



# NEWSLETTER 56 AUTUMN 2012

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## WIRG SUBSCRIPTIONS - A MESSAGE FROM THE TREASURER

Members were notified in May 2012 of increased subscriptions and a change in WIRG's bank account. Unfortunately several members did not change the bank account to which they renewed their subscription and some did not pay the increased amount in subscription.

The increased rates are as follows:

**Individual** member **£9.00** (or optional lower rate of **£8.00** for over 65s)  
or the **family** subscription which is **£12.00**.

***If you have not done so,  
please contact your bank to change your payment details for renewal on 1st June 2013***

The old account will not be active next year. We will receive no payment and your subscription will cease.

### The new bank account details are as follows

Wealden Iron Research Group  
Barclay Bank, Uckfield Branch, 120 High Street Uckfield, Sussex, TN22 1RG  
Sort code **204976**  
Account number **53653935**

Thanks to all those who successfully changed the amount paid and amended their bank details

## LETTER FROM THE CHAIRMAN

Dear Friends

It has been quite an eventful year for WIRG especially with the pleasant task of discussing the way forward. We are in the enviable position of having a good cushion of funds because of the generous legacy left to us by Mrs Pettitt. This puts us in a much better financial position than many other organisations.

One such organisation having to cut back because of great financial constraints is the Council of British Archaeology. Their funding from the British Academy has been cut considerably and will disappear completely in the not so distant future. CBA has

grown and changed since I first contacted them in the early 1960s when they helped me to experience my first taste of practical archaeology. They were a relatively small organisation then but have expanded to become the established voice for archaeology in the UK both for championing volunteers or lobbying MPs in Westminster. CBA also publishes a bi-monthly magazine which is a very interesting way of keeping up to date with research projects throughout the UK as well as practical work. They now have a network of regional groups who aim to coordinate and liaise with County Societies and other local archaeological groups and to promote archaeology for everyone. I am a trustee of the South East Regional Group and the recently formed London Group. The trustees of all

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groups have both non-paid and professional archaeologists from museums and archaeological units who bring much enthusiasm and knowledge.

One major concern of the CBA is the closing of various University and local continuing education courses which provided a splendid way of learning about and getting involved in archaeology in many ways. Many local museums also have to close because of the lack of state funding – many of the collections are being scattered to the four winds thus removing a valuable source of research.

I urge you to join the CBA as individuals; benefits include the magazine, as well as supporting archaeology in a positive way. They hope to expand the membership to help to compensate from the lack of outside funding which will make them even more of an independent organisation. Look at the website [www.archaeologyuk.org](http://www.archaeologyuk.org) which will also link you to the regional group websites.

I look forward to meeting many of you to the WIRG Winter Meeting on 2nd February 2013 – details to follow.

Best wishes for a very happy Christmas and all the best for 2013

Shiela Broomfield

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## SUMMER MEETING AND AGM

After weeks of rain, the sun shone on Biddenden where members met for the 2012 Summer Meeting. Proceedings began with an interesting and wide-ranging talk, by Tony Singleton, on Biddenden Hammer Mill, which was to be the subject of the afternoon visit. Tony traced the history of the site, explaining the various administrative boundaries that helped to identify the water courses, and the sources of raw materials in the area. He then introduced us to the Baker family of Sissinghurst, whose scion, Sir Richard, built the forge in 1570. He amassed a considerable acreage of woodland which enabled him to keep his forge, and the furnace he owned at Frith in Hawkhurst, supplied with charcoal. The demand for wood by the iron industry put it at odds with the demands of clothiers whose broadcloth industry was centred on Cranbrook and Biddenden, and we were given a brief outline of the various stages of cloth manufacture. The conflicting demands of iron workers and cloth workers nearly resulted in public disorder in the 1590s.

The forge was in production right through until the 1660s but evidence of a furnace at the Hammer Mill site does not appear until the middle of the 17th century, although it may have been in existence from earlier. Descent through the Baker family had been down the male line until the death of Sir John, the 3rd baronet, in 1661. Having only daughters, the estate was divided between them and their husbands,

and the last evidence of iron production is a rating assessment of 1668.

Sissinghurst 'Castle' became a prisoner-of-war camp during the Seven Years' War and the large part was demolished soon after. Improvements in agriculture led to the construction of the corn mill and mill house in the late 18th century, which made use of a reduced pond. But the former ironworks pond was incorporated into an ambitious plan, in 1801, to build a canal to connect the Medway at Yalding with the English Channel at Rye, in which the pond would act as a reservoir for the canal. A revised scheme by the celebrated civil engineer, John Rennie, got as far as an Act of Parliament, but financial backers pulled out and the canal was never started. Plans drawn up at the time, however, reveal the likely extent of the pond constructed in 1570 which was as much as 50 acres.

The corn mill continued in use until around the time of the First World War, with a brief attempt at revival in the 1930s, but has now fallen into decay although much of the machinery is still *in situ*. In 1970 an *ad hoc* group, called the Wealden Archaeological Research Group, carried out a brief excavation of the area around the furnace remains and tail race, their 'dig diary' and a plan of the site having been brought to light recently as a result of Tony Singleton's enquiries in advance of WIRG's visit.

## Annual General Meeting

The President, Jeremy Hodgkinson, welcomed members. The Chairman presented her report (which accompanies this newsletter), outlining the activities of the Group over the preceding year. The Treasurer's report drew attention to increased postage costs, and to the need for members to amend their standing orders following the change in bank used by the Group. Additional money had been received from the legacy from Phyl Pettitt, and a donation had been made to the Rural Life Centre's project to build a half-scale replica of a furnace and forge hammer (which members saw at last year's AGM). The officers and committee were elected without contest, and the President welcomed Alan Davies, who had joined the Committee. He also paid tribute to David Brown, who was not seeking re-election, for his sterling work as Secretary over the past five years, drawing attention to the many initiatives David had pursued during that time. He would be continuing as Secretary of the Field Group but he would be sorely missed on the Committee.

