Wealden Iron

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Research Group

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WEALDEN IRON RESEARCH GROUP

Bulletin No. 28 Second series

2008

Contents

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Field Notes

compiled by J. S. Hodgkinson

Ashdown Forest Iron Sites – updated locations

In early 2007 the Conservators of Ashdown Forest commissioned a review of the archaeological sites on the forest, as a result of which over 400 sites have been added to the East Sussex Historic Environment Record (formerly the Sites and Monuments Record). The review consisted of desktop and fieldwork elements, the latter providing an opportunity to revisit a number of sites and pinpoint their locations more accurately using a Global Positioning System (GPS). The following sites, where evidence of iron working has been noted, were visited and their revised locations are given:

a) Kidd's Hill bloomery, Hartfield

Former location: TQ 4576 3231

WIRG, *Wealden Iron*, 1st series **XV** (1979), 9; TQ 4590 3225, WIRG, *Wealden Iron*, 2nd series **17** (1997), 4; Cleere & Crossley, 291.[1]

Revised location: TQ 4578 3230

Slag was detected and observed for 30m along a bank south-west of a marshy area. It extended for 10m downhill from the top of the bank.

b) Ellison's Pond bloomery, Maresfield

Former location: TQ 462288

WIRG, Wealden Iron, 2nd series **1** (1981), 21; Cleere & Crossley, 292.

Revised location: TQ 4614 2895

Slag was discovered as previously described, about 22m north west

of the artificial pond. Slag was detected for about 14m to the west of the path in an area about 5m wide.

c) South of Stonehill car park, Maresfield

Former location: TQ 455286

WIRG, *Wealden Iron*, 1st series **XV** (1979), 9; Cleere & Crossley, 292.

Revised location: TQ 4554 2857

A scatter of bloomery slag was noted on the track.

d) Misbourne Romano-British bloomery, Maresfield

Former location: TQ 4580 2845

WIRG, *Wealden Iron*, 2nd series **18** (1998), 2; WIRG, *Wealden Iron*, 2nd series **21** (2001), 2; Cleere & Crossley, 292.

Revised location: TQ 4573 2846

Site as described in 2001.

e) Airman's Grave bloomery 1, Maresfield

Former location: TQ 4575 2760

WIRG, *Wealden Iron*, 2nd series **18** (1998), 2; Cleere & Crossley, 292.

Revised location: TQ 4578 2757

Slag covering about 100m^2 is in, and to the north of, the steep path leading down to two small footbridges across the Misbourne stream.

f) Airman's Grave bloomery 2, Maresfield

Former location: TQ 457273

Cleere & Crossley, 292.

Revised location: TQ 4581 2748

Slag covering about 140m^2 lies on a spur in a bend of the Misbourne stream about 50m north of a ford.

g) Glenmore Road, Withyham

Former location: TQ 502313

Cleere & Crossley, 294.
Revised location: TQ 5030 3134
A scatter of bloomery slag was detected on the track.

h) Buckhurst Stream 1, Buxted

Former location: TQ 486292
WIRG, *Wealden Iron*, 1st series **III** (1972), 11; Cleere & Crossley, 289.
Revised location: TQ 4865 2929
A scatter of bloomery slag was observed on the track.

A bloomery in Battle, East Sussex

A bloomery has been discovered at TQ 7155 1825, in Toll Wood, part of Netherfield Place Farm. We are grateful to Kevin and Lynn Cornwell, of the Hastings Area Archaeological Research Group (HAARG) for informing us of their discovery.

A bloomery in Ashburnham, East Sussex

A bloomery has been discovered at TQ 676139, south of Brays Hill, on Kitchenham Farm. It lies adjacent to a large depression or pit said to have been associated with the extraction of iron ore. We are grateful to Kevin and Lynn Cornwell, of HAARG, for informing us of their discovery.

A bloomery in Catsfield, East Sussex

A bloomery has been discovered at TQ 744132, in a field east of Pepperingeye Lane, between Forewood Cottages and the Forewood Pumping Station. We are grateful to Kevin and Lynn Cornwell, of HAARG, for informing us of their discovery.

Two bloomeries in Hartfield, East Sussex

Two bloomery sites have been discovered on the east bank of the stream which runs south towards the Kent Water, west of Cullinghurst Farm, in Hartfield parish. The first, which lies at

TQ 4719 3929 on a sloping hillside above the stream, covers an approximately circular area of about 80m^2. Pieces of tap slag up to 100mm across were found in the top soil.

The second site, at TQ 4718 3922, occupies a similar position in relation to the stream, covering an elliptical area of about 60m^2. Again, pieces of tap slag were recovered from the top soil. Both sites lie on Ashdown Sand.

A light scatter of slag was found in the bed of a small gill at TQ 4723 3934, but there was no evidence of a concentration. It may have been washed down from an as yet undiscovered site further uphill to the east.

At the head of the stream, adjacent to the A264, Tunbridge Wells-East Grinstead road, where Wadhurst Clay lies above the Ashdown Sand, a small number of minepits were noted, as was a large opencast working up to 300m in length, about 75m wide and about 3m deep. This may represent the reworking of ground previously dug over for iron ore extraction. A smaller, corresponding area of working can be seen in Broomland Wood, immediately opposite, on the south side of the A264 road.

A bloomery in Beckley, East Sussex

Jonathan Prus

This site is located in Blackland Wood, centred on TQ 8527 2171, on the north bank of the stream (marked further downstream as Eggshole Brook on the OS map) and stretches for about 130 metres from TQ 8527 2171 to TQ 8515 2168 in a band typically 3 to 5 metres wide (but extending to about 20 metres at one point) along the top of the bank. This possibly represents a number of small bloomery furnaces. The site was found by metal detection. Three test pits showed that the magnetic response was due to iron working debris, mainly slag and roasted ore. This debris is in a matrix of red soil while the surrounding soil is typically grey or grey-yellow. Unlike the Timber Wood 2 site (TQ 8541 2172, 140 metres downstream) there is

no sign of slag on the surface, or of blackened soil.

