

Wealden Iron



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Field Notes

compiled by J.S. Hodgkinson

Courtlands Farm bloomery, West Hoathly, Sussex

April 1989

The slag heap of this hitherto unrecorded bloomery (TQ 381314) was trenched to look for dating evidence. Four small sherds of pottery were found, one in the topsoil, two within the slag, and one in the stream. They were all shown to Mark Gardiner who described them as fragments of cooking pots, dated to the late 13th or 14th centuries. The slag itself was somewhat unusual in that freshly broken pieces showed a shiny black, almost vitreous, surface, and conchoidal fracture lines more typical of blast furnace slag. This suggests a higher smelting temperature than usual.

There is a small concentration of bloomery slag at TQ 378323 and a widespread scatter in the field called Great Cinders at TQ 380319 (Straker p.409).

A bloomery at Upper Parrock

A concentration of tap slag has been found at TQ 456344 in Ave Maria Wood in Hartfield. The location of this, as yet undated, bloomery is within the area which, it has been suggested, was a centre of medieval industry.¹

A bloomery in Crawley

A small concentration of forging slag has been found during building work at the rear of 43 High Street, Crawley (TQ 268365). Also in the debris were five sherds of 14th-16th century pottery. Further east, on the same plot, on land adjoining the parish churchyard, a furnace bottom and pieces of tap slag have been found. An increasing number

of such sites is being recorded, suggesting an active metalworking industry in the town during this period.²

Again we are indebted to the ever vigilant Don Edwards for drawing attention to this site.

A bloomery at Newick, Sussex

A concentration of bloomery slag has been noted at the edge of a field beside the public footpath off Allington Road, south of Newick (TQ 414205).

A medieval bloomery at Tidebrook, Mayfield, Sussex

Sept 1989

The bloomery in Wet Wood, near Mousehall (TQ 602294), was trenched to recover dating evidence. Three small sherds of pottery were found within the slag, and shown to Paul Smith who described them as late medieval.

A further concentration of bloomery slag was noted approximately 50 metres downstream of the first site (TQ 603294).

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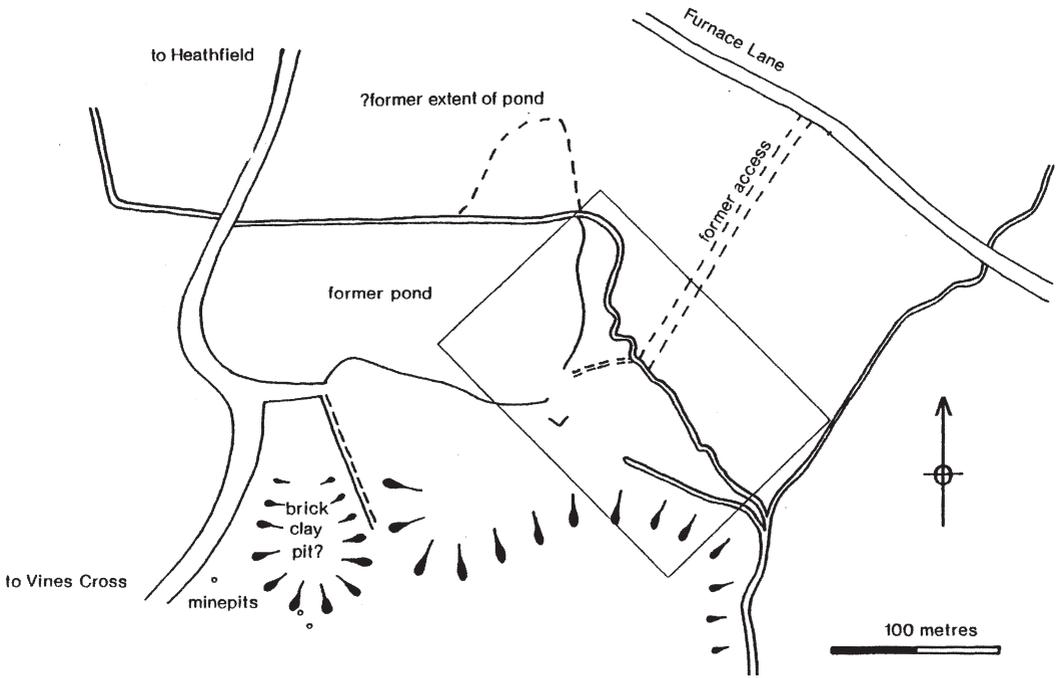
1. Tebbutt, C.F., An Abandoned Medieval Industrial Site at Parrock, Hartfield , *Sussex Archaeological Collections* **113** (1976), 146-51.
2. WIRG, *Wealden Iron*, 2nd series **8** (1988), 8-9; 2nd series **9** (1989), 2.



