



Newsletter 70 Autumn 2019

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New Insights into early modern prospection and ore-mining

Simon Stevens, a WIRG member working for Archaeology South-East, has uncovered (quite literally!) evidence for mining and prospection practices in the charcoal-blast-furnace era. The site in question is a new housing development in Horam, just south of Heathfield in East Sussex.

If you look through the bulletin *Wealden Iron*, or into Cleere and Crossley's *The Iron Industry of the Weald*, you will find little about how iron ore was won from the ground. Go further back into the literature of Wealden iron and there are guesses about mining methods for which there is little evidence. A de-bunked idea is that they dug "bell-pits" like those used in midlands coal measures. One reason for this lack of reliable information is that little archaeology has been done. The Horam excavation is on an unusually large scale and evidence from a swarm of pits looks as if it allows some new ideas to be examined. ***Simon will be presenting part of this new research at the WIRG Winter Meeting 2020.***





Once the ground is stripped back the minepits show as blue-grey stains

These pits are in the Wadhurst member of the Hastings Beds. None of the parts of the Hastings Beds form continuous strata. They were formed in a patchy manner, and, although the base of the Wadhurst member is particularly rich in iron ore, it does not run as a continuous layer. Also, although it is mainly a clay layer, it contains a lot of sand, including consolidated sandstone which may also contain iron ore. Iron-makers in earlier times did not simply dig holes sure to find ore: they had to prospect for it.

And once they had found a promising ore body they had to mine it out. The rock at the Horam site is clay. Clay seals itself and is impervious to water and air. At the surface this clay is aerated by plants and animals and is oxidised to a pale yellow. Lower down it is anoxic and a dark blue to grey colour. The backfill of the minepits is what makes their outline show up in the picture above.

WIRG Winter Meeting: Simon Stevens speaks about iron-ore prospecting and mining at Horam. Nutley Village Hall. Feb. 1st. 2020 at 2.00

Nutley Village Hall TN22 3NE Grid Reference TQ 442 289.

The Hall is on the western side of the main road through the Village (the A22). Nutley is south of Forest Row and north of Mayfield.

There is good car parking at the venue.

Recording a Horam minepit



The received wisdom is that in Roman times ore was easy to find and that iron ore was, typically, extracted from large open pits. In the mediaeval period and in the charcoal blast furnace period it is widely believed that small shaft minepits (like those at Horam) were widely used. There seems to be a large element of truth in these generalisations. There are often big pits associated with the larger Romano-British sites and usually small shaft pits with early modern sites. Certainly the best known sections of small shaft pits (those at Sharpthorne) have been dated to the mediaeval period.