A bloomery site in Brede, East Sussex

Jonathan Prus

This site, in Thorp's Wood, is at the confluence of a small stream flowing north and a larger stream flowing east to Powdermill reservoir. A slag heap, perhaps 700 mm deep, is eroding into the smaller stream. The slag is in large lumps. There is an abundance of large lumps of slag downstream for several hundred metres. There is also slag upstream to the west, in the larger stream, suggesting the possible presence of further bloomeries. The opposite bank of the larger stream has extensive charcoal burning areas and areas of red soil with strong magnetic response. At TQ 7832 2034 (±100 metres from the verified slag heap) a large block of material, provisionally identified as furnace wall, was recovered from the stream bed. No slag was found in the stream above this point.

Two bloomery sites in Heathfield & Waldron, East Sussex

Two concentrations of bloomery tap slag have been discovered in a field just south of Oxpasture Wood, formerly part of Possingworth Park. The first site is centred on TQ 5402 2042, where the slag area, measuring about 40m by 20m, lies adjacent to a small stream. The second site lies close to the south west edge of the wood and is centred on TQ 5406 2053. The slag area measures about 35m by 15m. In both cases, slag has been spread by ploughing, but distinctly darkened soil is noticeable where the slag is most concentrated. We are grateful to Jill Watson for notifying us of these sites.

A bloomery in Danehill, East Sussex

A concentration of bloomery slag has been found along the Ann Brook, centred on TQ 4262 2791. Pieces of slag, including tap slag, were noted in the stream, extending for a distance of about 30m on the west bank and 3m into the adjacent field.

Further to the north there is a widespread scatter of bloomery slag centred on TQ 4267 2804, on a spur of ground between two streams, tributaries of the Ann Brook, including some lumps greater than fist size which were noted in the western stream.

Notes and References

1. H. Cleere & D. Crossley, 1995, *The Iron Industry of the Weald* (Cardiff, Merton Priory Press).

Iron-Smelting in Kamalia

Robin Fox

When reading about the Scottish Enlightenment I came upon the following first-hand description of iron-smelting in the late eighteenth century.

> "… the owner and his workmen made no secret about the manner of conducting the operation, and readily allowed me to examine the furnace, and assist them in breaking the ironstone. The furnace was a circular tower of clay, about ten feet high and three in diameter, surrounded in two places with withes, to prevent the clay from cracking and falling to pieces by the violence of the heat. Round the lower part, on a level with the ground (but not so low as the bottom of the furnace, which was somewhat concave), were made seven openings into every one of which were placed three tubes of clay, and the openings again plastered up in such a manner that no air could enter the furnace but through the tubes, by the opening and shutting of which they regulated the fire. These tubes were formed by plastering a mixture of clay and grass round a smooth roller of wood, which, as soon the clay began to harden, was withdrawn, and the tube left to dry in the sun. The ironstone which I saw was very heavy, and of a dull red colour, with greyish specks; it was broken into pieces about the size of a hen's egg. A bundle of dry wood was first put into the furnace and covered with a considerable quantity of charcoal, which was brought ready burnt from the woods. Over this was laid a stratum of ironstone, and then another of charcoal, and so on, until the furnace was quite full. The fire was applied through one of the tubes, and blown for some time with bellows made of goats' skins. The operation went on very slowly at first, and it was some hours before the flame appeared above the furnace; but after this it burned with great violence all the first night, and the people who attended put in at times more charcoal. On the day following the fire was not so fierce, and on the second night some of the tubes were withdrawn, and the air allowed to have freer access to the furnace; but the heat was still very great, and a bluish flame rose some feet above the top of the furnace. On the third day from the commencement of the

operation all the tubes were taken out, the ends of many of them being vitrified with the heat; but the metal was not removed until some days afterwards, when the whole was perfectly cool. Part of the furnace was then taken down and the iron appeared in the form of a large irregular mass, with pieces of charcoal adhering to it. It was sonorous; and when any portion was broken off, the fracture exhibited a granulated appearance, like broken steel. The owner informed me that many parts of this cake were useless, but there was good iron enough to repay him for his trouble. This iron, or rather steel, is formed into various instruments, by being repeatedly heated in a forge…".

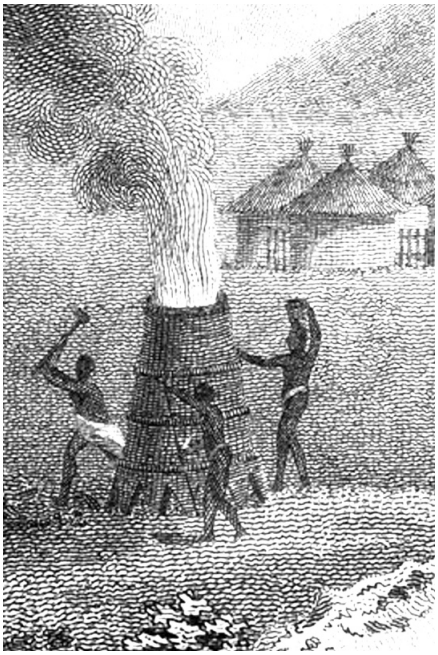

Figure 1: A view of Kamalia in Mandingo country (detail)

The writer was Mungo Park, a young Scottish surgeon/botanist, returning in 1796 from his first West African journey to determine the course of the River Niger. It was in Kamalia (close to Bamako, the modern capital of Mali) that he observed the iron-smelting operation, and the above passage is probably the first such description by a European. The published account[1] includes an etching of the scene, based on his drawing (Fig 1). On the journey eastwards from the Gambia River, Park had suffered many privations, losing most of his supplies and experiencing a gruelling period of captivity by Moors; coming upon the Niger near Ségou (Fig 2) he was too exhausted and ill-equipped to continue downriver. On the homeward journey, illness obliged him to halt for seven months in Kamalia where he occupied himself in studying the activities of the people – not just their commercial operations such as work with iron and gold but also their customs such as music-making,

