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Contents

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Field Notes

compiled by J. S. Hodgkinson

Stumbleholm Bloomery, Ifield, West Sussex

Limited excavation was carried out to search for dating material. A trial trench 1m x 1m was dug in the field known as Little Cinders. No dating material was found, although part of an ore-roasting hearth was revealed.

Park Wood, Burwash, East Sussex

A further visit was made to the bloomery site at TQ 6897 2599 and two more trial trenches were dug in the slag heap.[1] It was not possible to find any dating evidence; however, excavation produced more than a dozen cylindrical pieces of iron slag, averaging about 8cm long and 1.5cm in diameter, which are believed to have originated as blockages in tuyères, although no remains of tuyères were found. Similar cylindrical slag 'plugs' have been noted at Clappers Wood, Horam, which is a Romano-British site, and near Scallows Bridge, East Hoathly.[2]

Two bloomery sites in Mayfield, East Sussex

A small concentration of bloomery slag has been found above the vertical west bank of a stream, a tributary of the Rother, in Furlong Wood (TQ 5912 2332).

The second site lies in Little Furnace Wood, and is centred on TQ 5917 2438. A dense concentration of bloomery tap slag and furnace cinder has been found over an area of about 2000m^2 on the southern slope of a small gill behind Old Mill Cottage, off Newick Lane.

A bloomery in Heathfield, East Sussex

A small concentration of bloomery slag, probably not exceeding 100m^2, has been found at TQ 6009 2415 in Coneyburrow Wood, located about 30m from the stream and about 6m up on the east side of the valley.

A medieval bloomery in Ticehurst, East Sussex

Ann Callow

Slag had been noticed in a stream at Cooper's Farm, Stonegate, and the Field Group made a small excavation there to examine the site. This site, at TQ 6595 2850, is close to an ancient trackway running southwards from the ridge at Bardown. A large quantity of small pieces of slag was found in a layer near the trackway, to the west of the stream; this layer appears to be road metalling. A further area of slag, at the top of the east bank of the stream yielded, at a depth of 30cm, a small triangular piece of pottery, shaped like the rim of a flower pot. This has been identified by Luke Barber as being probably from a jug, dated between c1250 and 1350. Investigation of a side stream near this point identified further quantities of bloomery slag on the surface.

A blast furnace at Netherfield, Battle, East Sussex: a new water-powered site identified

Ann Callow

The Field Group visited an area of woodland at Netherfield where iron working remains had been noticed. The site lies in the valley between Netherfield Place Farm and Foxhole Farm, about 1km above Beech Furnace. The main valley runs from northwest to southeast, and a side valley joins it from the north.

A pond bay, at TQ 7220 1705, appears to be the site of an early blast furnace. There is a large quantity of slag, both on the bay and for some distance downstream. A long bank of slag at one end of

the bay appears to contain an overflow channel. Near this bank a piece of furnace lining was found, and also a piece of material which appeared to be metal but was a mixture of iron and slag.

Further upstream and situated just below the confluence of the two streams is a long, low bay. On the main stream just above the confluence is a feature which appears to be a causeway across the boggy valley, leading to an old trackway. Charcoal and slag were found on this causeway. Above the causeway, at TQ 7190 1725, is a pond bay, some 75m long and 7.5m high. At its western end is a long bank, 3m high, containing a spillway channel.

The side valley contains two bays. The lower, which carries the old way from Netherfield Place Farm towards Beech, contains slag and has a small pond in water. The upper, at TQ 7210 1740, is some 5-6m high, with channels at its eastern end.

A map of Netherfield Place Farm, which was surveyed in 1639, shows this last bay, the causeway, and the area of the upper pond on the main stream, although this is shown as woodland.[3] The field to the north of the bottom bay is shown as 'Sinderhill'.

A bloomery site in Crawley, West Sussex

A small concentration of bloomery slag has been noted at TQ 256378, in the bank of the Ifield Brook. The deposit lies at a depth of about 1.2m, and an unknown proportion of the concentration has been lost though erosion by the stream. Slag has also been found scattered across the fields to the north of the site.

We are grateful to Claire Denman for informing us of this site.

Iron Plat Furnace and Forge, Buxted, East Sussex

D. M. Meades

Iron Plat Furnace and Forge site, Buxted, was revisited following recent documentary work by Pam Combes and Christopher Whittick, which suggests that the ironworking on the site took place earlier than had been previously assumed.[4]

Features of the site described in the 1990/1 survey were at first glance substantially the same but careful inspection revealed two main developments.[5] Firstly lack of close grazing has allowed the growth of blackthorn bushes, which completely cover the bay, and tufts of grass cover much of the site so that it is now difficult to find any blast furnace slag at its eastern end. Secondly and more seriously, dredging of the river has greatly reduced the amount of forge cinder at the western end of the bay. It is fortunate that the previous survey was carried out before the river was deepened in this way. It is not known whether river boards are notified when an area is scheduled.

Pam Combes has drawn attention to the fact that the small area which was apparently the original Iron Plat was previously part of land on the west side of the river.[6] This gave rise to her suggestion that the area marked H in the 1992 survey may have been the remains of a meander rather than a tailrace. The suggestion seems plausible but more work will be needed to follow up this possibility, provided that suitable sources can be found.

Foray members investigated Mine Pit Wood (TQ 5015 2425), shown on the 1859 map, and found a very deep hollow-way above a single large opencast working. A hollow-way from the pit ended in the area of the former pond. This could have at least two interpretations: the track and the mine pit may pre-date the pond; or that mine may have been transported from the pit to the pond and thence by water to the furnace. The 1859 map shows Mine Pit Wood on the edge of the stream. However, too much reliance should not be placed on this map because the valley and the river course have been subject to much alteration since the 15th and 16th century ironworking sites were established there.

Notes and References

1. WIRG, *Wealden Iron*, 2nd series **22** (2002), 2-3.
2. WIRG, *Wealden Iron*, 2nd series **11** (1991), 5-6; 21 (2001), 2-3.
3. East Sussex Record Office, ASH 4377.