### Committee 2012-13

Chairman – Shiela Broomfield  
Hon. Secretary – Judie English  
Hon. Treasurer – Vivienne Blandford  
Vice Chairman – Tim Smith

Alan Davies, Brian Herbert, Jonathan Prus,  
Tony Singleton, Simon Stevens

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After an agreeable lunch, members reassembled at Biddenden Hammer Mill, where Tony Singleton conducted a tour of the site, and members took the opportunity to speculate amongst each other over the former layout of the ironworks from the surviving surface evidence.



**Tony Singleton explains Biddenden Hammer Mill to members** (photo: Keith Mason)

## THE ROBERTSBRIDGE PROJECT

It's becoming difficult to organise forays because fewer of us are prepared or able to lead one. So at our meeting in May at the end of last year's forays we tried to think of a project which didn't involve long days out walking over difficult terrain (some of us aren't getting any younger). And we came up with the idea of focusing our attention on one area where ironworking took place and examining it in detail.

Robertsbridge immediately stood out because of the extent of archive material we have about the working of the furnace and forge. Some of it is in the record office in Maidstone and some of it in San Marino, California. Luckily, microfilm of the Californian archive is housed at the record office in Lewes. In addition David Crossley has done a lot of work on the archive in Maidstone.

We thought it would be most useful to study the documentary material and then see to what extent it related to what we can now find on the ground.

We asked WIRG members if they would be interested in helping and immediately received offers. We don't know what we are going to find and we are in the early stages of organising the project. One member lives locally and is liaising with local landowners; one member lives near Maidstone and has offered to visit the record office and look at the papers there; and one of us is busy digitising the microfilm from Lewes. The record office at Lewes has been most helpful and supplied us with a number of old maps and permission to make the microfilm more widely available.

It's not too late to become involved in the project: contact David Brown by email at [wirgforays@gmail.com](mailto:wirgforays@gmail.com) or phone 01435 812506. The more help we have the more we can do. You don't need any prior expertise – all the help you need will

be provided. And if you end up out of pocket, we are more than happy to meet essential expenses like petrol, bus fares or parking (but not overnight accommodation, I'm afraid!). As a volunteer you will be kept informed of what's being done where so you can join in with other groups if you wish.

**David Brown**

### DO YOU HAVE ACCESS TO A COMPUTER?

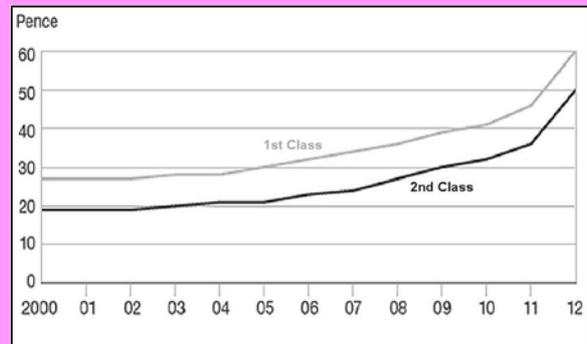
Would you like to see your WIRG Newsletter in colour?

If you answer "YES" to both these questions, AND YOU DO NOT ALREADY SUBSCRIBE, PLEASE: -

Contact David Brown by email at

**[wirgforays@gmail.com](mailto:wirgforays@gmail.com)**

This will reduce WIRG's postage and envelope bill, as shown by the ever-increasing slope of the Royal Mail's stamp-price graph, below.



## DON'T BELIEVE THE NEWSPAPERS 18th Century spin

In volume 32 of the WIRG Bulletin there is an excellent article by Jeremy Hodgkinson providing extracts from contemporary newspapers of references to Wealden ironworks. Item 14, from the *Middlesex Journal* or *Universal Evening Post* of 6-8 October 1772, reports that an iron ore mine near Horsmonden church 'has been found to produce 13 ounces of solid iron from 16 ounces of ore'. Jeremy quite rightly comments that this would mean the quality of the ore is in excess of 80% (iron content) far above the normal yield. In fact, this amount of iron is impossibly rich for any iron ore, whether the local carbonate siderite ore or the richer haematite or magnetite oxide ores on which the modern iron industry today relies.

The quantity of iron available in any ore can be calculated by the ratio of the atomic weights of the elements present. Thus for our local siderite ore, which has a formula of  $\text{FeCO}_3$ , the respective atomic weights are 56, 12 and 16. Thus the amount of iron present in 'pure' iron carbonate is  $56/(56+12+(3 \times 16))$

ie  $56/116 = 0.48$  or expressed as a percentage 48%.

In fact, no ore is pure as there are always other minerals present known as gangue, and indeed it is

partly these that form the slag we find in the field. From an analysis of the ores we have collected to use in our experimental bloomery we find the iron content of the Kent siderite we are presently using to be around 35% Fe content. Even if we take into account that the ore is roasted to decompose the carbonate to the oxide (known as calcining, which takes place at around 500-600°C for siderite) the oxide produced cannot have an iron content greater than 70% as defined by the atomic ratios:  $Fe_2O_3 = 56x2 / (56x2 + 16x3) = 0.70$  or 70%. Again, in reality there is always some gangue present and the best hematite ores presently used in the modern steel industry have an Fe content of 65%, with grades at 63% and even 55% also being employed.

Possibly the editor of the Middlesex Journal was 'leaned upon' to put this more than positive spin in his report by a landowner hoping to attract a gullible person to invest in the mine.

**Tim Smith**

## WEALDEN IRON ON TV

A forthcoming series on Channel 4 will feature a rarely seen Wealden iron product: the Crippenden Gun. Discovered in the 1850s at Cowden Furnace, it has lain in the garden at Crippenden Manor, in that parish, since then. It is a 16th century piece, probably a *falconet*; and like the *falcon* found at Pippingford Furnace, was rejected because of flaws in its casting. The television programme will be one of four in a series called 'Walking Through History', presented by Tony Robinson (Blackadder, Time Team etc.), and is expected to be broadcast in the Spring. Exact details of its scheduling are not known as yet, so keep an eye open for it.