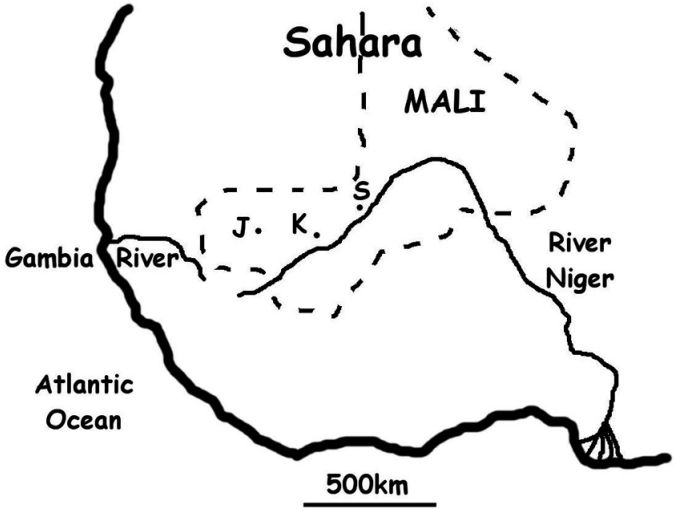

Figure 2: Map of West Africa with locations mentioned in text. Boundaries of modern Mali shown for orientation. J=Jeningalla; K=Kamalia; S=Ségou

religion, and the various modes of slavery. Park's urge to observe and record probably owed much to his exposure, as an Edinburgh student, to the ideas of the Scottish Enlightenment. Ten years later he made another expedition to Ségou, with the intention of mapping the Niger to its mouth, but perished by drowning some 5000 km downstream. His diary of the journey to Ségou records a halt at Jeningalla, where he examined and sketched another smelting furnace, similar to that at Kamalia but smaller at the top (Fig 3).

In 1796 iron-smelting had long since disappeared from the coastal region of West Africa, where the industry had succumbed to cheap imports of bar iron from Europe. In Kamalia, however, Park tells us that "… the natives smelt this useful metal in such quantities, as not only to supply themselves from it with all necessary weapons and instruments, but even to make it an article of commerce with some of the neighbouring states." Was this smelting operation typical of the region?

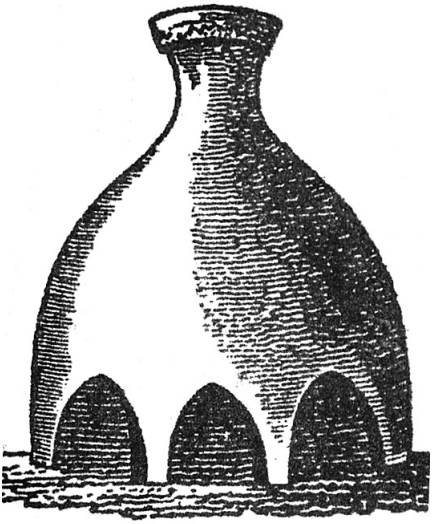

Figure 3: Furnace sketched by Park at Jeningalla in 1805. From ref 1

Archaeological evidence points to the existence of such natural-draught furnaces in West Africa from around 1000-1200AD,[2,3] and they could be seen in action well into the twentieth century: on the Dogon plateau of Mali, a high-shaft furnace, dating from Park's time and functioning until up to 1960, was rebuilt for the smelting film Inagina.[4] But, in sub-Saharan Africa as a whole, low-shaft and bowl furnaces (both requiring continuous use of bellows) were much more common.[2]

When did the iron age begin in sub-Saharan Africa? There is little doubt that smelting was underway from early in the first millennium BC, and some commentators make a case for its independent discovery in Africa. An alternative (and more persuasive) notion is that the technologies arrived by diffusion from the north – across the Sahara and down the Nile Valley.[5] In the Mediterranean civilisations, including those of Egypt and Carthage, iron smelting had been brought from Anatolia or the Caucasus. A more answerable question is whether, once established in sub-Saharan Africa, bloomeries evolved in specifically African ways. Here attention has focused on three features identified in archaeological and other work – the employment of long tuyères that might have increased furnace efficiency by preheating air before it reached the heart of the furnace (thus anticipating a British patent of 1828); the production of steel; and the use of high-shaft furnaces that functioned with natural draught rather than bellows.[2] Two of these features are illustrated by Park's Kamalia furnace, which required bellows only at the start of the smelt and yielded a bloom containing steel; he does not

tell us whether the tuyères projected into the chamber. Sceptics point out that the incidental production of high-carbon iron in a bloomery is not remarkable, and that the efficacy of preheating by the tuyère method remains hypothetical. The tall natural-draught furnace is a much stronger candidate for an 'African' technology, since this method does not seem to have been used in Mediterranean countries.[2]

Even though cheap imports of bar iron were making an impact in West Africa from the early 1600s, traditional smelting was still practised three centuries later. One possible reason, suggested by Pole,[6] is that imported iron was inferior to local iron for certain purposes. Also, iron-smelting had strong ritual significance, with reproductive overtones (illustrated by the presence of breast-like embellishments on some surviving structures). Finally, imported bar iron came to acquire the status of a hard currency: thus, a subsistence farmer in need of a new hoe, and with ready access to ore, wood, and clay, might reasonably prefer the blacksmith to work with a local product. The survival of multiple types of smelting furnace, even within close proximity, suggests that economic efficiency was far from being the only consideration.

Notes and References

1. Park M., 1816, *Travels in the interior districts of Africa: performed in the years 1795, 1796, and 1797: with an account of a subsequent mission to that country in 1805* (London, John Murray).
2. Kense, F. J., 1985, 'The initial diffusion of iron to Africa', in Shinnie, P. & Haaland, R. (eds.), *African iron working, ancient and traditional* (Bergen, Norwegian University Press), 11-27
3. Robion-Brunner, C., Perret, S., Serneels, V., Dembele, A., & Huysecom, E., *A thousand years of iron metallurgy on the Dogon plateau (Mali)*, http://cohesion.rice.edu/CentersAndInst/SAFA/emplibrary/ Robionetal,C.SAfA2006.pdf (accessed 10 June 2008)
4. Inagina. http://anthro.unige.ch/galerie/inagina/film.gb.html (accessed 10 June 2008)
5. Alpern, S. B., 2005, 'Did they or didn't they invent it? Iron in sub-Saharan Africa', *History in Africa*, 32, 41-94
6. Pole, L. M., 1985, 'Furnace design and the smelting operation: a survey of written reports of iron smelting in West Africa', in Shinnie, P. & Haaland, R., (eds.), *African iron working, ancient and traditional* (Bergen, Norwegian University Press), 142-63.