4. P. Combes & C. Whittick, 'Iron Plat, Queenstock Hammer-pond and a 15th-century ironworking site at Buxted', WIRG, *Wealden Iron*, 2nd series **22** (2002), 10-18; D. W. Crossley, 'Ralph Hogge's Ironworks Accounts, 1576-81', *Sussex Archaeological Collections*, **112** (1974), 52; H. F. Cleere & D. W. Crossley, *The Iron Industry of the Weald* (Cardiff 1995), 148, 339, 387.
5. D. M. Meades & R. G. Houghton, 'Iron Plat, Buxted, Sussex, Furnace and Forge Site Survey 1990/1', WIRG, *Wealden Iron*, 2nd series **12** (1992), 23-26.
6. P. Combes, pers. com.

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The Excavation of a First-Century Ironworks at Turners Green, Sussex, 1968-70[1]

Wilfrid Beswick

Remains of ironmaking include a complete works with five domed bloomery furnaces of unusual design and a stone-built sill supporting sections for both bloom refining and smith's work. Traces exist of three outlying furnaces and an ore-roasting site. C14 determination of the charcoal fuel provides a date within the first half of the first century AD which is consistent with the type of furnace. The operation is thought to span a period from before to after the Claudian conquest.

Location

The site, on Goldings Farm, Turners Green, Warbleton, East Sussex (TQ 6408 1947), stands at an altitude of 102 metres on an exposure of the Ashdown Sand (Fig. 1). A sale inventory of 1843 gives the following field names, which cover the area occupied by the site: No. 21 Lower Cinder Banks; No. 22 Lower Cinder Bank Shaw; No. 24 Upper Cinder Banks.[2] There are springs nearby and from Neolithic flints found in the vicinity as well as two Bronze Age flint-flaking

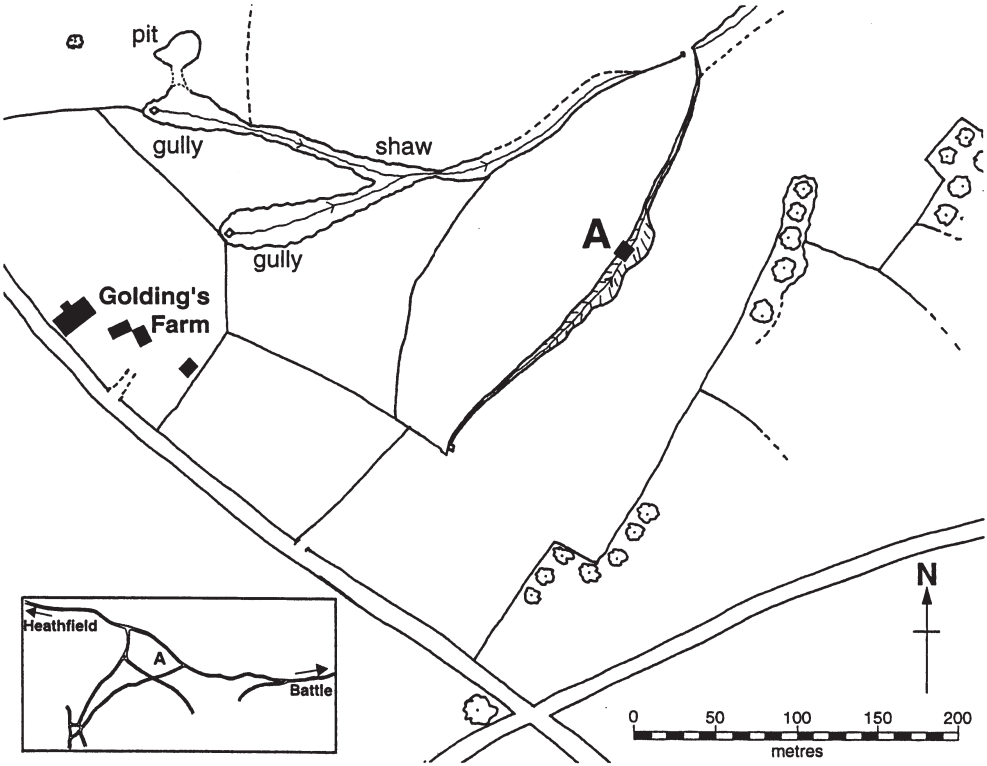

Fig 1: Location of site

assemblages, one of which is less than a kilometre and the other two kilometres distant, it appears that this district has at all times favoured settlement. A ridgeway is said to have run east-west in close proximity,[3] the alignment of which marks a change in the nature of the terrain, in so far as there is richer and more heavily-timbered country to the south but barer scrub to the north. The main works is built into a shallow gully with gently sloping fields on both sides.

Raw Materials

Carbonate iron ore abounds in the district, particularly where the Wadhurst Clay overtops the Ashdown Sand. This occurs about two kilometres to the east of the works. The ore is dispersed as nodules, varying from quite small pieces to tabular blocks weighing as much as 300 kilograms. In almost all cases, the surface of these pieces is oxidised to give a thin shell of limonite. From published analysis it can be calculated that for raw ore, the iron (Fe) content will be in the region of 37% and after roasting, about 50%.[4] This roasted ore was the material charged to the furnaces, having been graded from walnut-size up to 75mm maximum and with the limonitic flakes discarded.

The iron ore was subjected to a series of tests to determine its physical characteristics. The average figures were:

specific gravity	untreated	3.38
	roasted	2.53
bulk density	untreated	1920kg/m^3
	roasted	1445kg/m^3
loss on roasting		25-29%

When roasted, the ore responded actively to an ordinary hand magnet and was red to purple in colour, indicating that the carbonate had changed to an oxide complex of Fe_2O_3 and Fe_3O_4, the latter being the only oxide of the series to be magnetic.

Forest still survives in the immediate district with oak, holly, hazel, alder, birch, ash and elm. The charcoal taken from the inside of one furnace for carbon dating was oak, from mature timber. It is therefore just possible that, when the works were operating, much of the lighter growths, which were normally more desirable for charcoal burning, had been used up. It must be noted here that traces of at least 12 other primitive bloomeries have been found within the parish of Warbleton or close to its borders, quite apart from the many recorded by C. S. Cattell which lie in the valleys of the Dudwell and the Rother a few

kilometres to the north.[5]

Clay for furnace-shell construction would have been abundant, both sandy and plastic as required, the latter lying a couple of metres or so beneath the surface. Some friable sandstone comes to the surface 250 metres to the east, but the masonry used in the construction of the sill and its supporting wall, as well as the anvil block, was of much harder stone. The source of this has not been traced.