**The Crippenden Gun**

### PAST NEWSLETTERS

WIRG Newsletters March 2007 - March 2011  
(from March 2010 in colour)  
are available on the WIRG Website

[wealdeniron.org.uk/pub.htm](http://wealdeniron.org.uk/pub.htm)

## APRIL 2012 FORAY REPORT

Seven forayers met in the village hall car park at Punnett's Town, 5km east of Heathfield, to resume their investigation of the Dudwell valley. This lies in the southern most part of the block of land which is the subject of WIRG's current detailed investigation consisting of a 5km wide strip (TQ 60-65) extending north from a line level with Heathfield in the south for 14km (from TQ 21-35) the northern limit being on a line about 5km south of the centre of Tunbridge Wells and to the east.

Tim's group set off in an easterly direction from Brailsham Farm to intersect the tributary of the Dudwell in Binglets Wood. Here they located five charcoal platforms – one with a substantial tree growing from it estimated at 150 years old – and some large, old coppice stools. Downstream, a rather decayed ornamental pond was reached and, further on, near the confluence with the Dudwell, an arch approximately 1.75m high, well in excess of that needed to take the water even in spate. The stream's meandering nature through a small flood plain upstream of this obstacle suggested the bank had once been a bay to create a pond.

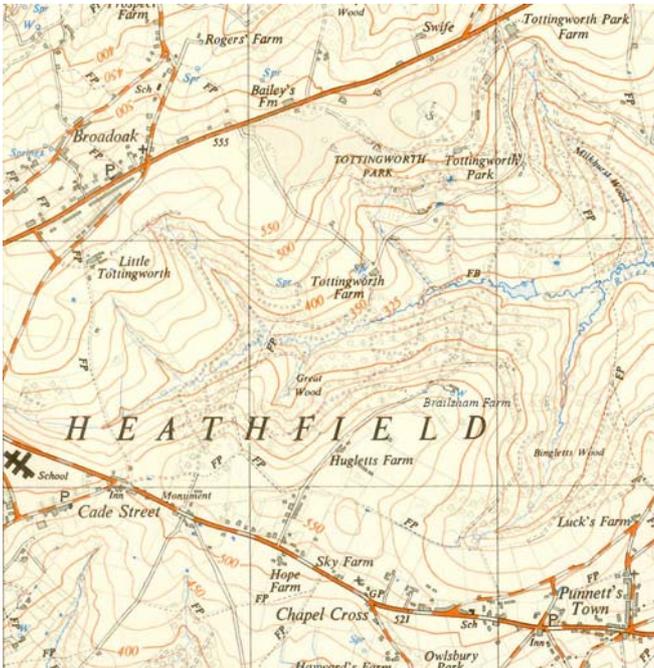
During their survey down the stream Tim's team noticed some fascinating geology, where the stream had cut through 2m or more of ground, wearing its way through the Purbeck Beds of shelly limestone, then through Limestone, more Purbeck, a thin band of blue clay and Purbeck once again: the only outcrop of Purbeck marble this side of Dorset.

After lunch beside a modern timber footbridge over the river Dudwell, where the December foray on the north side of the valley had finished, they started following the Dudwell upstream, two searching the stream and two well up the south bank as, in another location, a bloomery site had been found well away from a stream. Within 150m of starting, the newest recruit, Steve, found a small piece of slag in the stream. It was somewhat light for bloomery slag but further investigation revealed large lumps of dense slag weighing 1kg or more and exhibiting runs typical of bloomery slag, lying in the stream over a distance of about 50m. Probing the ground either side of the stream and in the bank, however, revealed no slag, which had probably been buried deep over the years due to land slip.

Continuing upstream they came to a second, older stone bridge in a poor state of repair with a small weir to create an old ornamental pond above it. But there were no further signs of slag in the river. Tim and his group then climbed up the southern slope of the wooded valley to look for possible bloomery activity further from the river and below a line of pits which they took to be created by quarrying, possibly for stone. However, nothing more was revealed.

Meanwhile David, with Brian and Geoff started looking at the south side of the Dudwell valley from the furthest point upstream where there was woodland. The owner of Streetfield Farm had

informed us his father had found slag somewhere round the field to the east of Gameland Wood. Brian and Geoff started to look there, but had not got as far as a find made previously by WIRG member, Dave Bonsall, who had discovered slag while walking his dog. David decided to follow the Dudwell to meet up with Tim's group to see if there was any slag in the river or on the southern bank. None was found, but a number of deep circular depressions were seen and some charcoal platforms.



**The foray area east of Heathfield, East Sussex**

### **MAY 2012 - THE SEQUEL**

In May David returned and found the slag. It was a scatter of small and large pieces of furnace slag on the slope leading up to the field. Probing only located a scatter under the surface, but on probing in the field a triangular area of slag was found some 30cm below the surface emanating from a point about 20m into the field. The exact area of the heap could not be determined very accurately as the field had been ploughed at some point in the past, scattering the slag and raising some into the top 30cm. At the fence line the extent of the heap was some 30-35m. Seen from the other (western) side of the field the fence line could be seen to peak at the centre of the heap with the ground falling away on both sides. The fence at this point is some 20m away from a small tributary of the Dudwell, but it seems unlikely that the finds made by Tim's group emanated from this site. However, it was upstream so the possibility cannot be completely discounted.

The owner informed David that the field had once been the site of a group of buildings (thought to be called Sharness), evidence for which was discovered by a group from the French embassy in the 1980s using metal detectors. Unfortunately no record of the find is known to exist. Nothing is shown on OS maps,

or the Gardner, Gream and Yeakel map of 1795. A record on the HER refers to the medieval village of Tottingworth in the vicinity (MES4343), location unknown. A link between the 'settlement' and the bloomery cannot be ruled out.

An interesting note in the geological memoir for Tunbridge Wells states, "... in Tottingworth Park (TQ 6170 2217), for example, two clay beds each up to 10 ft (3m) thick were traced above the Upper Purbeck clays and a clay pit in one of these (TQ 6210 2234) may possibly have been dug for iron stone." Unfortunately the group were denied permission to look in the land to the north of the Dudwell, now owned by Tottingworth Farm.

