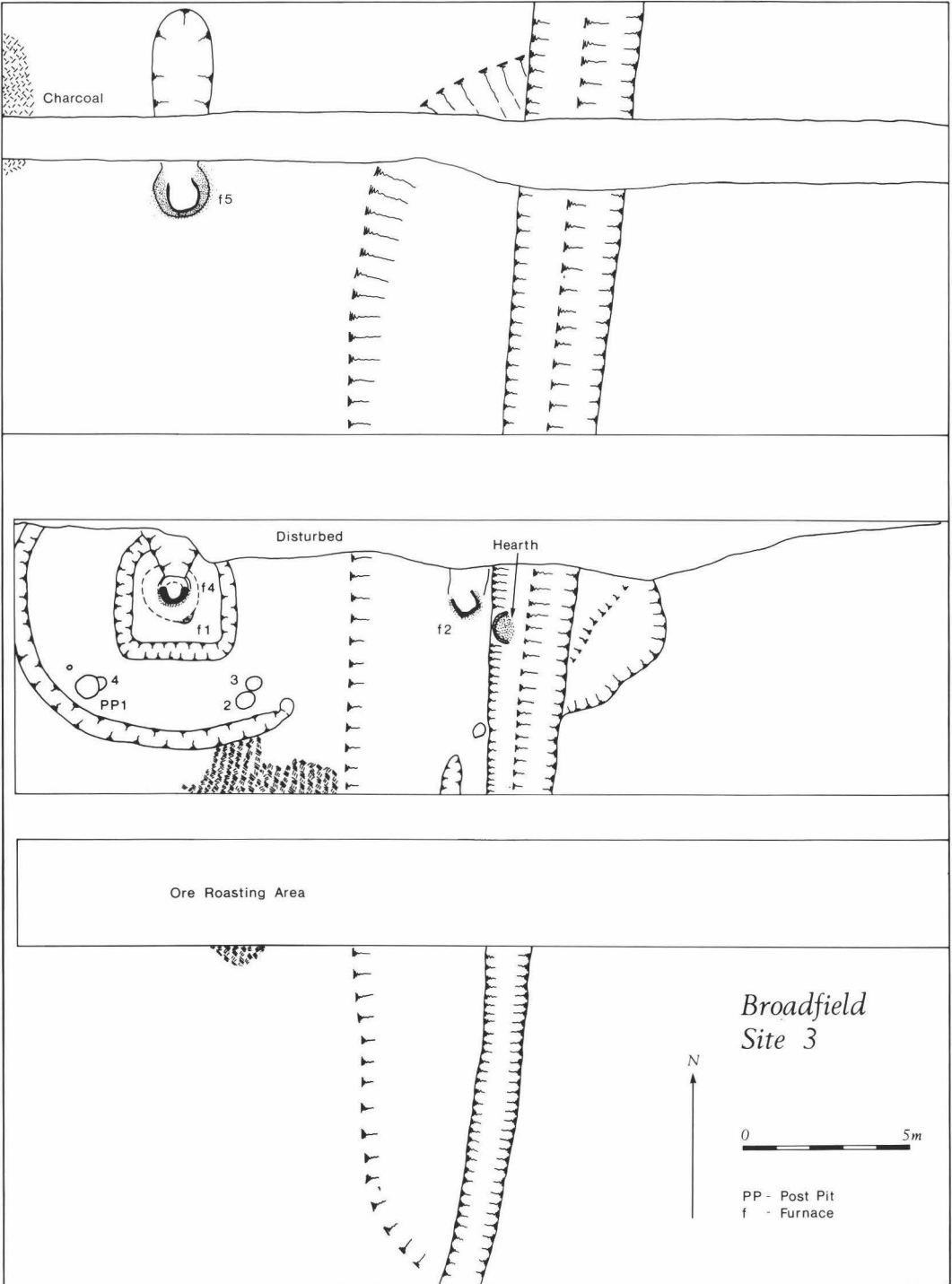
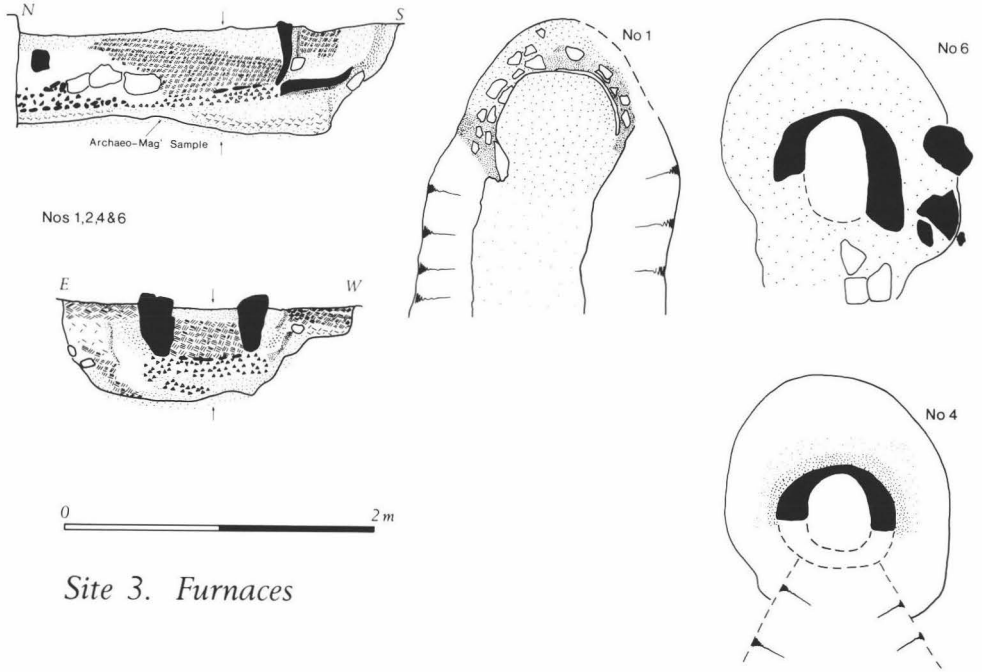
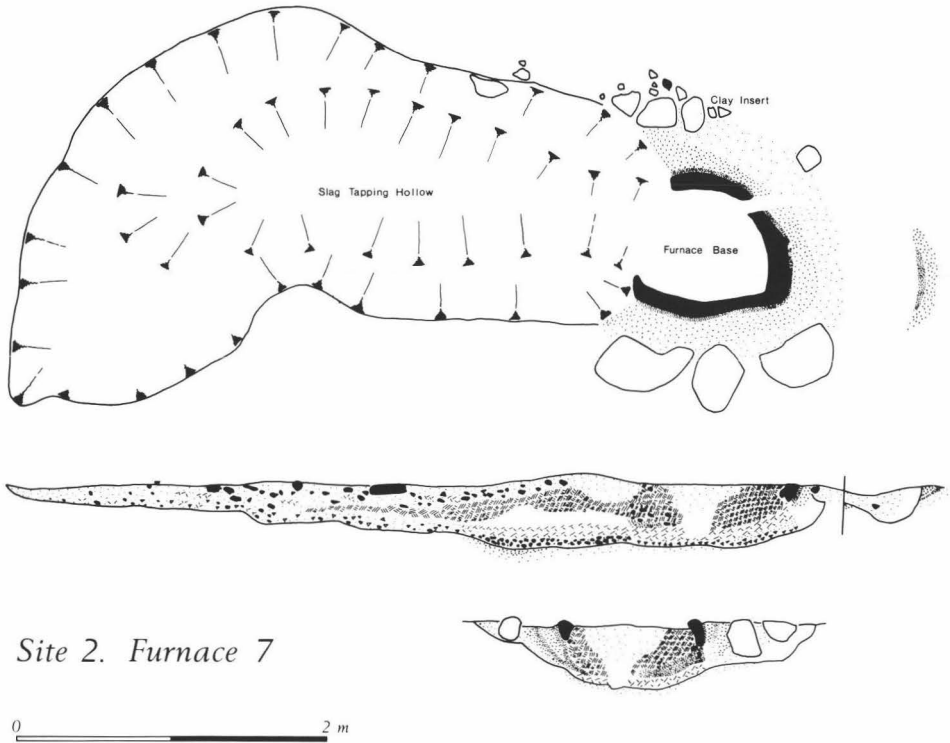