The survey

In 1968 the main works were uncovered during ditching operations and, at the same time, three outlying bloomery furnace sites and an ore-roasting pit were noted (Fig. 2). A smaller roasting site lies nearer to the present-day B2096 road, 350m to the east of the main works. A field to the south was black with charcoal over its entire area but here the closest examination after ploughing failed to find any evidence earlier than the 18th century, which was the period when an adjacent crossroad was given the name 'Colliers Corner'.

The small natural gully into which the main works are built is 3.3m below the adjacent field to the north. This gully now serves as a drainage channel for both surface water and the flow from a spring upstream. At 15m upstream from the works there is a swampy depression. This may have been a point at which puddle clay was made for furnace shells, or simply a diversion where the stream was led away from the works. It is probable that the stream was taken right round the south of the works and this is supported by what appears to have been a grubbed-out hedge and filled-in ditch. On both the north and south sides of the gully, land has been levelled for agriculture, thus causing detrital earth to slide over the main works, covering them to a depth of 350-500mm.

At the suggestion of the then Department of the Environment (DoE), a magnetometer survey was carried out with the generous help of Mr C. J. Ainsworth and his team. Although the readings thus obtained were affected by the spread of iron-bearing minerals, including small heaps of roasted ore, and an overhead power line prevented the use of

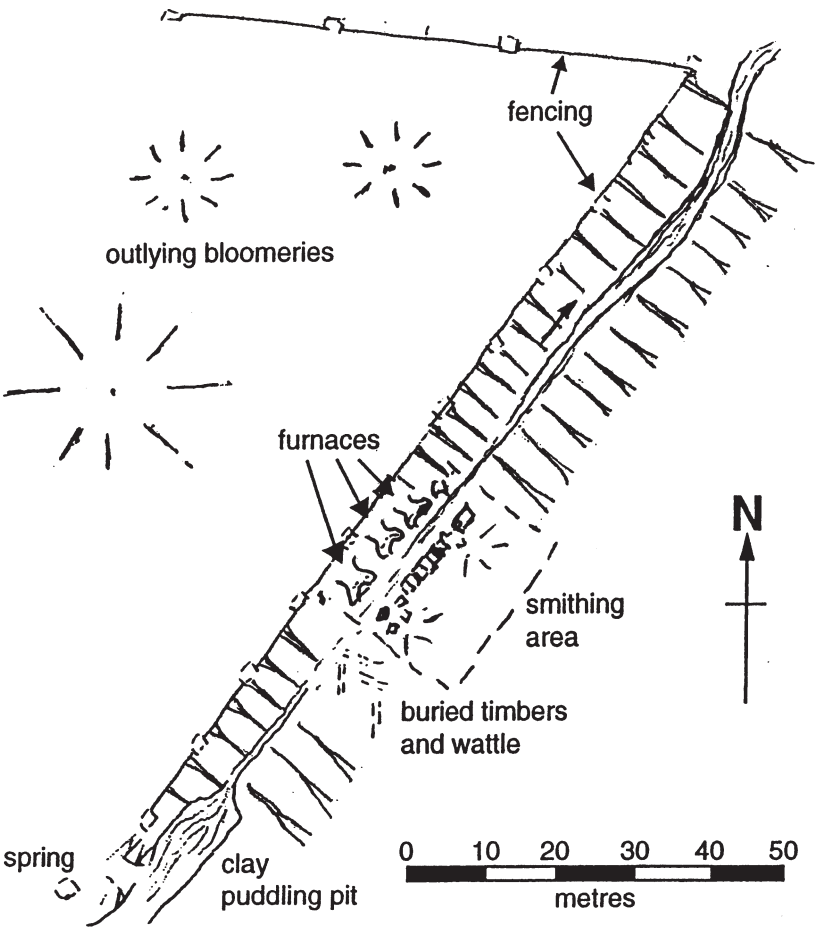

Fig 2: Site plan

the most sensitive equipment, this survey was of the greatest assistance, delineating the area which would need to be examined in detail. As it became apparent that the remains were of a substantial nature, a decision was made by the owner, Mrs R.C. Honey, not to attempt any further deepening of the gully for drainage purposes. During 1970 a sample of charcoal was accepted for carbon dating, the British Museum Laboratories providing a dating of 567AD ±45. It was further agreed by the owner that a detailed examination of the site could take place with a view to conservation. The DoE, however, took the decision not to schedule the site. Work then proceeded on a non-destructive basis in order to prepare a record of the site, with particular reference to the layout of the works and the design of the furnace, which appeared to be unusual.

Research on the continent and particularly in North Germany into furnace design, coupled with consideration of the few pottery sherds which at that time had come to light, raised some questions as to the validity of the 567AD dating. In 1978, with assistance from the DoE, arrangements were made for one of the furnace shells to be dissected, both to obtain charcoal from within the furnace for further carbon dating and also to establish more clearly the details of the furnace. This work was carried out by Dr Owen Bedwin of the Sussex Archaeological Field Unit. Two samples were taken of charcoal from the furnace and one of compacted charcoal from the smithy area. The results from the Carbon 14/Tritium Measurements Laboratory at Harwell were:

sample	*age BP*	*age BC/AD*
TG2/HAR-2930	1810 +/-70yrs	AD140 – furnace
TG4/HAR-2932	2040 +/-70yrs	90BC – furnace
TG3/HAR-3017	1900 +/-70yrs	AD50 – smithy

This charcoal was identified by Mrs C. A. Keepax of the Ancient Monuments Laboratory, as oak (quercus sp.) from mature timber. It will be noted that the samples TG2 and TG4 came from the inside of the same furnace and yet they gave an age difference of 150 years. These results from Harwell yield a middle dating of 33AD.