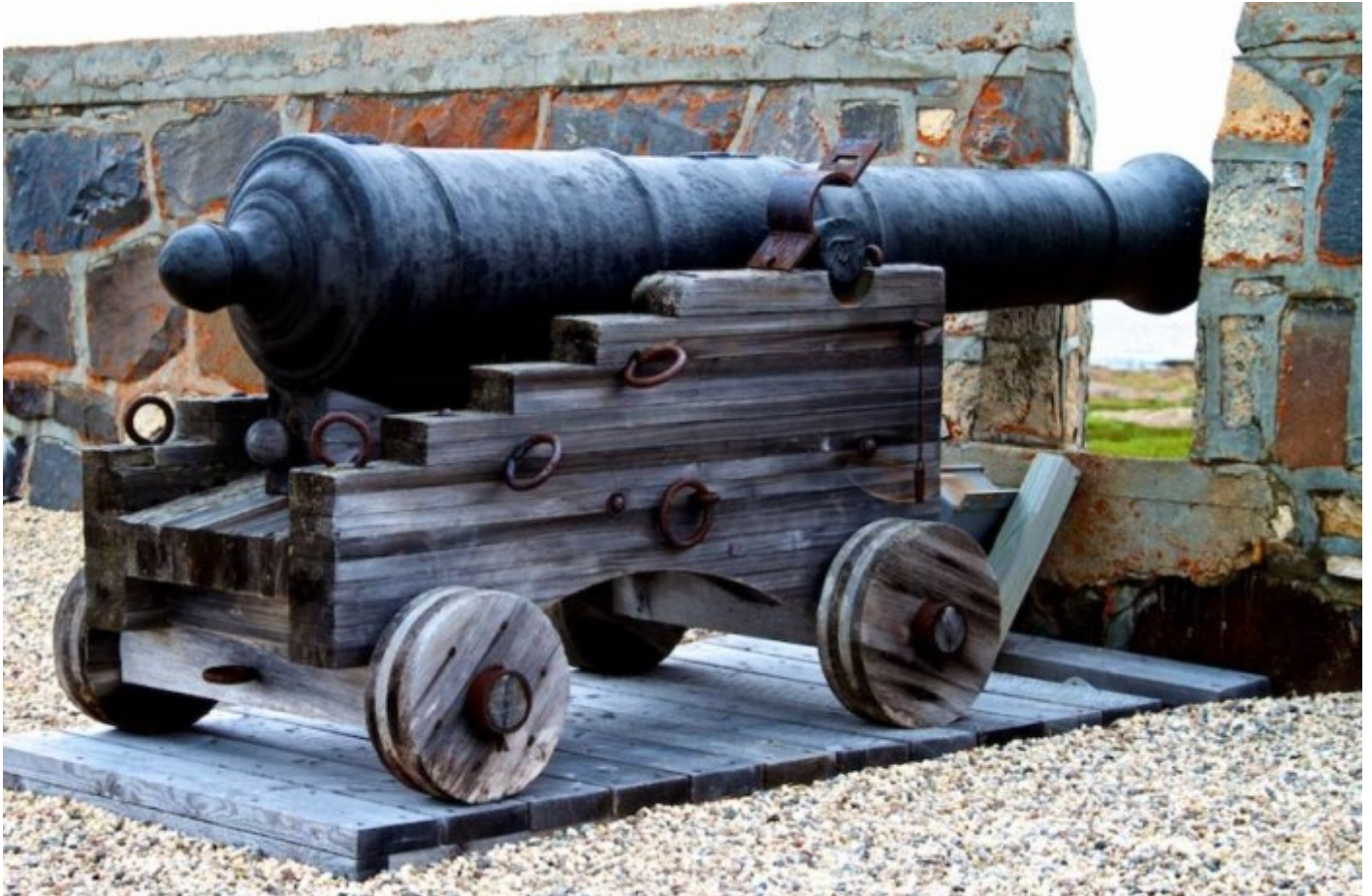
Minepits of any shape or size are reluctant to tell their own stories. It is not sensible to say that a minepit must have been dug to provide ore for the nearest known site. We can't know that. We can often make an educated guess. The pit shown above was probably associated with the Heathfield furnaces, but there is evidence of activity from other periods on this site. A more nuanced view of pit-types is required.

Large ore pits ("open cast mines") in clay almost invariably have a drainage point. The clay is waterproof and large pits would become ponds unless drained. A small shaft pit may be dug in a week, perhaps less. With luck it could be completed between downpours. The picture above shows why you wouldn't want a large pit on a flat site!

However, there are often small pits beside big ones and the former may represent prospection pits designed to relocate an ore-body that had petered out. Such pits can be seen, for example, at the Roman site of Beauport Park.

WEALDEN GUNS IN THE ARCTIC

It has always been the case that the best places to see guns that were cast at Wealden furnaces is where they were used, particularly in colonial settings. Barbados has a justifiable reputation for its accumulation of early Wealden cannon left behind by naval ships, and there are many on other West Indian islands. Wherever the British went guns went with them. So it should be no surprise that even in northern Canada, on the shores of Hudson's Bay, there are several to be found. Fort Prince of Wales was built by the Hudson's Bay Company at the mouth of the Churchill river in northern Manitoba between 1732 and 1771 to protect the company's fur-trading interests and, although it never made much impact as a defensive position, it has an impressive arsenal of weaponry.