Thirteenth-Century Ploughshares

Tim Cornish

The Custumals of the Archbishop's Manors in Sussex, with an estimated date of 1285, set out what the Archbishop's tenants owed him as rent for the land which they occupied. Archbishop Pecham, a local Sussex man, probably educated at Lewes Priory, wished to set down what the customs of past payment had been. He was attempting to reverse the dire financial circumstances of his see.[1]

Some of the payments demanded that ploughshares be provided at Christmas, and it is clear that these were made locally. The Deanery of South Malling, which stretched in a sausage-shaped strip of land from Lewes to the Kent border, was divided in half. The southern half was described as 'without the wood' where sheep-rearing and arable land dominated. The northern half, 'within the wood' comprised Wadhurst, Mayfield, Greenhurst, Framfield and Uckfield and it is here that the iron industry appears to have been concentrated. Framfield, with inhabitants called Robert le Stel and Jordan le Colyer, had to provide ten ploughshares annually, whilst Mayfield had to provide ten and a half (it is not clear how half a ploughshare can be produced). Both places had smithies and Mayfield's entry includes payment of one penny and three farthings to William Strymund 'for helping to make a ploughshare'.

Framfield was an ancient settlement which features in the Domesday Book. Mayfield, however, was a new settlement, probably founded by Archbishop Boniface of Savoy in 1260. This 1285 Custumal gives no indication that there is a village, nor any common field strips nor even a mill. All the corn was transported to South Malling 15 miles away. In fact the scattered community was entirely subservient to South Malling, where they had to take over 180 cartloads of firewood each year, roofing and fencing materials and pigs and hens. And yet, at this early stage in its development, Mayfield clearly had some sort of iron

industry, which provided ploughs for the Archbishop's arable fields nearer the coast. I estimate that the Sussex tenants provided annually 57½ ploughshares for their Lord. It can be guessed that these artefacts had a short life. With one exception, these ploughshares had to be provided at Christmas, probably a time chosen for the convenience of the Archbishop's use of them rather than to help the producers.

At Slindon near Chichester, the entry gives an opaque reference to the production process: 'They say also that the smith holds ½ virgate for which he shall make the ironwork of the lord's iron and steel for two plough teams…and further he shall not take money for fitting a new share to its beam or for splitting a lump of steel (*pro massa asser' findenda*) although he used to receive it wrongly through the reeve's ignorance'.[2]

Some of the providers of ploughs in West Sussex had connections 'within the wood' where they may have been made. John Marescal was the Archbishop's forester, who had to employ two men, one within the wood and the other in the Broyle, north of Ringmer. In Tangmere he held 'two acres for which he shall make ironwork (*ferramenta*) for the lord's two ploughs of the lord's iron and steel. When he puts iron on the ploughshare he shall have ½d. He shall shoe the lord's own stots [horses] with his own shoes and nails and when he has used 26 shoes for them he shall have 6d from the lord.'

And Thomas le Waleys owed two ploughshares at Tarring. His family were tenants of the Hawksden estate near Mayfield, which much later developed a forge. In the entry for Wellingham (north west of Ringmer) a price of 5s. 2½d. is put on a ploughshare. This is the equivalent of the annual rent for about 62 acres of land 'within the wood' where the desperately poor inhabitants needed all the income they could get. Iron was their only rich natural resource.

Notes and References

1. This Latin document, in the Canterbury Cathedral Archives, has been translated and published by Sussex Records Society in 1958 (Vol 57).
2. The SRS note says, 'Mr Kenyon suggests that this refers to breaking up a bloom'.

Three Examples of Blast Furnace Dross

their possible origins and uses

J. S. Hodgkinson

In recent years a small number of examples of waste material from blast furnaces has come to light. We are all familiar with blast furnace slag, which was produced in abundance from well over 100 furnaces throughout the Weald and which is ubiquitous on Wealden tracks and in field gateways. Apart from a statutory duty to place slag in the highway, ironmasters were probably all too eager for anyone with a need for hardcore to remove slag from ironworking sites. However, slag was not the only by-product of furnaces to find its way into the countryside. Three large masses of iron have come to notice, all of which appear to have been discarded when the furnace they came from was having its hearth rebuilt between campaigns, when a furnace had been 'blown out' and before it was 'blown in' again.

Two of these masses are quite similar (Figs. 1 & 2). Both irregularly shaped, they are each pierced by a near-circular hole, and a greater proportion of the iron/slag matrix from which they are composed lies on one side of the hole. It is by no means clear how they should be orientated, their unmeasured weight making them difficult to manoeuvre. Opinions received seem to suggest that they are examples of scaffolding, that is furnace contents which adhered to the internal walls of a furnace, possibly through an insufficiently high temperature being achieved during smelting, and forming particularly around the tuyère, hence the hole. John Fuller remarked on the problems these masses could cause:

> The Recrements which Hang about the Tweier, must be carefully shooke of with a Ringer, and the Hole kept open, for if they doe not