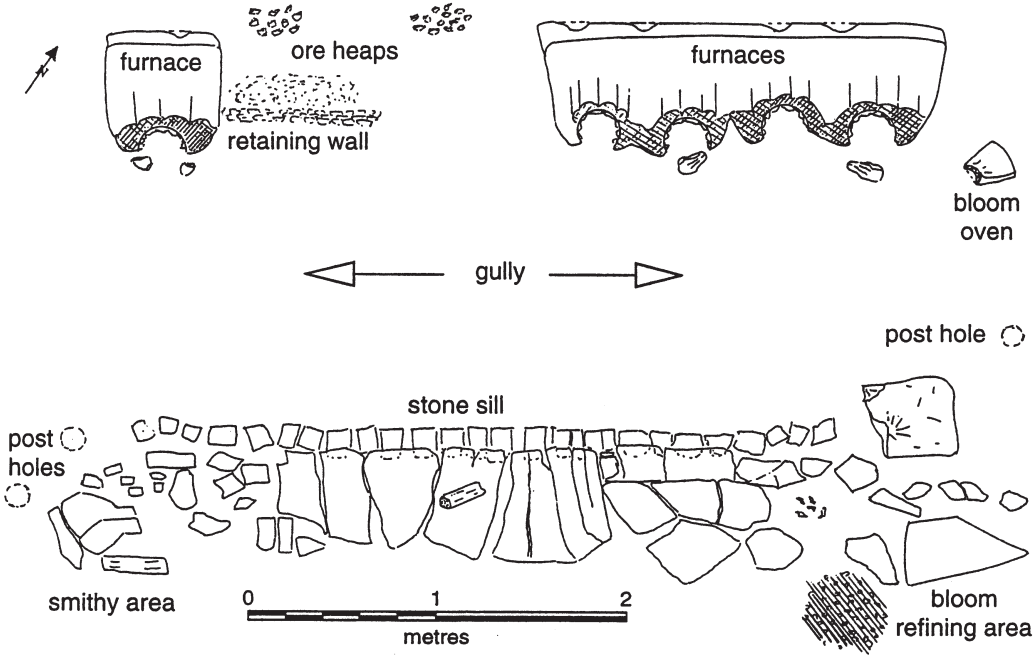

Fig 3: Works layout

Layout of the works

A plan of the main works is given in Fig 3 and a cross-section in Fig 4. Five domed furnaces in clay were built on a levelled-off pad along the north bank of the gully. With one exception, these furnace shells abutted each other and were in one alignment. Blowing was arranged from the north side i.e. away from the bottom of the gully and slag was tapped into the gully. On the same alignment, there was a small clay

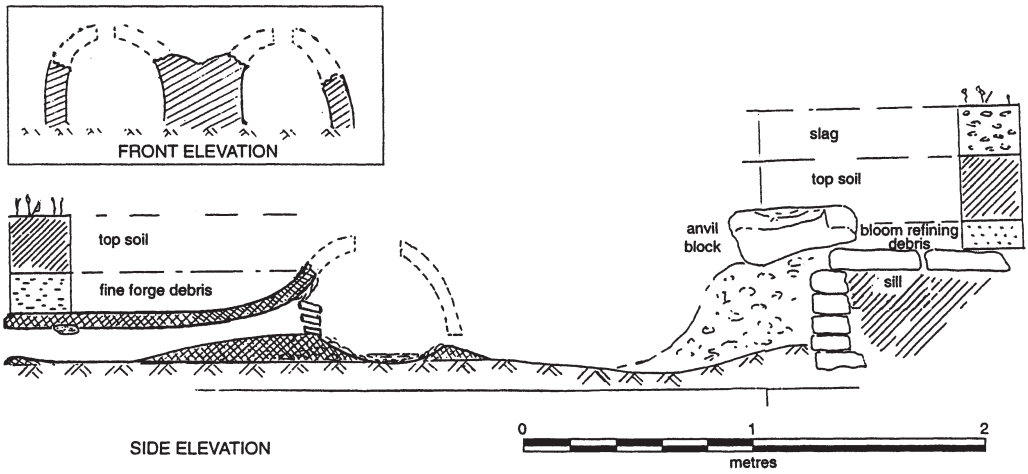

Fig 4: Sections of furnace

shell without blowing arrangements, which may have constituted a holding oven for raw blooms of iron. Opposite and parallel to the bank of furnaces was a stone sill supported at the front i.e. the side nearest the gully, by five courses of squared but roughly-cut stone, laid dry without mortar. The stones forming the platform of the sill were squared off at the front but otherwise laid at random, to provide a continuous platform 3.35m long and 0.6m wide. All this stonework was constructed from fairly hard sandstone. Operations were concentrated into an area

of 7m x 5m overall and, from the face of the supporting wall of the sill to the tapping holes of the furnaces, only 1.6m of working room had been allowed. This suggests that some form of cover had been provided. There were two post holes of 120mm diameter at the west end of the sill and one of similar size at the extreme east.

At the east end of the sill, there was a heavy, rust-stained and chipped anvil block of sandstone. This is almost identical to a stone anvil block found at a Celtic La Tène III site in France.[6] Behind the anvil was a ring of smaller stones. Although hearth-like in formation, there was no evidence of heat here, and only a few droplets of slag. It is possible that these stones were holding blocks for a support on which the stone anvil was raised to working height. Around this point there was an accumulation of cinder, slag droplets and fine charcoal, such as might have derived from the consolidation of blooms taken from the furnace. At the other extremity of the sill, there was another ring of stones. Here the surrounding layer of compacted debris was almost entirely composed of black iron-oxide scale compacted with fine charcoal. Lying at this point was a semi-circular piece of sandstone 30mm thick with a radius of 150mm. It seems fairly clear that this was an area where a smith had forged the finished products. Other than the semi-circular piece just mentioned and the holding blocks of stone, there was no trace of a forge block but it is well-established that Celtic smiths used a timber block, into which could be fixed a variety of large or small formers, or anvils. A memorial stele exists, which well illustrates such equipment.[7]

On the furnace bank, just opposite to the smithy, there was a section of low retaining wall 220mm high and 950mm long, made of slag. Behind this there was a store of fine charcoal, crushed slag and iron flakes, the latter clearly from the smithy. The single isolated furnace, which did not abut its neighbours, stood just at the end of this wall. It could therefore be assumed that it was so sited in order to use waste material from the smithy or that it was used as the furnace for the forge. In fact, when this furnace was uncovered, it contained pieces of graded ore, some slag and charcoal, just as the other furnaces did. The fronts

of all the furnaces had been destroyed by the excavator before digging could be halted.