George II 24-pounder cannon cast at Ashburnham; Fort Prince of Wales, Churchill, Manitoba, Canada

No less than 42 guns - eight 6-pounders, twenty-four 12-pounders and ten 24-pounders - line its ramparts, and all were cast in the Weald. When it fell to the French in 1782 without a shot being fired, being manned by civilians at the time, the captors either spiked the guns or disabled them by destroying their carriages or knocking off trunnions. Parks Canada has listed them and their dimensions but not, sadly, the letters on their trunnions which would tell us where they were made. Surfing the internet, however, one can find photographs of the fort and of several of the cannon, and the few that show trunnion initials indicate examples made at Ashburnham, Conster and Heathfield furnaces. Images of ciphers on the guns tell us that they date from the reigns of Queen Anne and George II, although it is likely that they were all installed at the fort at the same time.

Visitors to the restored fort have to keep a keen eye open for wandering polar bears, which is not something you normally have say about sites of Wealden ordnance.

Alexander Raby – Entrepreneur, Philanthropist and bankrupt

By Tim Smith

The Spring visit to South Wales in April included a stop at Alexander Raby's well preserved furnace at Llanelli which he operated from 1796 to around 1815. Since his initial interest was in the Weald as manager of Warren furnace, followed by forges in Surrey and later a furnace in Derbyshire, this summary of his rise and fall may be of interest to WIRG members. It draws heavily on the Proceedings of a conference held by the Surrey Industrial History Group in 1998 '*Alexander Raby, Ironmaster*' and production data from Phillip Riden's '*British Blast Furnace Statistics 1790-1980*'.

The eldest son of a London ironmonger, Alexander Raby was born in 1747 and lived to the ripe old age of 88 - a significant achievement for those times.

Following in his father's footsteps, at the age of 15 he was apprenticed to his uncle to learn the ironmongers' trade which in those days included operating blast furnaces and forges.

In 1764, he was assisting his father, Edward, at Warren furnace in Sussex which, among other products, cast guns and shot for the Board of Ordnance. This market was precarious, highly profitable in times of war, but vanished in times of peace often leaving gunfounders with cancelled orders and unsold stock on their hands. Smaller guns could be sold for merchant ships, but 'great' guns were only required by the government in times of war. Indeed, Edward Raby was declared bankrupt in 1764 but two years later was back in business again offering guns to the Board of Ordnance.

Edward Raby died in 1771 when Alexander, now 23, was manager of Warren furnace, less than a year after completing his apprenticeship. Even before his father's death he was establishing his own business. He moved to Surrey in 1771 acquiring the lease of Downe Mills, SW of Cobham, a paper mill, which he converted to an 'iron mill'. This had no furnace but instead, two forges and a rolling mill. He ended his interest in Warren furnace in 1772, aware of the precarious business of gunfounding. At Downe Mill, he had coke ovens and imported coal since Surrey and Sussex have no coal measures. He seems to have used the coke to fire air furnaces to melt metal for castings such as large iron anchors and various smaller castings in iron and brass. Iron probably came from Wealden furnaces using the river Wey navigation which had been extended to Goldaming in 1763. The nearest furnace was at Thursley SW of Goldaming.

In his rolling mill he produce sheet for tin plating and employed women in preparing the iron plates for tinning. Despite having coke, charcoal refined iron was considered better quality for tinplate production with coke refined iron considered inferior and simply referred to as 'coke plate'. He was good to his workers and, in 1803, built a row of housing for them which stands today.