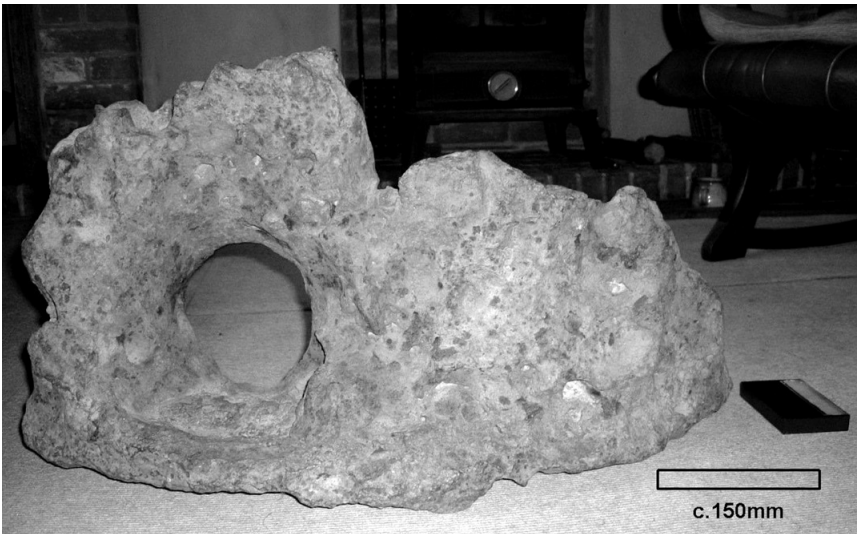

Figure 1: Iron mass from near Beckley Furnace, East Sussex

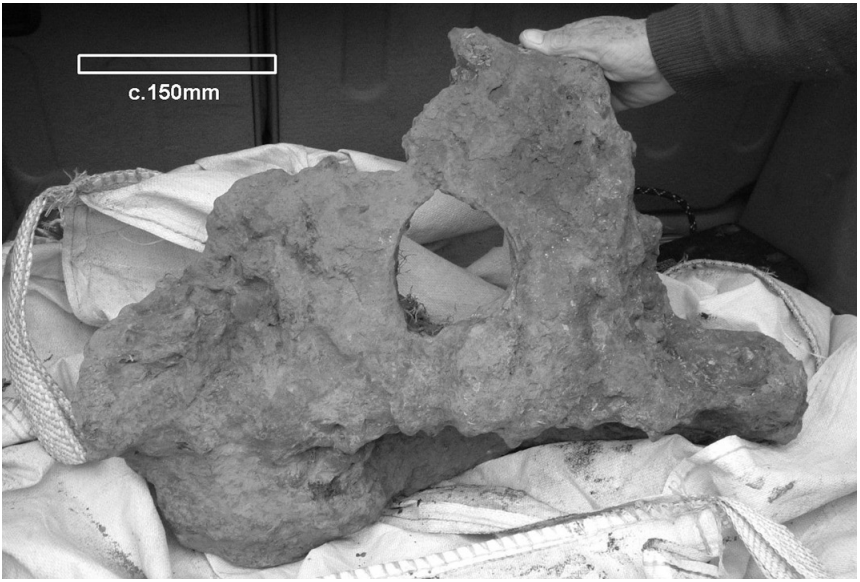

Figure 2: Iron mass from near Mayfield furnace, East Sussex

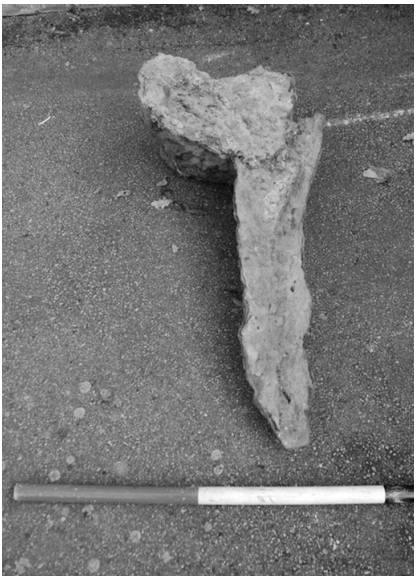

Figure 3:
Forehearth contents and runner from Maresfield, East Sussex

Figure 4:
Illustration showing the flow of iron from the forehearth past the damstone, along a runner into the pig bed (from Diderot & Alembert, Encyclopédie, 1762)

> take Especial care of this, the Hole will easily stop up, and the whole Heat of the fire extinguished.[1]

The larger of the two discovered was found in woods not far from Beckley Furnace, while the smaller came from near Mayfield Furnace.

A third mass is altogether different from the other two (Fig. 3). Found in a hedgerow between Langleys and Marshalls furnaces, in Maresfield, this appears to be the remnants of the contents of the forehearth of a furnace with a frozen runner issuing from it. The forehearth was an extension of the hearth which protruded into the casting arch.[2] Iron in the forehearth could be ladled out into moulds to make small castings such as cannon balls. When the forehearth was full, and the slag floating on the iron had been tapped, the corner of the damstone, which formed the front of the hearth, could be breached to allow a stream of molten iron to flow into long trough-shaped depressions to form sows, pigs and other castings (Fig. 4). At the end of a campaign, when the furnace was being 'blown out', the iron and slag in the hearth would become viscous and flow increasingly slowly. As the last of the iron ran towards the casting bed it would freeze to remain in its last position. During reconstruction of the hearth, this mass would have to be levered out and discarded, together with the bear that had formed in the main part of the hearth, and any material, such as the masses mentioned above, that were adhering to the inner walls of the furnace. Assuming this mass of iron/slag came from one of the furnaces nearby, it may represent a unique relic of 16th or 17th century iron smelting. It will be deposited with the Sussex Archaeological Society.

It is not without significance that none of these masses of iron was found on an actual ironworking site. Their great weight probably made them useful to farmers in a landscape where large blocks of stone were not easily come by. Heavy masses would have been useful for tethering animals such as bulls, propping open gates or as counterweights for simple lifting mechanisms.[3] Bears, on the other

hand, were generally too cumbersome to be moved far, although an interesting exception is the garden at Tanner's Manor, Waldron, former home of the Fuller family of ironmasters, where, on the occasion of the visit by WIRG members in 1999, it was noted that several of the larger flower beds featured a bear centrally placed as a design feature.

Notes and References

1. R. V. Saville, 1980, The operation of charcoal blast furnaces in Sussex in the early Eighteenth Century', *Historical Metallurgy*, **14**, 2, 72. A ringer was a long metal rod, or crowbar.
2. See R. G. Houghton, 2006, 'The construction of a Wealden blast furnace', WIRG, *Wealden Iron*, 2nd series **26** (2006), 22
3. J. Collett, pers. comm.

Two Additions to the Catalogue of Early Cast-Iron Graveslabs[1]

J. S. Hodgkinson

Maidstone Museum, St Faith's Street, Maidstone, Kent TQ 7556

Undated, c.1600-35, Great Hall fireplace; 66.5 x 116cm.

Plain slab with two shields of the Fowle family – a lion passant guardant between three roses – cast from an identical stamp to those used on a fireback at Hastings Museum, a graveslab in Wadhurst church,[2] and to those reported on a graveslab in Frant church.[3] At the lower end of the slab is a small rectangular stamp showing the crest of the Fowle family – out of a ducal coronet Or, an arm embowed in armour proper, garnished Or, holding in the hand proper, a battleaxe Or[4] – beneath which are initials which appear to be WF. The stamp is similar, but not identical, to the rectangular stamps on the Wadhurst slab.
From its dimensions, this graveslab could have been for a child, or perhaps a pair of children. It is not known from whence it came to the museum.