Furnace design

The furnaces were of the domed type with an extended rear blast passage. They must have had a top opening for the discharge of gases and the remains clearly indicated that there had been a slag-tapping hole at the level of the bottom of the hearth, on the side opposite to the blast inlet. The maximum internal height of the damaged dome part was 380mm from the hearth to the top of the remaining shell. If the same curvature continued, a height of 450mm could be assumed for an undamaged shell. It was possible to establish the interior diameter as 350mm, hence a working volume of 15,000 cubic centimetres would have been available within the smelting zone. From the numerous bottom-pans of slag, it was clear that no hearth well was more than 280 x 240mm in area or more than 120mm in depth. Owing to damage, it was not possible to determine with accuracy what had been the diameter of the top gas vent. Some highly-vitrified pieces of the shell were found, which could be fitted together to give an opening of not less than 230mm diameter.

Furnace shells were moulded in clay. In some cases, this included crushed, baked shell from earlier operations to serve as a grog, but in all cases the upper parts of the curved dome were made from rolled cylinders of a creamy-white clay, free from inclusions. These sausage-shaped strips were laid from front to back and pressed together, in the manner in which large pottery vessels have been made from classical times to the present day. Each cylinder had a diameter of 50mm.

The sides and rear air-blast passages of the furnaces were hand-moulded to give a surprisingly thin average thickness of 50mm but the inside of the furnaces all had layers of slag adhering, so that the normal working thickness of the active zones was in the region of 100mm. As will be seen from Figure 4, four of the furnaces were constructed as a monoblock bank, each with its own separate rear blast extension, as shown in the sectional elevation. This air-blast passage was 1000mm in

length from the entrance to the point at which it met the smelting zone. Here, three pieces of slag were set to provide horizontal slots of 20mm. Through these slots, the air would have entered in a crossways and downwards direction. The passage was 350mm wide and 150mm high. Tuyères for bellows were absent from this site but a piece of fired-clay pipe 38mm in internal diameter and 160mm long was found within the rear-blast extension of the furnace opposite to the smithy.

Tap slag was still lying in front of the furnaces, as it had run from the tapping hole, in thin layers about the size of a dinner plate. In some cases, slag had been allowed to run over several previous layers, so that quite substantial blocks of slag remained. No attempt had been made to provide slag basins, as has been noted on some bloomery sites. The slag was heavy and black in colour and had a specific gravity of 3.4. Some slag was vermiform but some solid blocks with gas holes showed that the furnaces had been running at temperatures which had produced very fluid slag conditions. Most of the slag heaps had been removed over the centuries but it is clear from existing evidence that, before the present layout was constructed, much slag and waste had been tipped down into the gully, indicating many years' operation of several bloomeries. Later, large quantities had been spread over the field to the north.

The ore-roasting pit lay 25m to the north of the works and was also convenient for the larger of the outlying bloomeries. It was 1m long by 750mm wide and was 520mm below present topsoil level. The height was probably about 1m but the clay walls had been broken by ploughing. At the front there were two distinct pads of base soil, each 250mm square with a similar space between them. These probably formed a simple grate. Of some interest is an accumulation of walnut-sized pieces of roasted ore, found at the bottom of this pit. All, without exception, were rejects, which had been overheated in an oxidising atmosphere, to the point at which oxide of iron had joined with the slag to form irreducible material. The operators had obviously been well-aware of this malfunctioning of the roasting process. The small

ore-roasting site near to the modern B2096 road had no recognisable structural features.

Discussion

In its last phase, at least, this complete ironworks seems to be one of the most sophisticated of its period so far uncovered in the south east. The works had clearly been planned under knowledgeable control but hurriedly, using such materials as lay to hand and with little neatness of workmanship. The outlying sites show remains of furnaces only, their debris indicating similar design and operation to the main works.

This design of furnace, with its shallow dome and rear blast extension, appears to originate from the area north of the Rhine.[8] No other examples of furnaces with a rear blast extension have so far come to light on the Weald but domed furnaces are fairly common, the nearest to Turners Green being 'a row of cauldron-shaped furnaces', unfortunately destroyed without examination in 1978 at Batsford, 4km distant. Others have been found by J. H. Money at Minepit Wood and by C. F. Tebbutt at Cow Park.[9] At the latter site some clay rolled cylinders were present, coupled with an absence of tuyères. On Levisham Moor, North Yorkshire, a major early settlement contains a group of domed furnaces which have the rear blast extension. They are comparable in size to those at Turners Green and are thought to date to the first century AD.[10]

The technical advantages of a well-arranged rear blast are several. Heavy bellows can be disposed on level ground or, where animal-skin bellows are to be used, there is ample room for a hollow to keep these in place. The operators are, to some extent, kept away from the toxic carbon monoxide gases. Above all, directing the air blast in an even manner, both downwards and across the charge, allows the maximum time for contact between the ore, the reducing gases and also such elemental carbon as derives from the gas-phase reactions. Only if the minute particles of iron within the ore are reduced to a metallic state before softening temperatures in the slag are reached, can usable metal

be produced at all. A disadvantage lies in the problems which might arise if the internal blast slots into the active zone were to become blocked by molten slag. The only remedy would be to break into the furnace and repair the affected part. This may explain why the idea of the clay cylinders was evolved, so as to have a supply of repair material ready to hand, when required.

Of the bloom-refining and blacksmith's section, little remains to be said except that, in all respects, it has pure Celtic characteristics. A recommendation was made, and accepted, not to destroy the smithy area for the purpose of gleaning more information about the timber building buried deep below it. This had been discovered when a test pit was dug at the south end of the sill to determine whether earlier operations had taken place in that area and subsequently been covered. Several substantial oak beams were revealed, as well as some alder wattle, lying in waterlogged clay and overlaid by densely-packed slag. It was fairly clear that little was going to be added to the knowledge of timber buildings of the Iron Age but much would be lost if the works above were destroyed. The works, in its final form, had been set up not only to make iron blooms but to go right through to finished products and therefore was in contact with a market for these or was perhaps linked to a military unit.