Fig. 15. Site 3.



Site 3. Furnaces



Site 2. Furnace 7

Fig. 16. Sites 2 and 3. Furnaces.

clay. The base of the shaft had become blocked by a mass of charcoal and slag. Smelting continued, forming a slag furnace on top of this material. The slag-tapping hollow was approximately 3.70 metres long and the clay at its base and sides had been burnt red by contact with the molten slag.

The site of a further furnace was observed, but there is little archaeological evidence of it as the area was badly disturbed during road construction.

Immediately east of Furnace No. 5 a thick deposit of charcoal, forming a rectangular shape in plan covered entirely a burnt clay area. At the centre there was a post hole containing a charcoal fill. It is possible that this represented the remains of a charcoal burning area, the post supporting the cover to the wood pile during firing.

BROADFIELD, SITE 4 (Fig. 3)

This site is immediately south of Site 3 and covers a slight rise formed by a clay ironstone outcrop. The remains of the base of the rise were truncated and, because of erosion and ploughing, disappeared some way from the summit.

PHASE IV-V

Following the demolition of the domestic settlement on Site 2, fresh quarters were apparently erected on this site. There is evidence for two dwellings, a granary or warehouse and two domestic hearths.

Buildings, represented by two areas of burnt clay, resemble in construction the floor of Building I on Site 2. One of these areas was rectangular in plan, measuring 12 metres by 1.5 metres. On its northern side, running parallel to the long axis, a shallow trench had served as a beam slot, the burnt clay ending abruptly on its southern edge (Building A). No trace of the beam slot was found on the other three sides, apparently removed by ploughing. The other burnt clay area (Building B), 15 metres square, provided no evidence of beam slots and although several shallow circular depressions of approximately 90 cm. in diameter were found in this vicinity they were truncated, making it impossible to establish whether or not they had supported vertical posts. Nearby, three other smaller areas of burnt clay were located, all were irregular-shaped in plan and had been extensively damaged by ploughing.

Another structure first located on Site 3 was revealed during the excavation of Site 4 (Building C). The remains consisted of five parallel trenches (beam slots) approximately 2 metres apart terminating at one end in a trench set at right angles to the others. The beam slots contained a fill of dirty brown soil, slag and charcoal. The structure was cut through by the ditch described above and while one of the beam slots was found to continue on its eastern bank, it was only possible to trace this for a short distance. Therefore the full extent of the structure is unknown. However, the remains indicated a building that was used either as a store house, or more probably a granary (see above for comments on possible arable farming).

Associated with this building is a domestic hearth similar to that of Site 3. The Site 4 example is more complete and consists of an irregular-shaped depression filled with a layer of charcoal and clay above the collapsed red burnt clay superstructure.

PHASE V-VI

The ditch mentioned above cut through the foundation of the granary and continued south towards the crest of the hill, becoming more truncated until it disappeared near the 83.5 metres contour line. It had been traced in a continuous line for 117 metres. Another ditch running from east to west for 41 metres was probably associated with it, providing drainage of this area. The fills of both ditches were similar and small finds confirmed they were contemporary.

Several minor depressions filled with slag were found on the site, but neither their function nor date could be ascertained. In addition to these there were three larger pits which may represent the remains of shallow excavations for clay and iron ore which outcrops in this area.

No plans appear to survive for two furnaces found on Site 4.

Furnace No. 1. A horse-shoe shaped area of grey burnt clay 67 cm. in diameter surrounded by red burnt clay. The shaft and base were filled with a black mixture of charcoal, slag and soil sealed by a layer of collapsed superstructure which had been levelled to make way for Furnace No. 2.

Furnace No. 2. Constructed in a pit cut into the slag-tapping hollow of Furnace No. 1. The clay insert was reinforced by eight sandstone blocks forming a horse-shoe shape in plan. Each block had one straight, worked surface that was positioned to face inwards and showed signs of burning at a high temperature. On the southern edge of the insert, near the front arch, there was a post pit. The interior of the shaft and base was lined with grey burnt clay 69 cm. in diameter with an opening leading to the slag-tapping hollow. The shaft was filled with a layer of charcoal and furnace slag sealed by fragments of furnace superstructure. The charcoal level continued into the slag-tapping hollow, covering its base to a depth of 50 mm. This in turn was covered by a layer of black-brown soil and tap slag, sealed by a thick deposit of red and orange burnt clay lumps.

Both these furnaces are very truncated and owed their survival to a covering of smelting debris that had been spread on this area by ploughing, the material derived from a nearby slag dump. Approximately 36 metres south-east of these two furnaces a slight depression 50 cm. in diameter was found, this was lined with grey burnt puddled clay and had small fragments of furnace base adhering to its surface. Slag, roasted ore and burnt clay were scattered round and pressed into the sub-soil, but no evidence of a slag-tapping hollow was forthcoming. Although these remains have features characteristic of an iron-working hearth, the evidence is too fragmentary to make a positive identification.

An oval area of smelting debris comprising broken pieces of furnace superstructure, burnt clay lumps, tap- and furnace slag is thought to represent the residue of a slag dump, extensively damaged by ploughing. At the centre of the dump the slag deposit described above rested on a layer of charcoal. Below this a thin layer of roasted ore fines had been pressed into the natural clay. This industrial activity is contemporary and associated with the Phase VI furnace group on Site 3.

GOFFS PARK

Excavations at Bardown and Holbeanwood had shown that iron-working sites in that part of the Weald may well consist of an original core settlement providing accommodation and serving as an administrative centre to a number of later

satellite sites where the industrial activities were carried out when core reserves were used up (Cleere 1970). The aim of the Goffs Park survey was to establish whether or not this applied to the Crawley area and if so, to locate sites for examination before construction work started (Fig. 1).