In 1777 he took on the lease of Coxes Mill, another forge at Addlestone, Surrey. This took water from the Wey Navigation which also provided a route for materials arriving at the mill and outgoing products. A major output was hoops for barrels which were in great demand by the government Victualling Board during the American War of Independence from 1776 to 1783. The forge had a hammer working at 2700 blows an hour (45/min) which attracted complaints due to the noise. Likewise, complaints came from the owners of the canal following unauthorised breaches to take water for wheels. In 1798, he proposed building a new mill with the aim of adopting Cort's puddling and rolling method of refining pig iron patented in 1783 & 84, but there is no evidence this new mill was built.

In 1783, he took the lease on Abinger Hammer, in Surrey for four years.

In 1792, he moved further afield taking a lease on the Dale Abbey ironworks at Stanton in Derbyshire which had two coke fired blast furnaces. No doubt, the local coal measures attracted his attention since the first coke fired furnaces were introduced by Abraham Darby I by 1709 at Coalbrookdale in Shropshire. These two furnaces produced 474 tons of iron in 1796.

Investing again in Surrey, he took the lease of Ember Mill in 1795 where he manufactured ironware. With easy access to the Thames, this offered a ready route to London. He surrendered the lease in 1802 as he concentrated his efforts in South Wales.

Llanelli, South Wales

In 1796, Raby moved to Llanelli, then a small fishing village and coal export port in South Wales, 12 miles west of Swansea. Here, he established himself as an iron and coal baron with interests in railways, ports and shipping.

He is credited with the growth of Llanelli to an industrial centre which, by 1886, boasted seven tinplate works, a copper smelting works, four large foundries, a lead and silver works, a ship-building yard, three saw mills and six collieries exporting 87500 tons a year. Today, tinplate production remains in the form of Tata Steel's Trostre works, also on the itinerary of the WIRG visit.

Here, Raby foreclosed on a furnace built in 1793. This coke fired furnace probably occupied the site of an earlier charcoal furnace. In 1800 he built a second furnace at present day Furnace on the NW edge of the town. Here, he also built himself a house. Output from the first furnaces was 1664 tons in 1796 rising to 2267 tons in 1805 from two furnaces. At first, demand was stimulated by the Napoleonic war (1803-15) and Raby supplied the Board of Ordnance with carronades (short barrelled cannon) and round shot. In 1804 he built a new forge with a mill to roll bar. However, orders for ordnance ceased in 1805 following Nelson's victory at Trafalgar. He constructed a dock and installed Trevithick high-pressure steam engines in one of his collieries and at his furnaces and forges. He owned four ships and a network of horse drawn tramways including the Carmarthenshire Rail Road Company to bring iron ore and lime stone some 12 miles to his furnaces. Good to his workers, he paid high wages and built over 100 cottages to house them.

But, by 1806, Railroad shareholders were complaining they were not receiving the expected dividends and Raby experienced a financial crisis. Tramway tolls were owed and £1000 rent on the sites of his furnaces. To raise funds, he sold his interests in Derbyshire in 1805 and in his Surrey mills at Cobham in 1806 and Addlestone in 1807. By



1809 he was in financial difficulty again and all his assets in Llanelli were put up for sale. With his son, and help from friends, he set up a new company supplying iron and coal, but both furnaces were no longer in blast by 1815 the year

WIRG's visit to South Wales 26-28 April 2019

Travelling to South Wales on a Friday means contending with week-end traffic so our first visit commenced at 3pm at the kind invitation of Tata Steel (Europe). This was to the Trostre Tinplate plant in Llanelli where, after an introduction to the manufacture and uses of tinplate, we were conducted around the plant by the MD, Joe Gallacher. Hot rolled coil arrives from the nearby steel plant at Port Talbot and is rolled to thin strip at Trostre 0.5mm or so thick. Following annealing, the strip is cleaned and passes continuously through the tinning line where tin is electrolytically deposited onto the steel. The two tinning lines in operation have a combined capacity of 0.4 million tonnes a year and an additional line plates chromium instead of tin. A coil painting line is also in operation.