**Tim Smith and David Brown**



### **WOODLAND TOOLKITS**

Field group members may recall the 'testing', on some recent forays, of some toolkits for understanding the archaeology of woodland. These are now available for download from the website of the Woodland Archaeology Forum

[www.sewaf.org.uk/surveying-and-lidar](http://www.sewaf.org.uk/surveying-and-lidar)

### **DATABASE DEVELOPMENTS** **People in the iron industry**

WIRG's on-line sites database has been available since 2007 and continues to be updated with new sites and additional information about existing ones. A new feature, which should be of value to researchers of the industry as well as genealogists and local historians, is the inclusion of a searchable database of people involved in the industry. These include the owners and tenants of ironworks, as well as the many ironworkers of different trades whose names appear fleetingly in parish registers, tax returns and correspondence. Many were of French origin. Compilation of this prosopography of the iron industry is, by no means, complete, and members who have access to unpublished sources, such as transcripts of parish registers, are invited to contribute data.

The database is accessible at [www.wirgdata.org](http://www.wirgdata.org), and can also be linked to from the Group's main website. Take a look – your feedback will be greatly valued.

### THIRD WIRG SMELT OF 2012 and the resulting iron from the forged bloom

The third smelt of 2012 used a much higher blowing rate of 11 litres/sec, up from about 6 l/sec. This was measured using a pitot tube system, made by Jonathan Prus, calibrated from the writer's moving vane meter which was calibrated from a variable area flow meter; not a satisfactory method of calibration but, hopefully, adequate. Because a flow-rate of 11 l/sec is rather exhausting to produce from our two 25-litre bellows, we resorted to our speed-controlled, blacksmith's forge, electric blower powered by a petrol generator.

Jonathan Prus's computer simulation of the thermal properties of furnaces suggests that more air is required for our new bloomery furnace, mainly due to its larger internal diameter. The extra heat produced should enable us to tap slag at least once per smelt. This exciting interlude has eluded us (after several hours of just charging the furnace) for some time although occasionally it is successful, but for no apparent reason.

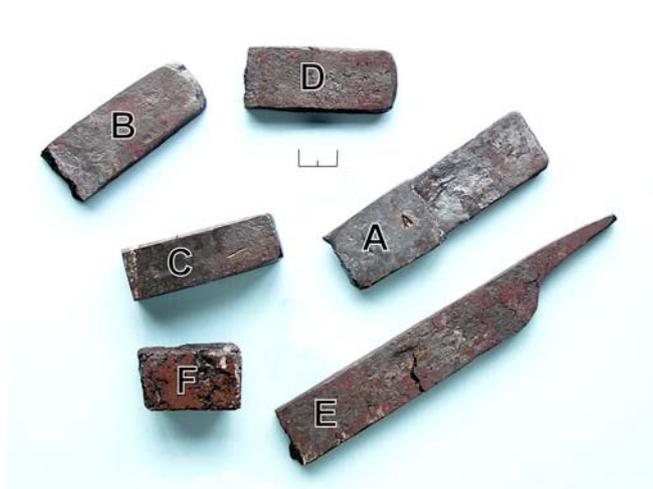
#### *A resumé of the smelt:*

Ore:charcoal ratio	=	1:0.75
Total (Kent) ore	=	20kg
Total charcoal	=	15kg
Blow rate	=	11 l/sec
No tap slag!		
The large bloom	=	2250g (partially consolidated by WIRG, forged by Dan Liggins)
Coke used at forge	=	4.5 buckets
A smaller bloom	=	120g (forged by John Baillie)

The large 2250g bloom was sent to the Black Dragon Forge, Derbyshire. Mr. Liggins first cleaved the bloom in two to make it more manageable, allowing two chances to the bloomsmithing process; this was the first bloom he had consolidated. Forging was carried out at a yellow to white heat, as is usual, but surprisingly at red heat the metal crumbled under the hammer. This suggests that a bigger bloom, but not so big that it becomes cumbersome, would be advantageous because it would retain its heat longer. After much forge work he returned five pieces of iron weighing 700g, proving that much iron is lost during forging, not to mention the slag within the bloom.

Fig.1 shows all the iron from the smelt; A to E was forged by Mr. Liggins and J by John Baillie. Mr. Liggins' samples confirm failed forging experiments by John Baillie, with cracks appearing in the iron; these cannot be repaired as they stand and the metal must be folded over at the crack, and fire welded to produce a thicker but shorted piece of iron, Fig.2, A. Samples B and D, Fig.3, show iron that has completely cracked apart, this has a very rough, oxidised surface.

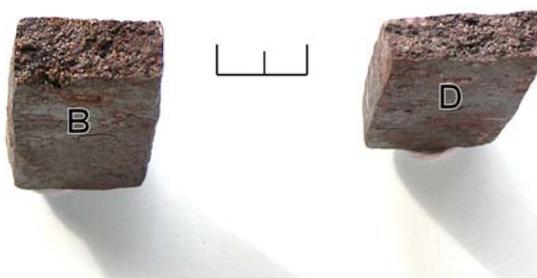
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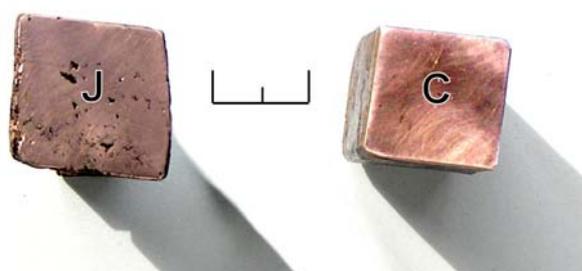
**Fig. 1 All forged iron from third smelt 2012  
Scale 1cm**



**Fig. 2 Folded and forge welded piece  
Scale 1cm**



**Fig. 3 Two fractured pieces  
Scale 1cm**



**Fig. 4 Two sectioned pieces  
Scale 1cm**

Fig.4 shows sections across the two formed bars; sample J was minimally forged by John Baillie whilst C was undoubtedly forged for much longer, hence the smaller voids which are undoubtedly the remains of voids within the original bloom.