The report by C. M. Green on the pottery sherds attributes that material mainly to the first to the second centuries AD. Of particular interest is the presence of Verulamium-type ware. At the large bloomery at Crowhurst, vessels similar to those from Wheathampstead were found.[11] There is a problem when attempting to relate pottery dates to ancient iron sites. Ivan Margary has referred to the 'colossal' quantities of ancient bloomery material used in Roman road construction and where, as in the present case, such a road existed, it may follow that some of the pottery relates to later activity rather than to the ironworks itself.[12] In the same context, a small iron hammer was found in the slag-heap area, which has strong Roman features.

The finds

Metal objects

1. Wrought iron hammer 90mm long by 30mm thick, tapered towards each end, weight 520gm. The shaft hole is round and 18mm in diameter. The shaft was wedged with two round-headed nails, which remain in position. A surface find on the slag dump area, since lost.
2. Wrought iron adze head 80mm long by 65mm wide on the cutting edge. Broken at what would have been a collar fastening. Splitting and lamination indicate the many small pieces of metal from which manufacture had been attempted. Surface find.
3. Small tapered iron object, probably an arrowhead, attached to a thin, charred wooden shaft. Metal portion: 40mm long by 17mm at the widest cross-section. Shaft: 125mm long. Very fragile, as the metal is highly oxidised. Found on top of one of the furnaces on the main site.

The pottery (examined by C. M. Green)

Of the 22 pieces examined, seven are too fragmented to give any sort of date. The majority are of East Sussex ware (cf Sussex Archaeological Collections 118, 69-86), probably of the 1st-2nd century. One jar sherd has the typical East Sussex-ware feature of thumb impressions around the girth, although not on a raised strip. The only reasonable fragment of profile is from a very small East Sussex-ware jar, probably of the 1st century. Among the well-thrown wares, flagons predominate, suggesting a 1st to mid-2nd century date range. One rim of a large Hofheim-type flagon is unlikely to be later than c. AD80. A body sherd and a flagon base are probably products of the Verulamium region, which would date from after AD60. One sherd (a lid) is Roman, wheel-thrown 'greyware' and another appears to be from a colour-coated beaker, possibly Oxford ware, which is likely to be of the 3rd-4th century rather than the 1st-2nd century. One piece of pottery only is of a later date: a London stoneware tankard made between 1700 and 1800. There is no suggestion of a pre-Roman date for anything in the collection.

Note: These items, which are numbered, together with a copy of the report, are lodged at Bexhill Museum.

Conclusion

Ironmaking had been taking place over a considerable number of years, during which period the layout had been entirely rebuilt. The dates could span a period from before to well after the Claudian invasion. With all the furnaces full of charges and many furnace-bottom pans lying about in an untidy state, it seems fairly clear that operations had terminated quite abruptly, leaving a small store of roasted iron ore behind the furnaces. Tribal conflict could account for this closure or, possibly, the enforced concentration of skilled ironworkers at the larger ironworks that were established nearer to the coast.

Acknowledgements

The writer would like to thank all those without whose help this piece of work would not have been possible: the owner of the site, Mrs R.C. Honey, for allowing the work to proceed; the Department of the Environment for much advice and for their generous sponsorship for the dating work at Harwell; the Carbon 14/Tritium Measurements Laboratory at Harwell for the dating programme; the British Museum; Mr C. J. Ainsworth and his team for the magnetometer survey; Dr Owen Bedwin for his help in dissecting the furnace shell; Mr C. M. Green for his report on the pottery. In Germany: Dr H. Hingst of the Landesamt fur Vor-und Fruhgeschichte von Schleswig-Holstein; the Helms Museum in Harburg/Hamburg and Frau P. Weimar in Bremen. The site team included Messrs C. Booth, T. J. Goode, A. Flood, Miss C. Flood and Miss J. Goode.

Notes and References

1. The text of this article is substantially as revised by the late Wilfrid Beswick in about 1978, with amendments by David Butler and Molly Beswick; the illustrations have been revised by David Brown.
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7. ibid., 16
8. P. Weirshausen, *Vorgeschichtliche Eisenhutten Deutschlands* (Leipzig 1939), 8-9, figs 1 & 2.
9. J. H. Money, 'Iron age and Romano-British iron-working site in Minepit Wood, Rotherfield, Sussex', *Journal of the Historical Metallurgy Society*, **8**, 1, 1-20; C. F. Tebbutt, 'The Excavation of Three Roman Bloomery Furnaces at Hartfield, Sussex', *Sussex Arch. Colls*., **117** (1979), 46-56.
10. R. H. Hayes, *Levisham Moor Archaeological Investigations 1957-9* (Helmsley 1983).
11. E. Straker & B. H. Lucas, 'A Romano-British Bloomery in East Sussex', *Sussex Arch. Colls*., **79** (1938), 224.
12. I. D. Margary, 'A new Roman road to the coast', *Sussex Arch. Colls*., **73** (1932), 38.

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Crookford Furnace: Not Cotchford but Worth

B. G. Awty

By identifying the place name Cruckford, or Cruckeford, mentioned in the 1574 lists of ironworks, with Cotchford near Upper Hartfield,[1] Straker made a link between the Eversfield family and Cotchford Forge for which no other evidence exists. There are two reasons for contesting the attribution; firstly, the 1574 lists mentioned both a furnace and a forge at Crookford, whereas re-examination of the Cotchford site showed that the glassy slag present in the stream was from the road surface at the north end of the bridge;[2] secondly, on 20 February 1586/7, 'A poor man who died at Crookeford Fornis' was

buried at Worth, an unlikely place of burial for a nameless man, if indeed he had died at Cotchford, which is 16 km distant.