The works has also preserved a small museum showing the former method of pack-mill tinplate production which once made South Wales the leading exporter of tinplate world-wide. More about this later.

Next, we drove to our accommodation, the Travelodge at Cross Hands a few miles N of Llanelli. Dinner was taken in a local pub.



Preserved rolling mill at Trostre

In a change to the planned itinerary, the next morning we visited Alexander Raby's furnace on the edge of Llanelli. Alexander Raby started his career on the Weald managing Warren Furnace for his father before setting out independently to open 'iron mills' in Surrey and Derbyshire. He moved to Llanelli in 1796, taking over the blast furnace and coal mines there. Sadly, interests in the Carmarthenshire Rail Company resulted in his bankruptcy in 1820. A detailed description of the activities of this remarkable man are found elsewhere in this Newsletter.

In the afternoon we drove to Neath to visit the Aberdulaise tinplate remains. Now owned by the National Trust we were given a private tour of the remaining foundations as well as visiting its famous water fall and water wheel, a modern replica now generating power for the site and National grid. The first business here was copper smelting using ore delivered via boat from Cornwall. Over the years the site was successively used as an ironworks, a corn mill and a tinplate works. Tinplate from Aberdulaise was exported around the world, and Welsh tinplate output dwarfed the production of any place else in the world. Unfortunately, the very success of the Welsh tin plate industry brought about its downfall, when the American government put heavy import duties on imported tinplate, and the Welsh industry collapsed. So Trump's 25% import tariff on British steel is not the first!



Neath Abbey Ironworks

This was followed by a visit to nearby Neath Abbey ironworks. Not normally open to the public, a private tour enabled us to inspect its two massive blast furnaces, built in 1793, and engineering works where stationary steam engines and ship engines were among its many engineering achievements.

Returning to our hotel, we again dined in the local pub.

On Sunday, we checked out of our accommodation and proceeded to Kidwelly Industrial Museum. This is believed to be the only surviving pack-mill with most of its equipment still intact. Owned by Carmarthenshire Council, sadly this well interpreted museum is no longer generally open to visitors but, with a reasonable donation, we were again given a private tour. Opened in 1737 and worked until 1941, the works hand rolled bars of wrought iron into sheets, doubling up the sheets by folding them over up to eight times – hence the name ‘pack mill’ - in order to produce sufficiently thin sheets within the limits of the small hand mills of the day. Cropping the ends enabled the sheets to be separated, then cleaned and tinned by dipping in molten tin.

Heading east towards the M4, we stopped at Merthyr Tydfil to visit the Cyfarthfa ironworks where six of the later 19C blast furnaces remain. Established in 1765 by Anthony Bacon, the works was initially the largest of four works in the town. The coke fired furnaces used a water wheel to drive cylinder blowers, some of the water arriving via the earliest surviving cast iron bridge carrying a leat and tramway over the river Taff to the works. In 1884 a Bessemer steel-works was added and in 1902 Cyfarthfa was sold to Guest Keen & Nettlefolds Ltd (GKN) who also owned the nearby competitor, Dowlais Ironworks. The works closed in 1919.

The final visit of the day was to Cyfarthfa Castle built in 1824 to overlook the works by the then owner, William Crawshay. Today the Castle houses a museum and art gallery, several rooms of which are dedicated to Merthyr’s iron-working heritage.

CHAIRMAN’S ANNUAL REPORT 2019

With regret I record the death in late 2018 of Dr Henry Cleere, one of our life vice-presidents. An obituary written by Jeremy Hodgkinson is in the 2019 Bulletin.

Adventure in Iron written by the late Brian Awty and edited for publication by Jeremy Hodgkinson and Chris Whittick was published by WIRG in April 2019. Its publication has been a major undertaking and Jeremy and Chris should be congratulated on seeing a work of some 977 pages in two volumes through all the stages to publication. Attached to the accounts for 2019 is a full record of the payments made by WIRG and the grants received and book sales to the end of May.