Excavations were restricted to a building site on the west side of the Old Horsham Road (A264) which had previously been occupied by Springfield House. Two areas of occupation debris were exposed by grading. The first was apparently the base of quite a large depression filled with roasted ore and tap-slag. Nearby there was a circular feature approximately 90 cm. in diameter and 10 cm. thick, the clay surface burnt buff to red and through to a blue-grey colour, indicative of heating at a high temperature in reducing conditions. In this it resembles the colour variations noted on smelting furnaces found at Broadfield, but the absence of any structural details made it impossible to ascertain the function of this feature. Approximately 4.5 metres west there was another irregularly-shaped area of industrial debris, comprising a thin layer of broken tap-slag pieces on top of a grey (probably wood ash) stained clay.

The features described above were found to be on a stretch of ground separating two ditches which ran parallel to each other around the contour of the hill. The western (inner?) ditch was least affected by grading. Its fill consisted of a layer of brown soil slightly stained with charcoal flecks. There were inclusions both of burnt clay lumps and rusty metallic particles. Below this the fill changed abruptly to a grey clay textured layer heavily stained with charcoal. Most of the pottery, together with a few pieces of roasted ore, burnt sandstone and fragments of tap-slag were recovered from this layer. The third layer was a light grey silt of a plastic consistency with virtually no inclusions except for a few sherds of pottery. In the section illustrated the top of the remains were approximately 1.55 metres below the surface of the subsoil, giving an overall depth for the ditch of 2.30 metres.

The second ditch had a more irregular profile, sloping outwards from the base. However, the fill was very similar to the one described above. Brown soil was found intermittently at the

surface throughout the length of the ditch. It was iron-stained and numerous tiny rusty lumps were recovered. The second layer was identical to the first ditch and again contained most of the small finds. The silt was inconsistent at various points. It would seem that both ditches were more or less contemporary, silting rapidly with material washed downhill by rain. When iron-working commenced in the immediate vicinity of the ditches, industrial waste and domestic debris were deposited in Layer 2. Pottery from this and the other occupation areas indicate a Late Iron Age date for the site, the total absence of any definite Roman forms suggesting that work ceased in this area prior to 43 A.D. The ditches were apparently no longer maintained after this phase and gradually filled by silting and erosion. The area was probably unoccupied as no further finds were recovered.

Aerial photographs of the area prior to the demolition of Springfield House show two ring-shaped features situated west of the ditch. They may represent the remains of structures (possibly hut-circles) associated with the Iron Age occupation. In any case these features and the area inside Goffs Park were not excavated, as they were not threatened by development.

Goffs Park is significant because of the clear evidence in the form of roasted ore, charcoal, tap-and furnace-slag of iron-working in a probably pre-Roman context. The pottery is similar to types found at Broadfield Site 2, Phase II, suggesting that they are contemporaneous. If the ditches at Goffs Park do in fact enclose a domestic occupation area with dwellings, then the associated smelting furnaces at Broadfield, as out-workings, are not without parallels. The excavations of the Iron Age hill fort and Romano-British settlement at Garden Hill (Money 1976) suggest a connection with several single bloomery sites found in the adjacent Pippingford Park by Mr C. F. Tebbutt (pers. comm. 1976). One of these bloomery sites has been excavated, providing a mid-1st century A.D. date. (Tebbutt and Cleere 1973, 27–41).

CONCLUSIONS

The earliest iron workings in the Weald were probably those associated with the hill forts that

occur in the area. They operated in a similar, though possibly less extensive, manner to the outworkings of the later Romano-British settlement at Garden Hill. This limited industrial activity supplied the needs of the community and it is not until the late Iron Age that there is conclusive evidence for iron working on a larger scale, when open sites such as Broadfield and Horsted Keynes were founded. At Broadfield two of the earliest cylindrical shaft smelting furnaces to be found in Britain are dated to this period. They are associated with the probable settlement at Goffs Park, the population of which used pottery of the Eastern Atrebatian type. Although iron working was undoubtedly a major factor in their economy, they may have practised some form of agriculture and were conceivably responsible for the cross-plough marks at Broadfield Site 2.

A further period of expansion took place shortly after the Roman invasion of 43 A.D. The settlement at Goffs Park was abandoned and new quarters were established in the vale of Broadfield (Site 2) with a contemporary industrial area (Site 1) on the adjacent bank of the River Mole. The domestic settlement consisted of an enclosure formed by a ditch and upcast bank containing an area measuring approximately 82 metres × 98 metres. There were at least three timber-framed buildings on the eastern side of the settlement, and sandstone foundations of other structures were found on the west side. Of these Building III was the more complete and clearly served a domestic function, being fitted with an oven and prepared clay floor. There is little doubt that this represents a planned complex, primarily concerned with mining and smelting iron ore. Distribution of the products was presumably via the Pease Pottage–Colgate Trackway to Horsham linking with the newly constructed Stane Street.

During the following phase (IV) the settlement in Broadfield Site 2 was abandoned, the buildings demolished and the eastern perimeter ditch back-filled to be replaced by a series of smelting furnaces. Site 1 still functioned as an industrial area, the reservoir and ditch and the initial furnace group ceased to be used, but the forge was still operative and some smelting furnaces were constructed. Several varieties of smelting furnace new to Broadfield were

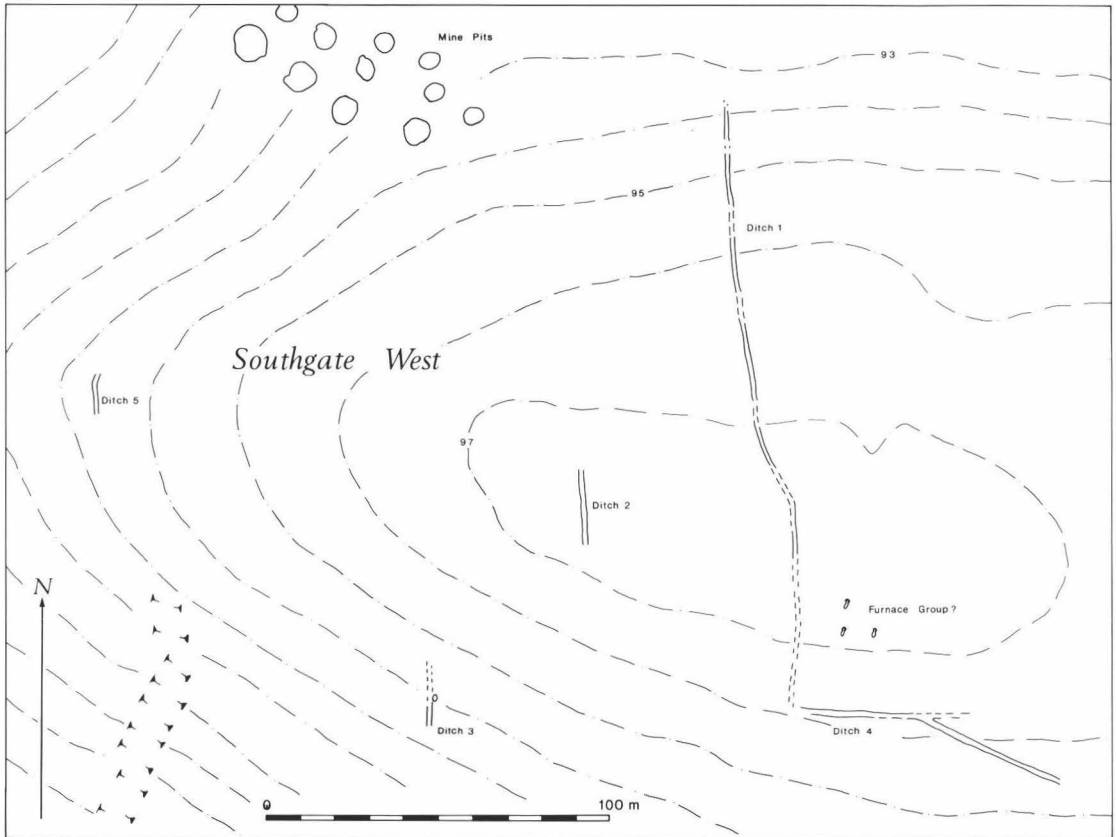


Fig. 17. Archaeological remains at Southgate West.

introduced at this time and occur on both Sites 1 and 2. The domestic accommodation was transferred to the south of this enlarged industrial area near to the crest of a slight rise that is formed by an outcrop of clay ironstone in the Weald Clay (Site 4).