Mr. Liggins tried to draw down bar E Fig.1, but was thwarted by a large crack appearing further down the bar as well as many smaller ones.

Mr. Liggins's report gives a few clues, listed below, that will be useful in future forging experiments:

- ◆ When fire welding wrought iron, reheating too many times or at too a higher temperature causes it to "burn", making it even more difficult to fire weld.
- ◆ He tried using silver sand as a flux to minimise oxidation, but found that it did not make much difference.
- ◆ Do not forge bloomery iron below yellow heat otherwise it is liable to crumble.
- ◆ Do not try consolidating small pieces of iron, they lose heat quickly and will crack.

Blackdragonforge.co.uk, The Cottage, Congreave Lane, Pilhough, Stanton in the Peak, Derbyshire DE4 2NF; 01629 735505;

### Brian Herbert for the Smelting Group

#### TEBBUTT RESEARCH FUND

Grants are available towards research into any aspect of the Wealden Iron Industry or subjects pertaining to it. Applicants may be individuals or groups, and the application can include any associated expenses, such as travelling and photocopying. The applicant should write a letter giving details of themselves together with relevant information concerning the research envisaged.

**Applications to the Hon. Secretary**

#### RESEARCH IDEAS

*The process of compiling the new Persons section of the WIRG On-line Database (see p.5) has drawn attention to several sites where our documentary or geographical knowledge is fragmentary, confused or just plain absent:*

- ◆ The ironworks at Thursley and Witley – Thursley Upper and Lower Hammers, Coldharbour Hammer and Witley Park Furnace (deeds in archives at Woking and Godalming).
- ◆ West End Furnace, Chiddingfold – no documentary sources known
- ◆ Verdley Wood Furnace, Fernhurst – no documentary sources known
- ◆ Inholmes Copse Furnace, Stedham – no documentary sources known
- ◆ Prinkham Farm Forge, Cowden – no

documentary sources known; possibly in records of the Manor of Starborough and Prinkham (in Surrey and Kent archives).

- ◆ Tickerage Forge, Framfield – no documentary sources known
- ◆ New Place Furnace, Framfield - no documentary sources known
- ◆ Bedgebury Forge, Goudhurst – no documentary sources known
- ◆ Langley Forge, Maresfield – only a picture on a map and a mention in Ralph Hogge's accounts record its existence
- ◆ Boxhurst Steel Forge, Sandhurst – site not identified
- ◆ Rats Castle Forge, Capel - no documentary sources known; is this the Tudeley medieval ironworks?
- ◆ Roundwick Furnace, Kirdford - no documentary sources known
- ◆ Bassetts Furnace, Hartfield - no documentary sources known
- ◆ Hammer Forge, Westwell, Kent – see WIRG Bulletin 1st series 6, 3-4; did this site ever exist? or is it a mistranscription of Westfield? (Tufton MSS - U455/E1 - in the Kent archives)

*As the Wealden Iron Research Group, we should be trying to answer some of these questions. If you need help in starting, the Editor will be happy to lend a hand.*

### THE SIGNIFICANCE OF THE LEGEND OF SAINT DUNSTAN

In WIRG Newsletter 44 (Autumn 2006) I urged giving serious attention to some elements of the legend of St Dunstan's triumph over the devil at his forge in Mayfield, in view of the considerable involvement of the archbishopric of Canterbury with the Wealden iron industry in historical times. Some readers seemed to think I was advocating taking the story literally.

'Serious attention' is not the same as 'taking literally'. Such legends originated and were re-told not primarily as hagiography or history but because they dramatically, and thus memorably, conveyed matters of real contemporary significance with practical consequences.

The review in Newsletter 55 (Spring 2012) of a paper on the organisation of iron utilisation in Anglo-Saxon England has supplied unexpected support for my contention. "Production of iron ... was embedded in the liminal zone between reality and myth. Blacksmiths were feared for their art was associated with magic."

To the Christian mind such supernatural powers were also associated with the devil, but God was stronger than the devil and could deliver believers from the forces by which he had held them in thrall. The contest at Mayfield was decisive assurance of Christianity's superiority to paganism.

The practical consequence was that Dunstan's successors as archbishop not only enjoyed their

rights to exploit the iron on their lands by the laws of man but had divine validation for them too.

Once Christianity had been firmly established as the religion of England then this legend would begin to lose its force and could itself be seen as outmoded superstition.

**M.J. Leppard**

*Michael Leppard wrote, in Newsletter 38 (Autumn 2003), of the probability that Edward Daniell was a founder at one of the Cowden furnaces, citing evidence of his occupation at his marriage in 1657 and his ownership of land in that parish. One of the consequences of research for the WIRG database was that I consulted the will of Richard Knight, owner of Scarlets Furnace, who died in 1681. In it Knight made a small bequest to Edward Daniell, his founder.*

*The confirmation of suspected links is one of the satisfactions of research. - Ed.*