Mark Ripley Ltd, High Street, Robertsbridge, East Sussex TQ 7323

1688, JOHN BAKER, 76 x 167cm

HERE LYETH THE BODY OF
JOHN BAKER LATE OF
STONELANDS ESQ TO WHOSE
MEMORY THIS MONUMENT OF
…. ….WAS ERECTED
…..… 11[?]TH 1688 IN
…. …. …. HIS AGE &
…. …. …. SEVEN
…. ….[5]

Rectangular plate with bevelled edges; incised Roman capitals; above is

a shield bearing the arms of Baker – a castle between three keys palewise – cast in bas relief within a circular border. It seems likely that this graveslab was formerly on an altar tomb in Mayfield churchyard. A marble monument to John Baker is on the south-east wall of the chancel inside Mayfield church. Two iron memorial plates to children of John Baker lie covered by the south stalls of the chancel.[6]

Notes and References

1. Willatts, R. M., 1988, 'Pre-Industrial Revolution Cast Iron Graveslabs', WIRG, *Wealden Iron*, 2nd series **8** (1998), 12-47; op. cit., 2nd series **9** (1989), 9; 2nd series **14** (1994), 28-9; 2nd series **22** (2002), 22-3.
2. Willatts, 1988, 34, no. 3.
3. ibid., 23, no. 2.
4. J. F. Huxford, 1982, *Arms of Sussex Families* (Phillimore, Chichester), 129, 422.
5. I am grateful to Kay Ripley for showing me her painstaking decipherment of the inscription on this graveslab.
6. Willatts, 1988, 25-6, nos. 2 & 3. I am grateful to Anne Dalton for giving me access to the Wealden Decorative and Fine Art Society Church Recorders' Record of the Furnishings of St Dunstan's Church, Mayfield, East Sussex, wherein are recorded the details of the monument to John Baker.

John Browne, Gunfounder to the Stuarts – Part 3

Ruth Brown

Guns for the New Navy

A week following Browne's restoration to his position in January 1646, the Commissioners of Navy were ordered to study 'the propositions made … by John Browne, senior, gunfounder, for the furnishing of ordnance for the three frigates … and do confer with him about the same and certify this committee their opinion whether the prices he proposed or what other are fit to be given for their pieces'.[1] Some changes were made to the armaments, with different calibres of guns agreed to. Some months later, in May, a number of ordnance officials went to Snodland and Milhall to view, proof and weigh the guns.[2] The debenture dated 8 June 1646 is for 34 culverin drakes at £30 per ton and 52 light demi-culverins of fine metal at £50 per ton, amounting in all to £2,218 2s 3½d.[3]

This order is an important indication of a major change in the iron industry, being one of the first large orders for complete sets of iron guns for State ships. Unlike the experimental armaments for the Whelps of 20 years before, this was not to be a dead-end but a sign of the future, with the Navy accepting the rightness of replacing bronze guns on the larger ships in the Navy with iron guns, a policy which would play an important part in the English success in the First Dutch war in the next decade. But this new policy would also play an important part in the future of Browne's business and the development of the Wealden iron industry in general.

Apart from this important order, the conflict used up quantities of shot which needed regularly replacing.[4] Parcels of shot were

delivered for the campaigns around Britain, for Hull, and Weymouth for Guernsey.[5]

The following year, more sets of guns were required, this time for four frigates: *Dragon, Elizabeth, Phenix,* and *Tyger*. Through the summer, the Ordnance kept an eye on progress, with the Ordnance messenger visiting the furnace in July. William Billers, Clerk of Deliveries, went to Snodland to check the readiness of the ordnance for the new frigates, while John White, Clerk of the Ordnance, saw Mr Browne at Spelmonden to give orders for the proving of guns at the beginning of September.[6] The officials came to Snodland to supervise the proofs and weighing of the guns in September, October and November 1647, bringing with them barrels of powder and round shot.[7]

Despite the dates of proof, the debenture for the guns is dated 17 September 1647. It lists the ordnance by ship, each having 10 culverin drakes, 14 demi-culverin drakes and 6 saker drakes, all described as of fine metal at 30s the cwt. In addition Browne supplied round shot from demi-cannon to falcon, cross-barred shot from demi-cannon to minion, 49 cwt of burr shot and over 800 hand grenades. The complete debenture came to £5,608 16s 7¼d.[8]

This must have been a difficult year; John Browne junior died in July, leaving a widow and two young children. As we have seen earlier, John senior had depended on his eldest son to oversee the works in Kent and this sudden death – he left no will – must have involved reorganization of the works. Of Browne's other sons, Thomas, a doctor, disappointed his father by becoming a catholic, while his youngest boy, George, seemed more interested in becoming a gentleman than an ironmaster. A few days after the last proof, the 20-year-old George was married to Anne Dobell, a Sussex heiress. John Browne himself remarried, to the widowed Elizabeth Littleton. It is likely that over this period John was becoming more dependent on his son-in-law Thomas Foley, an experienced ironmaster.

The Navy's orders for 1648 were much smaller than in recent years; iron guns for six shallops for the defence of Guernsey. The debenture for 10 May 1648 is for eight sakers cutts and eight minion cutts, both at 17s 6d per cwt, and eight 3-pounders and twelve falcon drakes, both these at 30s per cwt. The complete bill for the 36 guns only came to £192 4s 11¼d. The size of the bill for these small, lighter guns, compared with the earlier debentures, demonstrated how lucrative the contracts for the larger, heavier guns were.[9] In addition shot was ordered for the defences of Plymouth, Poole and Brownsea Island.[10]

The resumption of war following the execution of King Charles on 30 January 1649 necessitated an increase in military and naval expenditure. In 1649 another series of guns were required for the Navy, 82 iron guns for new ships. The debenture has not survived, but we have the bill of William Franklyn, the proofmaster, which indicates that he proofed 82 iron guns at Gun Fields for the Summer fleet in April 1649. This included 26 demi-culverin drakes, eight demi-culverin cutts, 14 saker drakes, 12 minion drakes, six saker cutts, six minion cutts and ten 3-pounders.[11]

Speeding the pace of ship building

Later in 1649 it was decided to quicken the shipbuilding programme. In September 1649 the Council of State approved of Browne's furnishing ordnance for five new frigates.[12] He was to get an advance of £3000.[13] Again, the lack of Ordnance records makes it difficult to follow the sequence of events, but these appear to be the guns which feature in a debenture a year later in November 1650.