This increase of industrial activity took place towards the end of the 1st century A.D. when iron working areas of the western mid-Weald were opened up by the construction of the London to Lewes and London to Brighton roads, which apparently coincided with the death of Cogidubnus and the acquisition of *civitas* status by Chichester.

All industrial activity had ceased on Broadfield Site 1 by the beginning of the second century, but smelting still took place on Site 2 and in a newly constructed furnace group on Site 3, as

well as those found around the periphery of Site 4. Previously the open fire method was used for ore-roasting. Although this technique was still applied there were, in addition, several oval pits fashioned in the slag-tapping hollows of disused smelting furnaces which were used for this purpose.

The buildings on Site 4 were probably dismantled at the start of this phase and new quarters constructed elsewhere. Although no positive evidence of its location was found during the excavation, Southgate West would be the most likely situation. The large quantities of contemporary domestic pottery including storage jars and amphorae, utensils and refuse and building material found in and around the ditches at the crest of the hill may support this view (Fig. 17). The resiting of domestic settlements may be

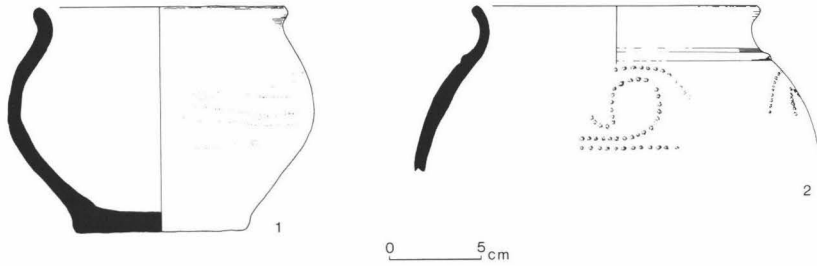


Fig. 18. Broadfield. Late Iron Age pottery ($\times\frac{1}{4}$).

attributed to pollution, and the need for cleared land so that more furnaces could be constructed.

The size of the Broadfield slag dumps is quite insignificant in comparison with those found on sites of the 'Coastal' group. There is clear evidence of the dumps at Broadfield being robbed for housing material, besides the large quantities of tap slag utilised as metalling on the Roman roads that cross the Weald. In short, the size of a dump is an example of the random survival of features rather than an indication of the scale of iron working on any given site.

LATE IRON AGE POTTERY FROM GOFFS PARK, CRAWLEY (by Sue Hamilton)

Introduction

Approximately 500 sherds from Goffs Park, probably of late pre-Roman Iron Age date, were examined (Fig. 18). These comprise four fabric categories: Fabrics 1, 2, 3 and 4 discussed below. Fabric 1 dominates and accounts for approximately 85 per cent of the assemblage.

Fabric 1: Grog tempered

Contexts with Fabric 1 sherds: 1, 4, 6, 7, 8, 9, 13, 23, 24, 34, 37, 43, 49, 50, 52, 55, 63, 69, 76, 77, 82 and 83.

Discussion:

Just over 400 sherds of hand-made grog-tempered pottery were considered to date to the immediate pre-Conquest period.

Grog-tempered wares are the commonest fabrics on pre-Roman Iron Age sites in Mid and East Sussex. The fabric tradition probably appears in the 1st century B.C and its production continues through the 1st century A.D. and much beyond (Green 1977, 155). The pre-Roman Iron

Age pottery in this fabric falls within Cunliffe's 'Atrebat' style tradition (Cunliffe 1974, 89), first recognised by Ward-Perkins (1938). Pre-Conquest grog fabrics from Bishopstone, East Sussex and Testers, West Sussex have received detailed analysis (Bishopstone Fabric 5, Hamilton 1977, 91; Testers Fabric 5, Hamilton 1988).

Without good contextual evidence and clear associations with other datable artefacts, it is difficult to ascertain with confidence whether specific Sussex grog assemblages relate to pre- or post-Conquest chronologies. Many of the style and fabric characteristics remain unchanged through this period. The post-Conquest production has been discussed in some detail by Green under the terminology 'Cooking Jar Fabric' (Green 1977) or 'East Sussex Ware' (Green 1980). The pre-Conquest grog tempered sherds from Goffs Park have been classified as pre-Conquest on the basis of the fabric and style characteristics discussed below. Pre-Conquest grog fabrics are frequently more highly fired and the colouring of the grog within individual sherds has a consistently 'reduced' or 'oxidised' appearance. The grog in post-Conquest fabrics is often multi-coloured and more loosely bonded in the clay matrix.

Dating of pre-Conquest grog fabric styles and forms is still not fully clear. There is a shortage of pre-Conquest datable associations together with a general absence of good stratigraphies. Bishopstone provides the only real exception to this for pre-Conquest Sussex grog fabrics (Hamilton 1977). The Goffs Park pre-Conquest grog fabric includes sherds from large globular jars with out-bent rims and narrow necks together with sherds from smaller jar forms with high shoulders and slightly everted rims. This combination compares with the late pre-Roman

Iron Age forms from Pit 20, Bishopstone (Hamilton 1977, Figs. 50–52). The same combination has been isolated by Cunliffe as typical of ‘Eastern Atrebatc’ forms (Cunliffe 1974, 344, A:29). The Goffs Park everted rims from smaller jar forms ascribed to the pre-Conquest period are less severely everted than post-Conquest rims.

The presence of sherds with lightly tooled ‘eyebrow’ decoration (Fig. 19) in the Goffs Park assemblage (in one instance emphasised by black paint, Fig. 19, No. 3) is also typical of Cunliffe’s ‘Eastern Atrebatc’ material. It is difficult to date such decorated material earlier than the immediate pre-Conquest period and it certainly continues post Conquest (Green, 1977). Wide-bellied grog vessels with tooled eyebrow decoration on their shoulders were associated at Bishopstone with a ‘Colchester fibula’ of a type produced during the hundred years preceding the Conquest (Bell 1977, 130). One of the Goffs Park vessels has a rouletted eyebrow design. Rouletted designs are likely to be early in the grog ware tradition since they are absent from wholly Roman sites (Green 1980, 72). (See Hamilton, forthcoming, for further discussion of pre-Conquest grog ware chronologies.)