### **OAKLANDS PARK, SEDLESCOMBE**

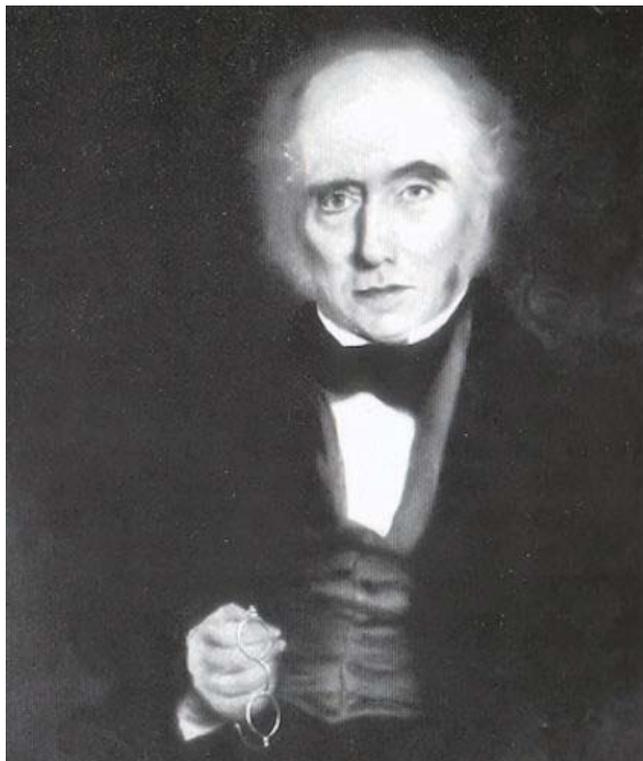
The Independent Historical Research Group (IHRG) has been taking a look at the Romano-British ironworking site at Oaklands Park, for many years a Pestalozzi Village. WIRG last looked at this site in 2001. David Staveley, who was one of the speakers at this year's Winter Meeting, has conducted a magnetometer survey of the site (below). The site was first noted in the early 19th century when the cinder was being quarried away to surface the local turnpike road, so the remains are somewhat diminished from what they might have been once. Nevertheless, David has commented that the survey has suggested that the scale of the site may not have been as great as previously estimated. IHRG have also been trying to trace the route of the Roman road past the site, which is beginning to look as though it follows a different route from that described by I. D. Margary.



**Magnetometer survey of Oaklands Park Roman ironworks, Sedlescombe**  
(photo: David Staveley)

### **WIRG PHOTOGRAPHIC ARCHIVE**

Many of you will be aware that WIRG has a photographic archive. Some of the photographs go back to the early days of the group and show excavations undertaken of forge and furnace sites. Some photos are much more recent and show the events of this year's AGM. We collect them all. Did you take a camera along to a WIRG event? If you did we would be very interested to place any photographs you have in our archive. Either email David Brown at [wirgforays@gmail.com](mailto:wirgforays@gmail.com) or phone 01435 812506. All original prints or slides will be returned.



**DAVID MUSHETT - IRONMASTER BUT NO ANTIQUARIAN**

The item below was published in *Mechanics Magazine* Vol 3 published in London in 1825.

It is a report on a commentary or letter by David Mushett (above), a Scotsman who came to the Forest of Dean and set up an ironworks there – later to be run by his son Robert who's fame was to be his development of alloy steels and for showing Bessemer how to make sound steel by the addition of the high manganese iron alloy, Spiegeleisen to de-gas it.

The report in the *Mechanics Magazine* does not state if the comments were by David Mushett (1772-1847) or his son Robert, but since Robert (1811-1891) would have been only 14 at the time of publication we can assume the comments came from the senior Mushett, David.

In the report David Mushett advocates the carrying out of 'antiquarian research' to record blast furnaces in Sussex and Gloucestershire (including the Forest of Dean) and elsewhere, but was evidently ignorant of the early Wealden blast furnaces, fixing the date of the earliest blast furnace in England at

about 1550 when of course the earliest furnaces on the Weald were around 1490 (Buxted) and 1496 (Newbridge).

The report reads:

*Mr Mushett, one of the most scientific and ingenious of our iron masters, has, in some late inquiries into the history of the discovery and use of cast iron, appeared disposed to fix its date in England about the year 1550; before which time it appears that the art of casting iron was unknown, and he supposes it to have been an English invention.*

*There were in England and Wales, in the year 1720, he says, fifty-three blast furnaces employed in making 17,350 tons yearly, or a little more than five-tons of pig iron each weekly. At that period fourteen of these furnaces existed in the two south-eastern counties of England, Kent and Sussex, where now one, at most, survives near Battle.*

*Mr. Mushett suggests, as a curious matter of antiquarian research in Sussex and Gloucestershire (including the Forest of Dean), and several other counties, to ascertain the date and place of erection of the first tall blast-furnace in England for the making of cast or pig-iron. At present the size and number of these furnaces are so wonderfully increased in Britain as to manufacture nearly half a million tons of pig-iron annually\*, with a consumption of pit-coal, in all the attendant manipulations, equal, at least, to five million tons annually.*

\* In a footnote the Editor says: We suspect this calculation has not been recently made. The amount of the manufacture for the present year is certainly much greater.

Tim Smith

[M. A. Lower's seminal paper on the ironworks in the Weald did not appear until 1849, some 24 years after Mushett's comments— Ed.]

### A TRACKWAY TO 'THE SUSSEX IRON FIELD'

In an article entitled, 'A pre-Roman trackway to the Sussex iron field' (in *Surrey Arch Colls.*, 49 pp. 20-5), James Graham traced an ancient route from Selsdon south as far as Dry Hill Camp, an Iron Age hill fort in Lingfield parish, and demonstrated that it could not be Roman or Saxon. To account for it, among his "observations [that] must necessarily be largely hypothetical", he argued, quoting Straker, that the "large and important" Sussex iron industry, which produced an exportable surplus, implied "a more or less saturated home market" and necessitated a road north "to the interior markets of the island". He did not, however, cite any evidence of iron-working on his route or any specific sites south of it, though on the Dry Hill portion he consulted I. D. Margary. He thus knew that Margary and S. E. Winbolt had undertaken an archaeological investigation of the fort and found "definitive evidence of pre-Roman iron smelting, though no hearth" (*Sussex Arch Colls.*,

43, pp. 79-92). Why the slag they found was imported was, they had written, "not easy to explain".

Complementing that article, Margary summarised the evidence for, but did not map, the route's southward extension to the Kent Water, up to Hammerwood and Thornhill, down to the Medway near Tablehurst, and onwards from Forest Row, near enough the line of the 'Vanguard Way' long-distance footpath on the modern Ordnance Survey 'Explorer' map 18. He too made no mention of iron working (*Sussex Notes & Queries*, 11, pp. 62-4).