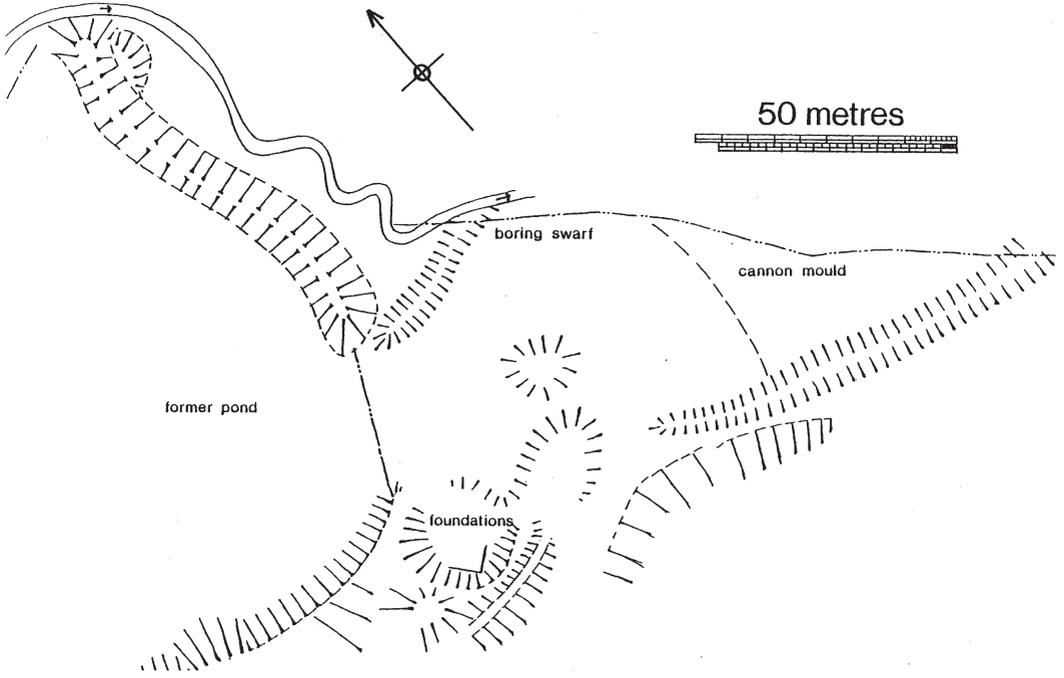
Heathfield Furnace Site Survey 1989

R.G. Houghton and J.S. Hodgkinson

The WIRG Field Group visited the site (TQ 600186) on three occasions. Heathfield was one of the most important sites in the Weald in the eighteenth century but it has suffered considerable depredation and Cleere and Crossley's description (1985: p.335)



Heathfield Furnace site



Heathfield Furnace site

requires little amendment.

Despite their small scale, Yeakell, Gardner and Gream's map of 1795, and the First Edition of the One Inch Ordnance Survey map give some indication of the general shape of the pond, which appears to have been very wide close to the bay, markedly narrowing to the west and continuing under the Heathfield-Vines Cross road when full. On both maps, buildings are shown in the working area at the south end of the bay or to the south of the pond.¹ The corner of the foundations of a building were detected during the survey, together with boring swarf and cannon mould fragments which indicate the probable position of one of the two boring mills. In 1742, low rainfall, which was hindering the boring of ordnance, encouraged John Fuller to make double use of the limited water supply by erecting a second boring mill, although it is not clear where it was situated.² The nearby Boring House Farm suggests a site further downstream, but no surface evidence was found.