Fabric 2 Medium-coarse quartz sand and iron oxide inclusions.

Contexts with Fabric 2 sherds: 5, 19, 70, 78, 93 and 98.

Discussion:

Approximately 50 sherds were identified as belonging to this fabric category. The quartz was predominantly of coarse and medium sand size grade (Krumbein and Pettijohn 1938, 30). The grains are polished. Both translucent (milky white and also iron stained in colour) and transparent grains are present. The iron oxides are pisolithic in form and of medium sand size grade.

The fabric is unevenly oxidised red-brown to buff. Its texture, inclusions and colouring suggest that the fabric is comparable with Bishopstone Fabric 3d (Hamilton 1977, 90) for which a High Wealden, possibly Tunbridge Wells Sand, clay source is suggested.

Few diagnostic sherds are present in Fabric 2. Only one form can be isolated. This is a

barrel-shaped jar with out-turned rim. This form is current in both middle and late pre-Roman Iron Age contexts in Hampshire, Kent and the Thames Valley and is difficult to date precisely. The form is present in West Sussex ‘saucepan’ assemblages. In East Sussex however its presence is most commonly associated with the later Iron Age.

Fabric 3: Finer Quartz Sand

Contexts with Fabric 3 sherds: 2, 4, 6, 36, 48 and 49.

Discussion:

Approximately 25 sherds were recovered in this fabric. The fabric comprises fine and medium sand size grade quartz. These quartz grains are polished and transparent. Sherd surfaces are burnished and evenly reduced black. Sherd cores are grey. Fabric 3 compares well with Oving Fabric 3 (Hamilton 1985, 222) and Testers Fabric 6 (Hamilton, 1988). The latter two fabrics belong to a quartz sand fabric tradition which has a distribution concentrated on West Sussex. A Lower Greensand source has been suggested for Oving Fabric 3 (Hamilton 1985, *ibid.*). Hand-made imitations of wheel-thrown forms also occur in this fabric. Insufficient conjoining sherds were present in Goffs Park Fabric 3 to ascertain whether the fabric was associated with hand-made or wheel-thrown pottery production.

This quartz sand fabric tradition which has been isolated and analysed at Oving and Testers is regularly associated with late pre-Roman Iron Age cordoned bowl forms which are Sussex versions of ‘Belgic’ forms. One of the Goffs Park Fabric 3 sherds was cordoned (Context 8). The only other diagnostic sherds in Goffs Park Fabric 3 were associated with a wide-bellied jar with a shoulder decoration of a lightly tooled involuted design emphasised with impressed dots (Fig. 19, no. 2). The form falls within an ‘Eastern Atrebatc’ style repertoire (see Goffs Park Fabric 1, discussion above). Some of the Oving and Testers sherds in this quartz sand fabric tradition have tooled ‘eyebrow’ decoration, which in the case of one of the Testers examples is associated with a wide-bellied jar. This suggests some interchange of style traditions within a single late pre-Roman Iron Age finer quartz fabric tradition. Curvilinear and impressed dot designs have their

origins in mid and West Sussex Middle Iron Age 'saucepan pottery' designs (e.g. Cunliffe 1974, 329, Fig. A:14) but are also found in East Sussex in the late pre-Roman Iron Age, associated with grog wares (e.g. Hamilton 1977, 116, Fig. 53: 94).

Fabric 4: Coarse Flint

Contexts with Fabric 4 sherds: SF 642.

Discussion:

A few sherds of coarse flint-tempered fabric were present. These sherds were undiagnostic. The thickness of the sherds in cross-section (about 7 mm.) and the maximum measurements of the flint grits (6 mm.) suggested a 1st millennium B.C. flint fabric tradition rather than one that was earlier or later. The presence of flint is interesting since it is non-local to the site.

Conclusions

The lack of pre-Roman Iron Age material from the Sussex Weald makes any material of this date from the Weald a valuable contribution to our limited understanding of Wealden Iron Age ceramic traditions (Money 1978). Radiocarbon dates for the Broadfield ironworking sites, which are close to Goffs Park, suggest the possibility of pre-Conquest ironworking in this part of the Weald. Two of the Broadfield dates are of interest, namely 190 ± 80 b.c. (HAR-871) and 60 ± 60 b.c. (HAR-970) (Gibson-Hill 1976, 30). In the context of these dates the above discussed Goffs Park pottery provides further evidence of immediately pre-Conquest activity in the mid-Sussex area, albeit limited.

THE ROMAN POTTERY (by David Rudling)

Introduction (Figs. 19–23)

The Crawley museum has 14 boxes of mixed but mainly Roman pottery from John Gibson-Hill's Crawley excavations, 1970–75. The sherds were found to have been grouped/bagged by Gibson-Hill by pottery types (mainly based on colour and form) rather than by archaeological context. This situation is especially unfortunate since there are many sherds which are unmarked and thus lacking a precise findspot. In addition, it would appear from discussions with volunteers who helped on the excavations that not all of the

pottery discovered by Gibson-Hill is now stored at Crawley Museum. The whereabouts of the other pottery is unknown. Given the factors outlined above, it was decided to treat the available Crawley pottery as a single assemblage and to study a sample of it with the following aims:

- (a) To provide a guide to the main range of pottery fabrics and vessel forms. This is considered to be particularly important since there is, as yet, little published information about large assemblages of Roman pottery from ironworking sites in the Weald. A representative selection of the pottery is described and illustrated.
- (b) To provide a general date range for the excavated Crawley sites.
- (c) To provide, where possible, dating evidence for specific archaeological contexts.

Owing to the problems concerning context data and possible missing finds, no attempt is made to quantify the pottery accurately by fabric groups. The dating of individual coarse ware sherds is in many cases hampered by the lack of information concerning associations with more closely dated types.

Fabric Groups

Grog-tempered Wares: Hand-made grog-tempered wares form one of the two largest categories of pottery found at Broadfield. The other large category is that of Sandy Grey Wares. It is interesting to note that at Garden Hill (another Wealden ironworking site), grog-tempered vessels accounted for some 78.4 per cent of all the pottery (Fulford and Eade 1977, 349). Elsewhere in East Sussex, the core area of this ceramic tradition, the locally produced grog-tempered wares usually account for more than 50 per cent of the total pottery assemblage, but sometimes account for as much as 80 or 90 per cent (Green 1980, 79).