Jack Cranfield is the second WIRG sponsored Ph.D student at Exeter University. He started in autumn 2018. An introduction to Jack is in the autumn 2018 Newsletter. Ethan Greenwood, our first sponsored student, is in the final stages of completing his dissertation.

To publicise WIRG we exhibited at Wakehurst, Biddenden Tractorfest, and Fernhurst. The experimental furnace at Pippingford continued to be in use. Excavations continue at Great Park Wood in Brede led by Simon Stevens. The site has been firmly dated to the first/second centuries AD by some 20 sherds of pottery. For details of future excavation dates please see the WIRG website.

Six members visited South Wales in April to look at sites related to tinplate production. The winter meeting heard an interesting talk by Greg Chuter on recent excavations at Romano- British sites at Bridge Farm and Arlington. After the 2018 AGM many members visited Anne of Cleves house in Lewes.

WIRG celebrated its 50th anniversary at a lunch at the Middle House in Mayfield in September 2018. The guest of honour was the High Sheriff of East Sussex, Major- General John Moore-Bick.

The committee met four times during the year. There were no changes to its membership. My thanks to all members of the committee for their work throughout the year.

Bob Turgoose

Chairman

QUERY - WHY NO IRON GRAVESLABS In WEST SUSSEX?

Hidden in the catalogue of iron graveslabs compiled by Rosalind Willatts in 1987, updated by the present author and available to download at [www.wealdeniron.org.uk/Catalogue of Iron Graveslabs3.pdf](http://www.wealdeniron.org.uk/Catalogue%20of%20Iron%20Graveslabs3.pdf), is a curious anomaly.

There are graveslabs in all the Wealden counties: East Sussex 76; Kent 9; Surrey 2; West Sussex 7.

However, those in West Sussex are all in parishes that, before the reorganisation of local authorities in 1974, were in East Sussex. In historical terms, that means that all the Sussex graveslabs were in parishes in the archdeaconry of Lewes or the Archbishop of Canterbury's deanery of South Malling and none was in the Archdeaconry of Chichester. It is not as if there were no furnaces in the archdeaconry of Chichester for there were 15 (the actual archdeaconry boundary was west of the old county division so the furnaces in Burbeach Hundred - St Leonards, Bewbush and Gosden - were in parishes in Lewes archdeaconry). Nor is it the case that the western furnaces significantly post-date the eastern ones. The peak of iron graveslab production in the Weald was in the 17th century.



So why are there no iron graveslabs in churches in Chichester Archdeaconry? Is it just a coincidence or were iron memorials frowned upon by the clergy in the western part of the county. Or is there another reason? Was this a reflection of social divisions? Or are there iron graveslabs that have escaped notice? I would be most interested to hear of any theories that might explain this anomaly.

Jeremy Hodgkinson

Caption:

Iron graveslab of Richard Infeld, 1624; St Margaret's church, West Hoathly, West Sussex.

Showing off WIRG

For the third year running WIRG has participated for free at Wakehurst's Wild Wood event and the Biddenden Tractor Festival.

Despite rain for half a day at both events attendance was good, particularly at Wakehurst, where we have built a bloomery furnace and get the kids to operate the bellows and present them with a nice bit of wet and dirty slag for their efforts – much to the parents' delight!.



Wakehurst Wild Wood Event

The location of these events allows us to spread the knowledge of the past Wealden iron industry throughout the Weald, reaching Biddenden in the east and Wakehurst – Kew Garden's country outpost – near the centre of the Weald. Usually, we also have a stand in the west at Fernhurst in September – but unfortunately this year, I am away that week-end so we have had to give this a miss.