So far as I am aware, no one has yet drawn attention to the significance for more decisively connecting the route to the iron industry of the comparatively recent discovery of "the first pre-Roman bloom furnace in the Weald" alongside it in the Tablehurst area (*WIRG Newsletter* 32, 2000, p.6). That site could well have been chosen because it was ideally located for transporting products to markets and navigable water both north and south, possibly before the route was fully developed (Graham acknowledged that other north-south through routes were held to be older). Simultaneously the identification of that site could be the start of replacing the vague "Sussex iron field" with other specific sites already known or awaiting discovery within easy reach of the trackway wherever else it crosses iron-bearing ground.

M.J. Leppard

### WIRG BULLETIN 33 2013

Contributions for this year's Bulletin should reach David Crossley by **31st March 2013** (for contact details see back page)

### RECENT PUBLICATIONS

**Françoise Dumasy, et al; *Travail de la terre, travail du feu. L'espace rural autour d'Argentomagus (Saint Marcel, Indre)***; ISBN 978-2-35613-032-7; h/b; 70€; in French with no English summaries.

An area of 20km radius has been archaeologically surveyed around the Saint Marcel area of central France. WIRG members' interest will be in part 3 (chapters 7 and 8) where 242 iron smelting sites (assumed to be bloomery furnaces) have been located, 114 of which are Roman and with just one site, Roman, being excavated at Latté à Oulches, adjacent to a Roman road, about 20km west of Argenton sur Creuse.

A complete set of organised structures (for smelting) has been found; including ore dressing, charcoal production, bloom-smithing and forging of semi-products. There is strong evidence of cast iron and hyper-eutectoid steel (iron with a carbon content slightly less than cast iron) which, with special heat treatment, will produce a high-strength iron that is not brittle. There is also evidence of the decarburization of cast iron and hyper-eutectoid steel

(to produce low carbon wrought iron). Interestingly, a furnace was used to produce charcoal along with a bloom smithing hearth. The site has been dated from around 200BC to about 100AD.

One furnace, associated with a pool, was used for heating glassy slag containing prills of carbon-rich iron by causing the slag to shatter when immersed in water. These prills (<5mm diam.) of isolated iron have often been seen by the WIRG smelting team but have not been thought worth recovering. The WIRG prills were mainly cast iron and brittle, thus they would have required decarburising before consolidating by unknown techniques before a usable piece of wrought iron would be produced.

**Brian Herbert**

**Ruth Rhynas Brown, 'What's under the crud? A guide to uncovering European cast-iron cannons', *ICOMAM Magazine* [International Committee for Museums of Arms and Military History], 8 (October 2011), 56-61. [www.klm-mra.be/icomam/icomam/magazine/index.html](http://www.klm-mra.be/icomam/icomam/magazine/index.html)**

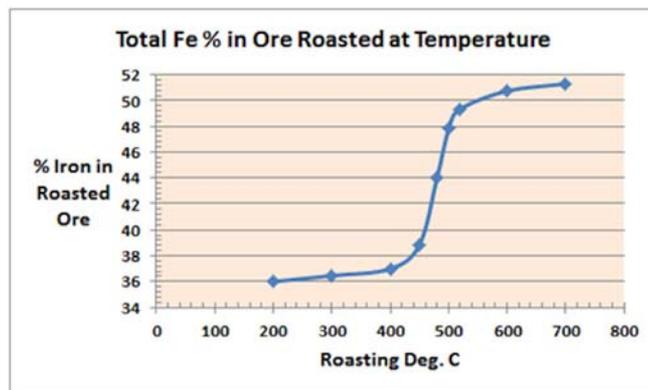
Intended for museum conservators, this is actually a very useful article for anyone who comes across iron cannon and wants to know where they came from (as one tends to do on holiday in foreign parts). Stylistic indicators, such as the rings along the barrel, the shape of the cascabel (i.e. the button at the back), trunnion marks, touch holes, ciphers and identification marks are all briefly dealt with and illustrated, showing both national and chronological differences from the 16th to 18th centuries. Why not download a copy and keep it with your passport and sun cream?

### COMPARING CURRENT AND HISTORICAL ORE ROASTING EFFECTIVENESS

Prior work shows that full roasting of Wealden ore needs a temperature of about 700°C or more to convert siderite completely to oxides and minimum weight. Fully roasted ore contains just over 50% total available iron by roasted ore weight compared with typically about 35% iron by weight in as-mined siderite ore, see Figure.

In practice maintaining a uniformly high temperature in an open ore roasting pit for ore pieces is highly unlikely. This variability results in ore pieces that are not fully roasted. For example, a piece of ore that is only '70% roasted' provides about 6% less available iron for same weight as a fully roasted piece of ore. Extent of under roasted ore usage is considered a factor influencing furnace productivity.

Current study has trialled a method which seems feasible for giving a *Roasting Effectiveness* score for already roasted ore. This compared a recent WIRG roasted ore sample with an 18thC pit roasted Fernhurst ore sample and demonstrated a



statistically significant difference between roasting effectiveness score for each sample.

In summary this feasibility trial has demonstrated:  
 A simple, quick and practical method for estimating ore original roasting effectiveness  
 Differences can be detected readily between samples of current and historical roasting practices which may help in assessing historical furnace smelting performance  
 Estimates can be made of original roasting temperature ranges achieved for trial samples examined.

However even with these encouraging preliminary trial findings additional historical samples from different locations are needed to help validate these initial results and especially to give a broader picture of historical practices. I am seeking help from members who would like to contribute to this on-going study and who can provide for analysis representative small samples of dated roasted ore from known furnace locations. If you can assist then kindly contact me via my e-mail address below:

**Alan Davies**

### FACE THE IRONMASTER

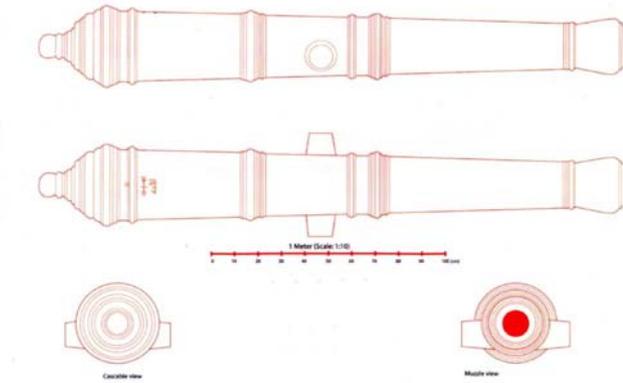


**John Tufton, 2nd Earl of Thanet (1609-64)**  
 whose property included furnaces at Ewhurst and Northiam

## ORDNANCE NEWS

### Tudor cannon at Dartmouth

An English iron gun of 14 cwt 1qr, marked 1577, which may be the date, has been recovered from the seabed off Kingswear Castle, in Devon. Other guns are known to lie on the same site which, from the positions of the guns, appears to be a wreck.