The origins of this pottery tradition go back to the first century B.C. and examples of such late pre-Roman Iron Age grog-tempered wares belong to Cunliffe's 'Eastern Atrebatian' style (Cunliffe 1978, 97–100, 381). Examples of grog-tempered wares which date to after the Conquest are often referred to as 'East Sussex Ware'. The tradition continued in East Sussex until at least the late 4th or early 5th century. For a detailed

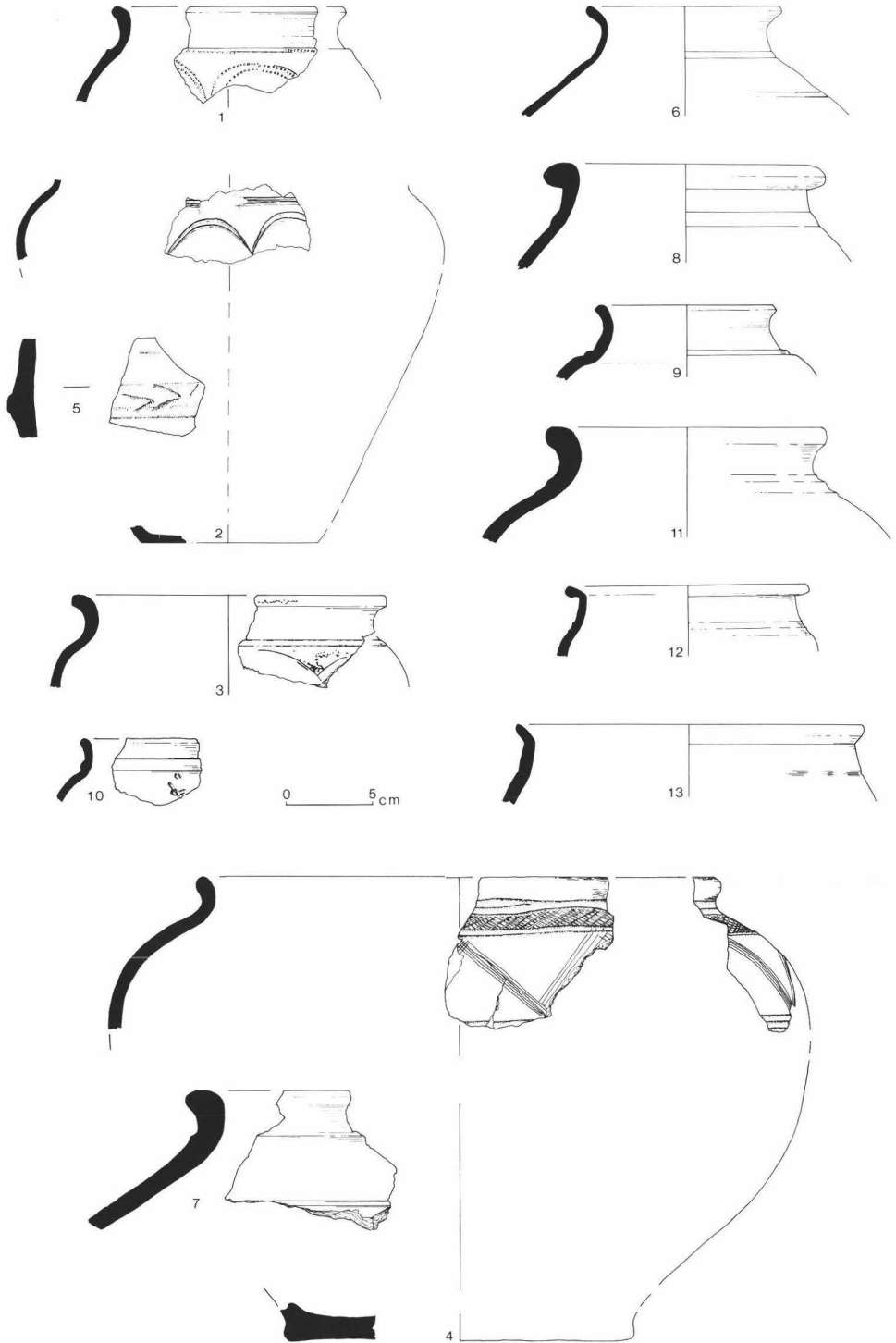


Fig. 19. Broadfield. Grog-tempered Wares ($\times\frac{1}{4}$).

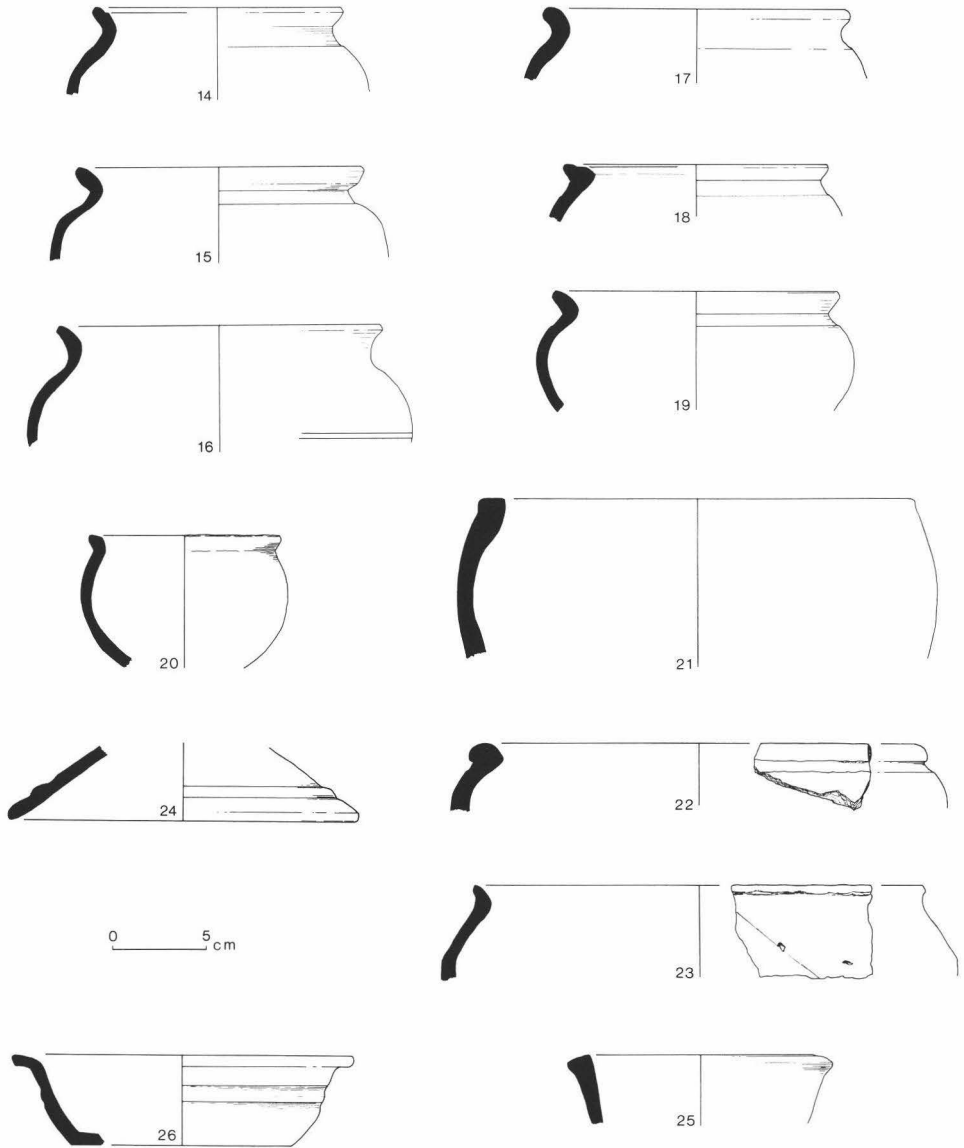


Fig. 20. Broadfield. Grog-tempered Wares ($\times\frac{1}{4}$).

study and discussion about this long-lived pottery industry the reader is referred to a paper by Chris Green (1980) and Hamilton (above).