We are short of volunteers to help at these events so please, if you can assist in 2020, and are not already a regular helper, let me know at secretary@wealdeniron.org.uk or telephone 01403 710148

Tim Smith (Hon Sec)

Summer Meeting Talk&Walk 2019

Jeremy Hodgkinson made a presentation of the history of the charcoal blast furnace, boring mill and forge at Beckley, East Sussex. Few subjects have engendered more argument (albeit civil argument) within WIRG than this site.

One reason for this is its labyrinthine history as an ironworking site. Jeremy's exposition of its organisational history made the subject as plain and understandable as it is likely to get. This history is intimately linked to that of other sites over a wide area. These links were shaped by complexities of the shifting ownerships and partnerships that controlled the site. It is clear that it had different functions at different times and that these changes of function had profound effects on the layout of the site and even on the shape and levels of the ground surface.

A second factor that makes understanding the Beckley site is made more difficult is that it is on or near a mediaeval flour mill and it was reshaped by what has happened since the end of its iron-making lifetime. A flour mill was built on the site around the beginning of the nineteenth century and its necessary leets and wheel pits are not good indicators of how the leets and wheelpits of the furnace or the forge were set out. In addition to the early nineteenth century work there is clear evidence of much more recent work on the water management system in the form of a small reinforced concrete dam or overspill that connects the Tillingham stream in its current bed with the mill's water management system.



Morticed timbers in the Tillingham stream, believed to be part of either the forge or the boring mill.

THE HENRY CLEERE ARCHIVE

Recently, WIRG was asked by his family if it would like to have the late Professor Henry Cleere's archive of correspondence, field notes and excavation papers. Unsurprisingly, the group accepted this generous offer but made it clear that, having no facility for storing his papers, they would, in turn, be deposited elsewhere. After careful weeding out of ephemeral material a draft list was drawn up of the archive's contents, and the Sussex Archaeological Society library has agreed to take the bulk of it which principally comprises the records of the excavations at Bardown and Holbeanwood which Henry dug in the 1960s and early 70s, and which were never fully published. This collection also includes more recent discoveries at those sites made by the Independent Historical Research Group, with whom Henry was collaborating, and reports on the pottery at both sites by Dr Malcolm Lyne. Other material includes papers and photographs relating to the *Classis Britannica* and to the excavation of the Roman bath-house at Beauport Park. This archive will, in due course, be available for study at Barbican House, Lewes.

Henry Cleere was, successively, Assistant Secretary at the Iron and Steel Institute, Director of the Council for British Archaeology, and consultant to UNESCO's International Committee on Monuments and Sites. Correspondence and reports relating to the wider iron industry in Britain and beyond from these aspects of his career have been offered to the Historical Metallurgy Society, together with Henry's records of the experimental iron smelting he undertook at Horam in 1969. The last of these was among the earliest examples of experimental iron smelting and therefore could be said to have national, rather than merely regional, importance.

Update: WIRG Investigations at Great Park Wood, Brede

Members of the WIRG field team have been hard at work again this summer continuing to investigate the remains of a bloomery site at Great Park Wood, Brede, East Sussex (NGR 585252 119038). Despite the presence of a thick layer of hillwash covering the area, steady progress has been made on the examination of the underlying archaeological deposits.

The main development this year has been the recovery of pottery probably dating from the 1st and 2nd centuries AD from the slagheap, hinting that the site may have been in use over a long period of time, given the discovery of material dated to the Late Iron Age at the site last year. Abundant charcoal offers the chance to confirm this longevity with a series of C14 dates. Other finds at the site have included vast quantities of slag, raw and roasted ore, and fragments of furnace lining.

However, in typical archaeological style, possible *in situ* masonry was uncovered in the corner of one of the trenches during the last session of the planned season. This feature will be protected over the winter, ripe for investigation next spring.

Thanks are due to the landowners for their kind invitation to investigate the site, and to all the WIRG volunteers. New volunteers (who must be members of WIRG) are always very welcome. Please email Bob Turgoose, our chairman for details: bobturgoose@yahoo.co.uk



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