**The Kingswear gun** (*drawing: Sami Abd-Rabbo*)

### Wealden Mortar on Corfu

One of a small number of 18 in. iron mortars cast by 'The Great Ironmonger', Thomas Western, for the Venetian Republic in 1684, and for many years in the Old Fort in Corfu Town, has recently been fitted with a replica bed. Weighing over two tons, it would have been cast at either Ashburnham or Brede Furnace, both of which Western operated at that date. Other examples from the same batch of mortars can be seen on the Thames Embankment by the Tower of London, and at Dover Castle.



**The Corfu mortar**

### NEW MEMBERS

We welcome the following:  
Peter Wallis, Heathfield  
Mr G. C. Child, Lewes

### William Bowen gun in the West Indies

A bronze 3-pounder field gun made by Wealden gun founder, William Bowen (d. 1771), has been noted on South Caicos in the Turks and Caicos Islands, north of the Dominican Republic. Dating from 1756, it would probably have been cast at Bowen's foundry near Marigold Stairs in Southwark, but could also have been made at Barden Furnace, near Tonbridge, where Bowen may also have cast bronze ordnance.

## BREDE HIGH WOOD ARCHAEOLOGY PROJECT

### Trial excavations on the ironworking site

Over two days in March we carried out some trial excavations at the iron working site in Thorp's Wood, helped by some 20 volunteers. Five 1m square test pits were excavated on the site, based on the results of the magnetometry survey carried out earlier in the year. The first two test pits were excavated on areas of high magnetism, and sure enough below the topsoil in both of these test pits a large deposit of iron working slag was found. Further down we found areas of burnt clay, usually an indication of furnace structures or burning. We also found parts of furnace structure, including fragments of the lining and part of a rounded fired-clay brick using to make the wall of the furnace. All the elements of the ironworking process were present including iron ore, roasted ore, and various types of slag (the waste product).

The third test pit also found similar deposits of slag and fired clay. The fourth and fifth test pits did not find any evidence of the ironworking site, but were useful in that they have helped to define the limits of the ironworking area.

Although no definite dating evidence was found, all the indications are that the site belongs to the Roman period. We will return to the ironworking site in 2013 to carry out a large scale excavation, and hopefully will find the iron furnace(s) and other elements of the iron production process.

### Vivienne Blandford



**Thorp's Wood bloomery site**

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**EDITOR'S NOTE**

Thank you for your contributions and please keep them coming. Newsletters are published in March and November each year. Items for publication, normally not exceeding 500 words, should be received by 14 February and 14 October, respectively, for inclusion in the forthcoming issue. Please send by email preferably, by CD or hard copy; I can work with most PC formats. Line drawings and photographs are welcome (colour or monochrome; the newsletter is published in colour but printed in monochrome). Please send them separately, not embedded in the text, and with captions separately. Digital images need to be at least as big as their expected published size (column width 86mm), ideally at 300 dpi or more.

**PUBLICATIONS FOR SALE**

	PRICE	
	BY POST (UK)	AT MEETINGS
<i>British Cast-Iron Firebacks of the 16th to Mid 18th Centuries</i> , J. Hodgkinson (2010)	24.99*	<b>24.99*</b>
<i>The Wealden Iron Industry</i> , Jeremy Hodgkinson (2008)	15.99*	<b>15.99*</b>
<i>Excavations of a Late 16th./Early 17th. C. Gun Casting Furnace at Maynard's Gate, Crowborough, Sussex, 1975-1976</i> , O. Bedwin.	2.00	<b>1.50</b>
<i>A Middle-Saxon Iron Smelting Furnace Site at Millbrook, Ashdown Forest, Sussex</i> , C.F. Tebbutt.	2.00	<b>1.20</b>
<i>The Fieldwalker's Guide and an Introduction to the Iron Industries of the Weald</i> , B.K. Herbert.	4.00	<b>3.50</b>
<i>Metallurgical Analysis of Ferrous Alloy Produced in a Primitive Furnace</i> . R. C. D. Sampson & B. K. Herbert.	5.00	<b>4.00</b>
<i>The Penhurst to Ashburnham leat: a first foray + map</i> (2007)	2.25	<b>1.50</b>
<i>The Penhurst to Ashburnham leat: a second foray + maps</i> (2007)	2.25	<b>2.00</b>
<i>The Penhurst to Ashburnham leat: the flow rate + graphs + map</i> (2007)	3.25	<b>2.50</b>
<i>Fernhurst Furnace</i> . Chichester District Archaeology No. 2, J. Magilton (ed.).	14.00	<b>12.00</b>
<i>Second series Bulletins: -</i>		
Volumes 1 to 21 (1981 to 2001)	2.00	<b>1.50</b>
Volumes 22 to 32 (2002 to 2012)	2.50	<b>2.00</b>
<i>Note:</i> Vols. 5, 10, 15 & 20 have 5-volume cumulative indexes. Vols. 21 onwards are separately indexed		
<i>Index for Wealden Iron</i> , WIRG Bulletin 1st ser. Vols. 1-17 and 2nd ser. 1-20	2.50	<b>2.00</b>

Publications are available from the Publications Officer, Brian Herbert (see Contact List above)  
 Cheques payable to **WIRG** (except where marked\* - payable to J. S. Hodgkinson)