Other information concerning Crookford furnished by the 1574 lists was that it lay within Woore [i.e. Worth] Forest, and that it was owned by lord Abergavenny, from whom it was held by John Caulfield. The latter, however, signed the bond as John Eversfield of Grinsted. But entries of 1580 and 1582 in the Duke of Norfolk's rent rolls show that John Eversfield paid £10 in each year for the ironworks in the 'Forest de Woorthe', whilst he had the 'farm of the forest', and paid £20 for wood taken out of the forest for the ironworks.[3]

The only known furnace on the Duke of Norfolk's lands at Worth is the double furnace built by William Levett in 1547, after Norfolk's attainder. It was then held briefly by Sir Thomas Seymour, brother of Edward VI's Lord Protector Somerset, but following Seymour's attainder in 1549 it was leased to Clement Throckmorton in 1550 for 21 years at a rent of £90 p.a.[4] How it had come into Abergavenny's hands is unknown. Could the discrepancy between the rent of £90 at which Worth was let in 1550 and the £10 entered in the Norfolk rent rolls be accounted for by supposing that Eversfield had also to pay a large sum to Abergavenny, because the latter held the furnace's head lease?

All this being so, the connection between the Eversfield family and ironworking in Hartfield hundred becomes doubtful, despite the fact that in 1551 William Alfrey senior of Hartfield and Thomas Alfrey were appointed overseers of Nicholas Eversfield's will, along with Nicholas' son John, and William Levett himself.[5]

As for Cotchford, unless Straker's other suggestion that it was the forge linked with Newbridge in its earlier years is accepted, the loss of its Eversfield connection means that the mention of Cotchford Forge in 1579, in a survey of the bounds of Falkenhurst borough,[6] is the only definite evidence for it, prior to its conveyance in 1627 by Sir John Shurley to Nicholas Smith of London.[7]

Notes and References

1. E. Straker, *Wealden Iron* (London 1931), 251.
2. H. Cleere and D. Crossley, *The iron industry of the Weald*, 2nd ed., Cardiff, 1995, 324, 384.
3. Straker, op. cit., 464.
4. ibid.
5. Public Record Office, PROB11/35/19.
6. East Sussex Record Office, ASH 117a.
7. Straker, op. cit., 251.

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'John Trew is an Able Man'[1]

Michael Chrimes

The establishment of an engineering profession in the British Isles is normally dated to the late eighteenth century, more or less coeval with the career of John Smeaton, who was probably the first person to call himself a 'civil engineer.[2] Smeaton generally referred to himself simply as 'engineer', a term which can be traced back to medieval times, but which was generally applied to military practitioners, a possible reason for Smeaton to introduce the prefix 'civil'.[3]

There had, of course, been a number of engineering works carried out before Smeaton's time, notably the drainage of the Fens in the seventeenth century, but also river improvements, turnpike roads, small harbour schemes, bridges, and developments in mining and metallurgy. These works were carried out by a whole range of people – military engineers, master masons, 'water carpenters', millwrights, coal viewers, mathematical practitioners. Aside from a few well-known foreign engineers like Cornelius Vermuyden there are few examples of full-time engineers in anything like the modern sense. One possible candidate is the Tudor gentleman, John Trew.

Trew, (Trewe, or True), is relatively well-known in a civil

engineering context for his work in constructing the Exeter Canal (1563-1567), to revive the haven there, for (possibly) introducing pound locks to Britain on the River Lea (1579), and for attempted improvements to Dover Harbour (158-1582). Archival information on these works is reasonably accessible from nineteenth century publications of the Historical Manuscripts Commission and Society of Antiquaries,[4] and this has probably helped recognition of his role in more recent publications.[5]

What was known about Trew made him a prime candidate for an entry in the *Biographical Dictionary of Civil Engineers (1500-1830)* when work began in 1996.[6] As with many early entries the problem with Trew was that he was known through his work, rather than as a person, with his activities only partially known for a twenty-year period in his life. When he emerged at Exeter he was described as a Gentleman of Glamorgan, which gave no real hint as to his previous training or experience, although, from his success in Exeter he had attained a degree of engineering competence. One problem with the study of the history of technology is that it tends to be technology- rather than people-focused. Thus as an editorial board we were well aware of Trew's civil engineering work, but had no clue as to his other engineering activities. At this point an important clue emerged in a document referenced in *Archaeologia* as being in the Lansdowne manuscripts.[7]

This is essentially a petition by Trew to Lord Burghley regarding his poor treatment at the hands of the City of Exeter, who initially balked at paying Trew in full for his work. In the course of his diatribe Trew lists his experience, and value to the state, namely:

- prospecting and dressing minerals
- draining mines
- pump water to houses
- drain marks 'with less charges than heretofore hath been done'
- 'make a haven to any ___' 'so as the sea cannot be brought to ebb and flow to the same'

- 'rayse a great weyght' with 2 men rather than 40 or 50 oxen or horses – as shown in Ireland
- control the water from a small stream so that it can power a mill and grind as much corn as a great river
- inventing an ingyne for the wares 'not lawful to put in practis'
- the location of copper in Devonshire
- the location of a mine of rock likely to be prove very good
- some knowledge of essaying and conversion of base metals

While some of this work can be related to what is known of Trew's work in Exeter and Waltham Abbey, it suggests he had a great deal more experience than hitherto known, and in probability was trained as a mining engineer, a possible explanation for his location in Glamorgan. Further research provided some confirmation as he is mentioned in connection with the construction of an ironworks at Pont-y-moel, near Pontypool in 1575-1576,[8] filling a small gap in his activities, and a possible explanation as to why he was described as from Caerleon in connection with his work at Dover.

Trew's reference to work in Ireland and Devonshire would suggest he was abreast of many of the metallurgical activities of the time, and possible knowledge or involvement with the activities of Bevis Bulmer and Johan/Christopher Schultz.[9] A further lead was provided through advance publicity regarding the publication of the *Biographical Dictionary*. Christopher Whittick, of East Sussex Record Office, drew attention to his work on protestant 'martyrs' in Sussex, and the identification of Trew with John Trew of Hellingly, a member of a puritan sect, who lost his ears in the Marian persecution, and was possibly the son of John Trew the ironfounder at Robertsbridge (and Panningridge) in the 1540s, and who had two sons of the same names.[10] Another Trew (True), Richard, it transpires, was ironfounder at Vauxhall Furnace, Tonbridge.[11] All, it seems, were regular petitioners of government.

John Trew now emerges as a more rounded individual, trained in the iron industry of the Weald, possibly by his father,[12] and evidently

of some national importance. Much recent work has been concerned with the technology transfer of mining technology from Central Europe to England at this time. There is a suggestion here that the Germans had at least one native rival. There are still many gaps to fill, but hopefully some clues here will help complete Trew's biography.