Early in January 1650 the Council of State wrote to 'Mr Browne the gunfounder', to get the guns ready for the *Swiftsure*. The Navy Committee was to give him assignation upon the excise of salt, according to his own proposal.[14] A week later they were considering the next contracts and the Ordnance Committee were sanctioned to 'contract with Mr Browne the gunfounder for ordnance for the winter fleet for next year'.[15] The payments from the salt excise were

continued; the date for the guns' delivery was fixed for August, and price was set at 30s per cwt.[16]

The guns for the *Swiftsure* were finally accepted in April 1650; they were all demi-cannons, one of the heaviest calibre guns of the period. They consisted of twelve demi-cannons of 8 feet length; four demi-cannon drakes of 8½ feet, two demi-cannon drakes of 10½ feet and two demi-cannon drakes of 8 feet. At £30 per ton the whole order came to £1,077 14s 2d.[17]

However there was a problem looming. The Council of State ordered the Officers of the Ordnance to bring in Mr Browne the gunfounder or his deputy in June 1650, to explain the state of the guns ordered for the *Fairfax*.[18] The guns had already been proved in May and there was concern why they had not been finished and sent up. No payments for the *Fairfax* guns seem to have survived, but being one of the Great Ships, they were almost certainly of bronze.[19] Browne himself attended the Admiralty to explain the delays.[20]

The debenture for iron ordnance for six new frigates: *Foresight, Assurance, Pelican, Advice, Centurion,* and *Reserve*, is dated 30 September 1650. These consisted of twelve culverin drakes of 9½ feet; 104 culverin drakes of 8 feet, twelve demi-culverin drakes of 8½ feet, 16 demi-culverin of 8 feet and 36 saker drakes of 8 feet. Again the price was 30s the cwt and the total came to £6,422 17s ½d.[21]

The contract from October 1649 was fulfilled by 14 November 1650. This was a huge undertaking. The debenture is for 40 demi-cannon drakes of 9 feet; six demi-cannon drakes of 8½ feet; eight culverins drakes of 10 feet; 24 culverins of 8 feet; 38 demi-culverins drakes of 8½ feet; 50 demi-culverins of 8 feet and 34 sakers of 8 feet. These guns cost £30 per ton. In addition he cast bronze guns at £27; they were cheaper, as the government supplied old guns to be recast and Browne was only paid for this work. These included four heavy culverins of 11 feet; six culverins of 10 feet; four demi-culverins of 10 feet; six demi-culverins of 9½ feet and four demi-culverins of 8 feet.

Browne was also paid for cutting the arms of the Commonwealth on 229 brass and iron ordnance, as well as casting ammunition of different sorts, In all, the bill came to £12,179 12s 9¼d.[22] The warrant for payment was granted by the Admiralty on the 23 November.[23] It seems likely the bronze guns were the missing armaments for the *Fairfax*.

Commonwealth Army

The renewed hostilities also involved the armies, and Browne, and to a lesser extent, Richard Pitt, the sickly son of Thomas Pitt, was involved in casting guns for the land service. Earlier conflicts had involved batteries of small calibre drakes, but there was a change to larger, longer guns and a number of mortars for the field. In March 1650 contracts were drawn up with the two founders to cast new pieces for the artillery train from 22 tons of old ordnance.[24] This was approved by the Council of State.[25] By mid-April the Council of State was bidding the gunfounders to make 'all possible haste with guns of the train now in hand'.[26] Browne's debenture dated 30 May 1650 is for six brass sakers and six minions for the train of artillery, at the manufacturing price of £27 per ton, costing £291 8s 10d.[27]

At the same time three tons of brass metal was delivered to both founders, for making mortars.[28] Browne's debenture for his two bronze mortars, one of 14 inch, the other of 12 inch, is dated 13 September. The technical difficulties were recognized by the charge of the very high price of 44s per cwt.[29]

The last year

In the autumn of 1650 Browne was as busy as ever. The Ordnance Committee was ordering more brass guns: two mortars, one whole cannon, two demi-cannon and two culverins.[30] Unserviceable ordnance was sent down to Kent from Tower Wharf in October.[31] In addition, following a campaign to move brass guns from fortifications around the country on to ships, Browne was contracted to cast 100

iron guns to replace them.[32] Late in November he was contracted to cast ten pieces of battery – six cannon and four demi-cannon.[33] As usual Browne was keen on the details of the payments; The Council of State ordered that his proposals for casting the 100 pieces of iron and ten brass ordnance were approved. He would be supplied with the metal, and paid £20 per ton for the iron guns, and £27 6s a ton for the brass. £1000 was to be paid within a month, £500 on the delivery of the first guns; one half of the remainder on delivery of the whole, and the remainder three months after. The Ordnance officers would give him the dimensions of the 100 iron pieces and the lengths for the brass pieces.[34]

In addition there were more orders for mortars and shells: three mortars were cast at 44s per cwt: also 18½ inch, 16½ inch, 15½ inch and shells to go with them. The original contract was dated 11 October and the debenture was dated 30 December 1650.[35] Another set of mortars was ordered in January 1651; the debenture for them is dated 31 May 1651. Again it was for three mortars: two at 18½ inches, one of 16½ inches.[36] The total bills for the six mortars and shells came to over £4,250. These were presumably needed for the sieges which attended the Royalists' resurgence in Scotland and Ireland.

Ending the Browne monopoly

In the last years, John Browne was earning unprecedented sums of money from his government orders, although it was not always paid quickly. Thus it may not be coincidental that at this time the Ordnance Committee were investigating other suppliers of iron ordnance. The Brownes' monopoly of supplying cast-iron guns for the State had lasted for over 50 years; on the other hand the Ordnance had always dealt with more than one supplier of bronze guns. Now that more and more cast iron was needed at a time when the royalists were attempting to restore the Stuarts to the throne, it was only sensible to apply the same approach, and to look for

a second supplier of cast-iron guns, one whose loyalty had never been in doubt. Moreover, dealing with only one founder must have restricted the amount of guns cast, and consequently the growth of the Navy. Finding other founders was not easy; years of the Brownes' actions in defending their position and, more recently, the dislocation caused by the Civil War had led to a situation where there seemed to be few competitors.