The fabric, which has a 'soapy' feel, is soft to hard, occasionally orange-red but usually grey or brown to black and primarily filled with coarse grog. Catalogue examples: 1-26. (Figs. 19, 20).

Samian Ware or Terra Sigillata (incorporating

comments by Catherine Johns). All the Samian appears to be second century and of Central Gaulish manufacture. There are no decorated samian forms.

Vessel forms:

Dragendorff 18/31; 27; 33; 35/36; 38

Curle 11; 15.

Although no samian ware is described or illustrated in the catalogue, a list of samian

sherds identifiable by vessel form is on microfiche.

Imitation Samian: There are two examples of local late 1st/early 2nd century fine ware bowls imitating samian forms. Catalogue examples: 27 and 28 (Fig. 21).

Colour-Coated Wares: The Broadfield pottery assemblage contains very few sherds of non-local colour-coated wares. There are however sherds from three colour-coated beakers which have a date range of mid 2nd century to mid 3rd century. Catalogue examples: 32; 32a; 33 (Fig. 21).

Mortaria: All the mortaria have flint trituration grits and were manufactured in Southern England. Most of the mortaria appear to be of types dating to the late 1st or 2nd century. One example (Cat. no. 40) however, is a product of the New Forest kilns and is dated to c. A.D. 270–380. Catalogue examples: 34–40 (Fig. 21).

Amphorae: The only type present is Form Dressel 20 from Southern Spain. Date range: late 1st century B.C. to ?4th century A.D. Catalogue example: 41 (not illustrated).

Light Self-Coloured Wares: Mainly cream, pinks, buff or orange in colour and of varying textures from very well levigated to medium sand tempered. This group of vessels probably comes from various production centres in South East England. The vessel forms include beakers, flagons, jars, bowls and a colander. Date range: late 1st to mid 3rd century. Catalogue examples: 29–31; 42–47 (Fig. 21).

Fine Textured Grey Wares: Most vessels in these wares are beakers, but other forms include jars and bowls. Date range: late 1st–mid 2nd century. Catalogue examples: 48–53 (Fig. 21).

Sand-Tempered Grey Wares: Fine to medium textured sand-tempered wares which are mainly grey or grey-buff in colour. This group of wares forms a major element in the Broadfield pottery assemblage. The wares come from various local production centres, including perhaps the Alice Holt/Farnham kilns. The vessel forms include

flagons, jars, lids, and bowls/dishes. Date range: late 1st–3rd/?4th century. Catalogue examples: 55–81 (Figs. 22 and 23).

Grey-Black Burnished Wares: There are a small number of sand-tempered grey-black wares with burnished surfaces and decoration. The forms are either bowls or jars. Date range: 2nd–3rd century. Catalogue examples: 82–84 (Fig. 23).

Discussion

Viewed as one assemblage, the Broadfield Roman pottery indicates an overall date range of 1st–late 3rd century, with the possibility of some activity both earlier (perhaps 1st century B.C.) and later (4th century). The majority of the pottery however appears to date to the late 1st and 2nd centuries. The relatively small number of sherds which can be dated to the 3rd and 4th centuries may indicate that by then the ironworking sites had gone out of use or were much less important than previously. The catalogue of Roman pottery appears as microfiche.

ROMAN TILE (by David Rudling)

Only eight fragments of Roman tile are amongst the finds from the Crawley excavations. Such a very small quantity of tile from a programme of extensive excavations of Roman ironworking sites is surprising.

The examined fragments represent three categories of Roman tile: *tegulae*, *imbrix* and 'flat' tiles. Of the five tegulae (Tiles 1, 35, 42, 45 and 'Site 4, Ditch LI'), one example has part of a semi-circular 'signature' mark on its upper surface, and another fragment has a flange measuring 3.7 cm. high. Fabrics range from orange sand tempered to highly overfired red ware with ironstone and slag inclusions and a pimply surface (?wasters). The one piece of imbrix tile ('CRBS 70 Southgate West') was in a soft orange fabric with some grog, ironstone and slag inclusions. The two pieces of 'flat' tile (from BR/C/-375 J/C/S 2nd Ditch section, LIV) are both 3.5 cm. thick and are highly fired red ware with ironstone/slag inclusions.

The presence of ironstone and slag inclusions in some of the tile fragments suggests that these tiles, and possibly also the others, may have been manufactured in the vicinity of the ironworking sites.