Notes and References

1. *Calendar of State Papers (domestic)*, 1547-1580, John Garrett, Mayor of Dover, 5 November 1580.
2. R. A. Buchanan, *The engineers: a history of the engineering profession in Britain, 1750-1914* (London 1989); A. W. Skempton, John Smeaton FRS (London 1981); A. W. Skempton, *Civil engineers and engineering in Britain, 1600-1830* (Aldershot 1996).
3. For example Richard Lengenyour; see J. Harvey, *English medieval architects: a biographical dictionary down to 1550* (Gloucester 1984).
4. P. C. de la Garde, 'On the Antiquity and Invention of the Lock Canal of Exeter', *Archaeologia*, **28** (1838), 7-25; *Calendar of State Papers (domestic)* 1547-1580; 1581-1590; *Acts of the Privy Council,* new series, vols. 7 (1558-1570) and 12 (1580-1581); *Report on the records of the City of Exeter*, Royal Commission on Historical Manuscripts.
5. R. A. Otter, *Civil Engineering Heritage: Southern England* (London 1993); K. R. Fairclough, 'The Waltham pound lock', *History of Technology*, **4** (1979), 31-44; J. M. Crook and M. H. Port, *History of the King's Works*, vol. VI, part 2 (1982), 756-7.
6. *Biographical Dictionary of Civil Engineers of Great Britain and Ireland, vol. 1: 1500-1830* (BDCE), London (2002).
7. de la Garde, 1838.
8. D. Rees, *The Industrial Archaeology of Wales* (Newton Abbot 1975).
9. ex inf. R. C. D. Baldwin and BDCE entry for Bulmer.
10. *Reports on the Manuscripts of Lord de l'Isle and Dudley, vol. 1*, Historical Manuscripts Commission (1925), 306-314; payments to Trew are noted 1541-46; A. S. Gratwick and C. Whittick, 'The Loseley list of 'Sussex Martyrs',' *Sussex Arch. Colls.* **133** (1995), 225-40. A further indication that Trew was involved with the Sidneys' interests is provided in T. Bevan, 'Sussex Ironmaster in Glamorgan', *Trans. Cardiff Naturalists' Soc*., **86** (1965-7), 5-12.
11. H. Cleere and D. Crossley, *The Iron Industry of the Weald* (Cardiff 1995), 362; the identification of Robert is incorrect as confirmed in PRO C1/1387/53.
12. Some doubt must remain about which John Trew is which. He described himself as a very old man when offering his services to the government in the 1580s. He could conceivably have been working in Robertsbridge in the 1540s.

Scrag Oak (Snape) Furnace

Paul Collins

The date of construction of the furnace at Scrag Oak is not known. Previously known documentary references date from 1629 when John Barham of Shoesmiths was indicted for carrying iron sows from Snape and Coushopley furnaces to Verredge Forge, without laying down cinders, in the summer of 1628.[1]

The surviving papers from a case heard in Chancery around 1621 add further insights into the operations at the furnace in the early 17th century. The case relates to a dispute between John Barham of Scrag Oak and his brother David. The original complaint by David Barham seems not to have survived, but John's reply[2] and more interestingly the questions put to witnesses and their responses do.[3] From these it seems that the furnace was for 'some many years' occupied by William Barham, the elder brother of John and David. William had died intestate at the end of 1616 and administration was granted to John and David in 1617.[4]

For a period before his death ('for one small blowing and not more' according to Joseph Chapman, one of the witnesses) William had been in partnership with his brother John. It seems that, shortly after William's death, John had sold 33 tons of sows for £4-10-0 a ton for his own benefit. David Barham's complaint was that John had already taken his share of the iron produced by the partnership, before William's death, and that the 33 tons should have been included in William's inventory.

William Colepepper of Goudhurst was called as a witness and said that his father, Sir Anthony Colepepper of Bedgebury, had bought some iron sows from John Barham in 1617. He did not know the quantity or price, but was aware that two payments totalling just under £114 had been made. He did not, however, know if these were the only payments made.

John Wimble, an iron founder, was also called as a witness. He confirmed that he knew of the partnership between William and John Barham which, according to him, continued until the 'furnace blowed out and spent'. John Wimble also confirmed William's sole occupancy

beforehand. He said that at the time of William's death there were about 200 tons of iron sows at the furnace, of which 33 tons had been made by the partnership and the remainder before. Both John Wimble and Joseph Chapman confirmed that they had been instructed by William not to allow John Barham to take away any further sows until the residue were weighed as he believed that John had already had the share due to him.

Unfortunately the outcome of the case is not known and it may have been settled out of court. It does, however, seem that John ended up in possession of the furnace, as it is mentioned in his will dated 27 April 1639, when he left it to his son John.[5]

The William and John Barham associated with Scrag Oak seem to be from a separate, but related, branch of the Barham family to the one associated with Verredge and Brookland forges. William, John and David's father, John Barham, died intestate some time around 1583. As a consequence, all of his freehold land was inherited by his oldest son William and, according to the custom of the manor, the copyhold land went to David, the youngest son. This left his middle son, John, with nothing, no doubt causing some resentment, which perhaps surfaced to give rise to the court case described here.

As a footnote, John Wimble moved from Wadhurst to Brightling in 1618, where he bought the copyhold of Sheepshaw Farm. He continued to be described as a founder, although it is not clear if he worked at any of the nearby furnaces. Two of his sons became founders; William who moved to Dallington and James who lived in Waldron. The author is researching the involvement of the Wimble family in the iron industry and would be pleased to hear of any connection with other furnaces or forges.

Notes and References

1. See E. Straker, *Wealden Iron* (1931); East Sussex Record Office, Q1/EW/1.
2. Public Record Office (hereafter PRO), C2/JasI/B9/38.
3. PRO, C21/B33/1.
4. See *Index to Administrations in the Prerogative Court of Canterbury, vol. V*, British Record Society (Index Library 83), 1968.
5. PRO, PROB11/180/105.

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Compiled by J. S. Hodgkinson

Compiler's Note

Wealden locations are listed by parish; other locations are listed by ancient county. Names of shipping vessels and publications are in italics.