However the Council of State began their search and in November 1650 first asked the 'Ordnance Committee to send for Mr Cheeke and speak with him concerning the bringing in of sufficient security to the committee for performing such contracts as he has or shall make with them'. In addition they were authorized to make a contract with Mr Browne for iron ordnance.[37] Not unexpectedly when Browne realized what was happening, he protested vigorously, while stating he was only motivated by 'his desires to do his utmost to secure the commonwealth'. The situation was made worse by Robert Cheeke, who had formerly worked for Browne and had been one of the witnesses against him in Parliament's investigation.

One of Browne's arguments was that the government did not understand how the iron industry worked, pointing out that he had only a short time left to buy enough wood and if this was missed, it would be difficult to fulfil orders in time. He also pointed out that their government policies would disable him from doing 'that service which, for speed and serviceableness, cannot be performed by any other artist within their dominions, but by the petitioner and his sons and their agents'.

He moved on to make his objections concerning Cheeke, whom he described as a 'menial servant and clerk', dismissed because of his 'ungodly conversation'. Browne pointed out that Cheeke had 'neither the skill, stock, nor credit to carry on the whole work'. He was particularly angry that while Browne had tight time-restrictions placed on – he proudly reminded them of how he had 'cast three great mortar pieces and 300 grenades … in 6 weeks' – Cheeke had

no time restrictions placed on him at all.

Browne then went on to list the advantages of the old system, how it was much more important to have certainty of supply than a cheap price; that he could not afford to do the work more cheaply and would be unable to carry on, leaving no-one to continue the work and difficult to re-assemble his workforce. He also pointed out that bringing another person into the trade would lead to them competing to keep the workforce, which would drive up wages and ultimately the price, and that Cheeke had already enticed away some of Browne's workmen, and if he removed more, Browne would not be able to carry on the State's business. Browne finished with a ringing endorsement of his own work: 'Having thus fully stated the business, and the evil consequences that will follow if I have not the whole employment, as no other man has ever done the like for goodness, greatness and expedition is in any nation, I hope I shall be excused, having given timely notice thereof, if any disasters shall ensue: to that purpose I desire an entry here be made." Of course he was not quite finished, asking that the debts the late King had accumulated should be paid him, and stating his charges were £4000 a year 'for rent, repairs, wages, and use of money'. He threatened to withdraw from the business – 'I must give over this chargeable employment and change my cause in my old age, which may be very advantageous to me in the best things, but dangerous if I understand anything to the Commonwealth. Yet if this committee shall hold it better service to Parliament to give long time for their commodities so that they shall have them cheaper, upon taking away my stock, and lessening the number of workmen, I will sell as cheap in any man'.[38]

In March the Council of State considered John Browne's petition and ordered an investigation into his accounts.[39] However on 2 April they received new propositions from Nathaniel Powell to cast 300 tons culverin and saker drakes at £27 per ton instead of £30; 300 tons of grenado shells at £35 (instead of the current price of £42 10s) and 300 hand grenades at 2/4d each (instead of the current price of

2/6- formally 3/-.[40] In the event Browne was correct about Cheeke's technical abilities and there were complaints about the quality of his guns. However Nathaniel Powell was a more serious threat; he used furnaces near his Sussex estates and supplied iron guns and ammunition throughout the Commonwealth. It was he who really broke the monopoly of the Brownes and set the pattern for the next century, with the Ordnance employing multiple groups of founders, as well as re-establishing the Sussex works as important gunfounding furnaces.

Two days later the Council of State were making decisions on the armaments for the next four frigates, which were to have 18 demi-culverins drakes and four long demi-culverins for chase guns.[41] Nathaniel Powell was awarded a share of the contracts, although John Browne still received the larger share. Late in May 1651, Browne used his status as Gunfounder to the State to have a protection for his workmen from being pressed 'as necessary for making guns for the kingdom'.[42]

However this was one of John Browne's last acts; on 15 May he fell ill enough to draw up his last will and testament, and he died on the 4 June 1651. The bulk of his fortune was to pass to his grandson, John, son of John junior, who would be the last of the Brownes to bear the title Gunfounder to the King. In the meantime his uncles, George Browne and Thomas Foley, would look after the family's interests in the iron industry through the years of the Commonwealth.

Conclusions

Without doubt, John Browne was one of the most important men in the development of the English charcoal iron industry. After the anonymous records of his father Thomas, John Browne leaps into life from the documents. When he took over the business, the family, although royal gunfounders, had no political influence, and for a time were unable to change government policy on exporting ordnance or to prevent some of their trade being damaged by

Sir Sackville Crowe's monopoly. However, John Browne was able to raise his family's importance through his professionalism, technological abilities and entrepreneurial talents. His ability to cast large numbers of guns, which though light in weight could fire heavy shot, was a major factor in the Navy's growth from the 1640s onwards.

Browne's failures, when a young man, to persuade the government to encourage rather than prevent the trade in iron guns allowed the creation of the Swedish iron industry, which would grow to rival the English for over a century, while his ruthless suppression of any competition damaged the industry as a whole, in particular the Sussex furnaces, which had virtually ceased to operate by the outbreak of the Civil War.

Paradoxically, one of the most important things Browne did was to add bronze casting to his ironworks. Not only did he earn the gratitude of the government, it brought tangible benefits, culminating in the visit of Charles I to his foundry to watch a cannon being cast. Concentrating iron and bronze cannon founding into one business gave Browne much more power and influence, which was demonstrated after his arrest by Parliament. In the end, Browne had to be released and given his works back, because there was nobody else capable of supplying the much-needed guns and ammunition. But the price was high in both senses of the word and this probably contributed to the ending of the Brownes' monopoly. Browne had given the State a vision of a navy armed with heavy iron guns. To make that dream a reality, the Ordnance had to find new ways of working and more gunfounders to supply them, at prices they could afford to pay. When this was achieved, the Sussex furnaces would spring back into life.

Postscript

Two new major publications relating to John Browne are due to be published in 2008. The first is *The Great Guns like Thunder: The*

Cannon from the City of Derry by Brian G Scott, Ruth Rhynas Brown et al (Derry), which includes previously unpublished manuscripts on Browne and his agents and surviving Browne iron guns. The second is *The Furie of the Ordnance: Artillery in the English Civil Wars* by Stephen Bull (Boydell and Brewer), which deals with Browne in the wider picture of the Civil Wars, with more of an emphasis on the field guns and bronze guns.

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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.