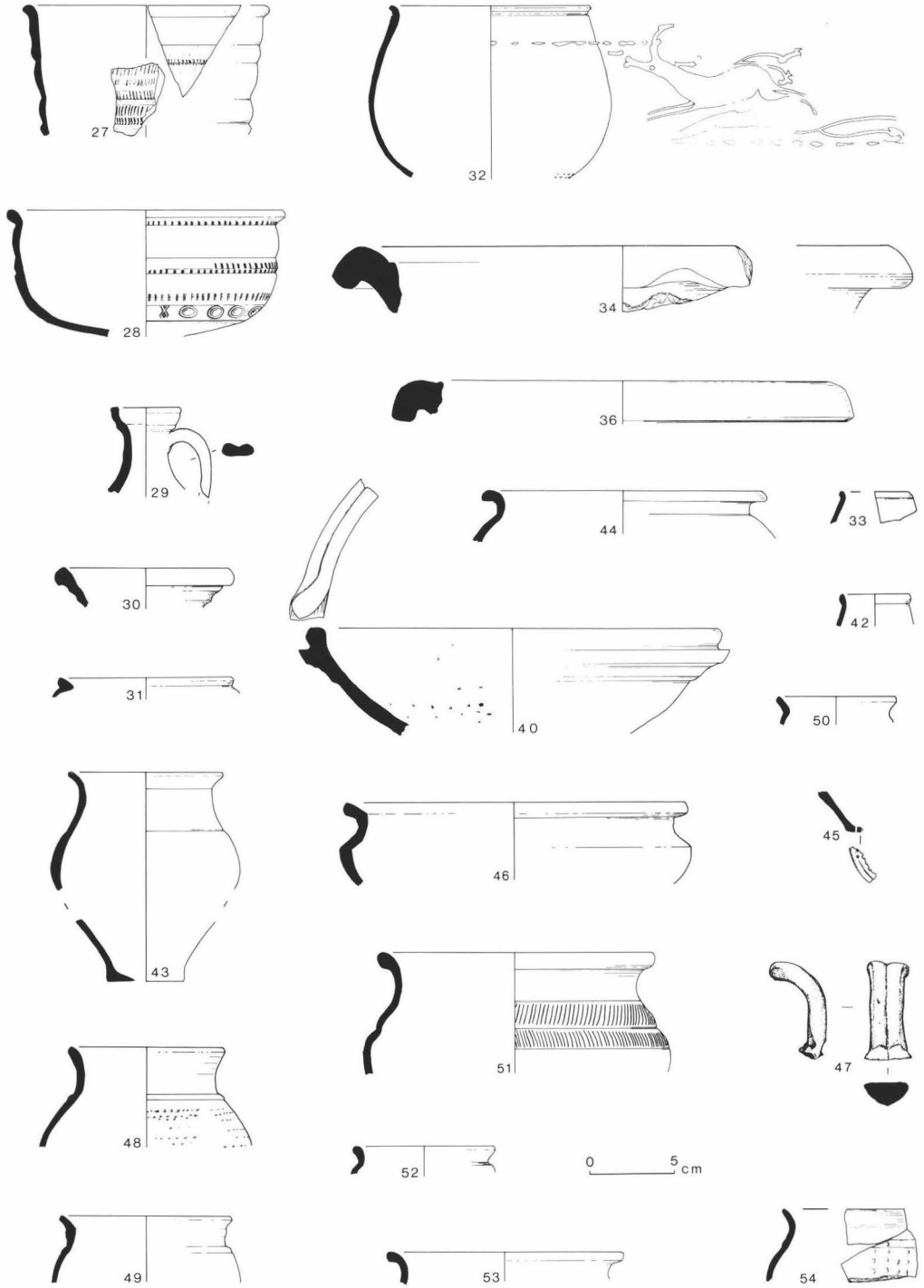


Fig. 21. Broadfield. Roman pottery ($\times\frac{1}{4}$).

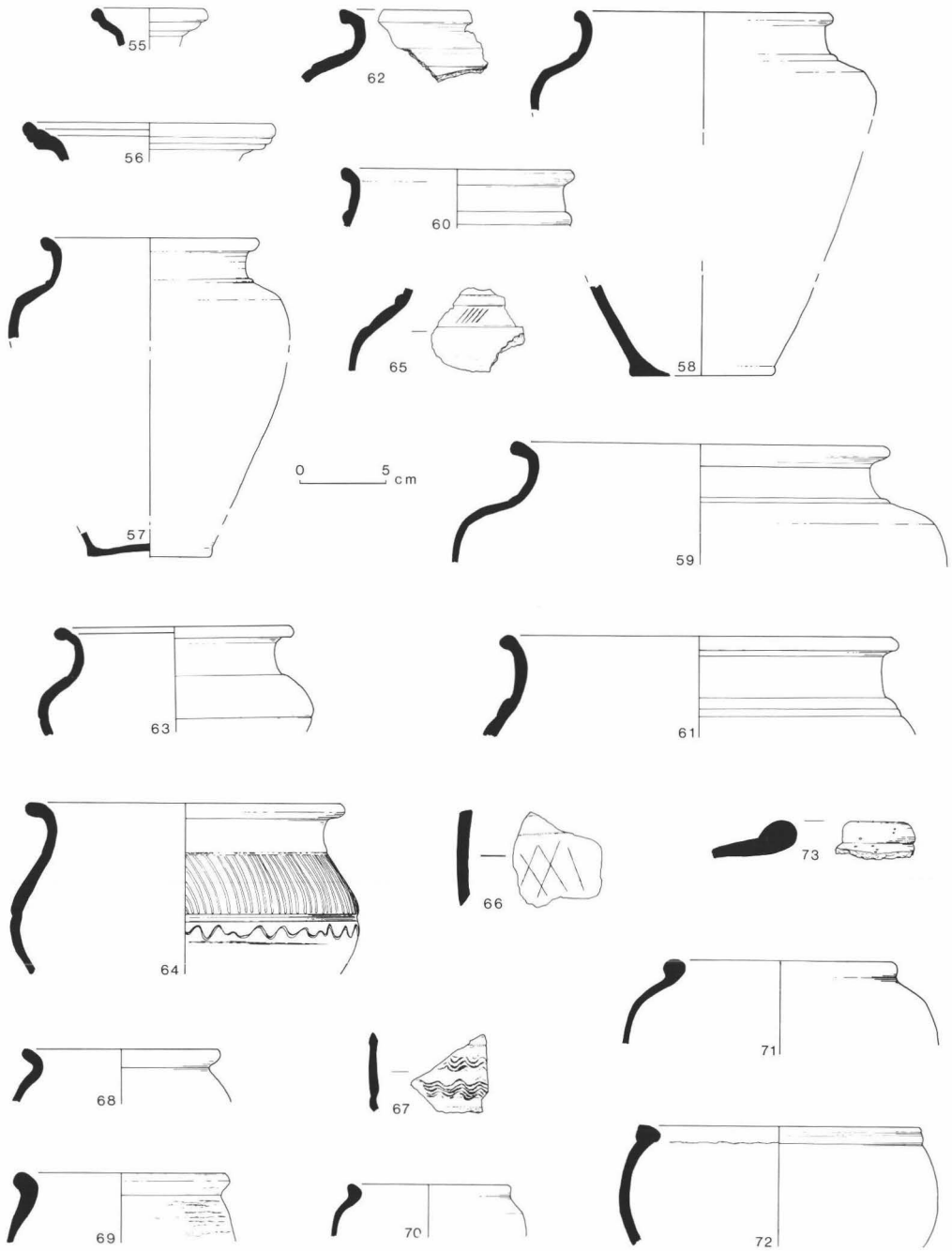


Fig. 22. Broadfield. Roman pottery (x $\frac{1}{4}$).

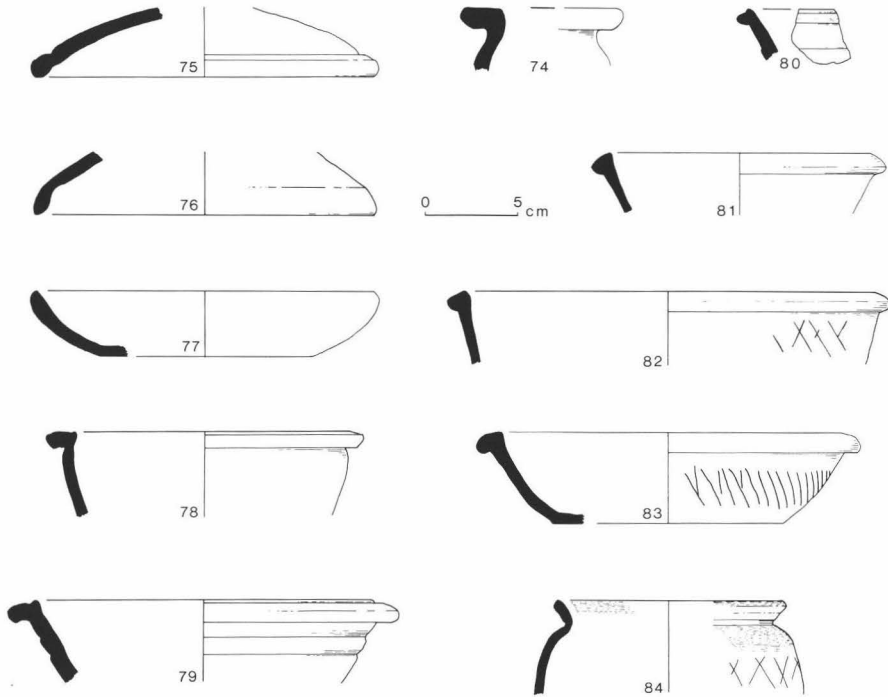


Fig. 23. Broadfield. Roman pottery ($\times\frac{1}{2}$).

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