The substantial opencast working in Brick Kiln Shaw may well have supplied clay for bricks for the furnace hearth. The three minepits above the opencast may well predate it.

Notes

1. Margary, H. (ed), *Two Hundred and Fifty Years of Map-Making in the County of Sussex* (1970).
Harley, J.B. and O'Donoghue, Y, *The Old Series Ordnance Survey maps* Volume 1, (1975); Sheet 5 was surveyed between 1797 and 1813, that is within twenty years of the closure of the furnace.
2. East Sussex Record Office RF15/25, p.153, June 23rd 1742.

The Indirect Process in the Pays de Bray

Brian G. Awty

The term *fonderie ou feronnerie* was used in 1454 to describe the ironworks built shortly before that date by two Walloons on land belonging to the Bishop of Beauvais on the river Avelon in the eastern or Picard part of the Pays de Bray. All documents from the Pays de Bray subsequently keep to *fonderie* as the term used to denote a blast furnace during the 15th and 16th centuries.

It was Rolf Sprandel who first drew attention in 1968 to the fact that *fonderies* were to be found in 15th century Wallonia, and since they occurred in association with the Walloon forge which indicated that the indirect process of iron manufacture was involved, he rather diffidently accepted that *fonderie* must imply a blast furnace.

Schubert's *History of the British Iron and Steel Industry* included a copy of a 1509 inventory of Newbridge Forge, where the employment of separate pairs of bellows in the finery and hammer-mill proved that the two-hearth Walloon forge was in use. He also cited the production of *timp irons* at Robertsbridge Forge in the 1540s as proving that Panningridge Furnace was equipped with the forehearth of the true blast furnace, because they indicated that the hearth there must be equipped with a tymp or tymp-stone, from below which the forehearth protruded towards the casting floor.

Charles Gerard or Jerratt, who was always borrowed from parson Levett of Buxted by Sir William Sidney whenever a new hearth was needed at Panningridge, belonged to a family based since 1504 at one of the principal ironworking centres of the Pays de Bray, Neuville Ferrières, so proving a very specific link between one of the more important blast furnaces in Sussex and the *fonderies* of the Pays de

Bray. Not only were all the nine or ten furnaces in the Pays de Bray for which documentation exists styled *fonderies* but, in 1496 when Henry Fyner was authorized by Letters Patent to establish ironworks in Ashdown Forest, the word used was 'foundries'.

Though the sites of around 13 or 14 blast furnaces are known in the Pays de Bray, all except the one at Neuville-Ferrières were probably older foundations than Newbridge Furnace. By 1560 only the furnaces at Neuville-Ferrières and Glinay continued in use. The furnaces of Frenchy and of Ste-Radegonde are known through single documentary references, in 1500 and 1504 respectively; Ste-Radegonde probably had an existence of fewer than 20 years, and Frenchy could have been even more ephemeral. No documentation at all has so far been found for three other sites.

As a consequence, remains tend to be even more vestigial and harder to interpret than the remains on Wealden sites. Only in the cases of the blast furnaces at Hodeng and Glinay do probable furnace foundations still exist. Glinay is a very promising site for archaeological investigation; Hodeng, where the foundations may have been incorporated into the later corn mill, has now been converted into a maison secondaire and the possibility of further investigation is remote.

Water Management

This varied widely. Where, as in the case of Glinay, the site nearest the source of the Béthune, the supply of water was small, the remains of the *chaussée* or bay are particularly impressive. Where, as in the case of Ste-Radegonde, several mills were in competition for the available supply, the arrangements made are so complicated as to make interpretation difficult. Here, on the Béthune, and at most sites in the Beauvaisis, rapidly flowing streams originate from springs yielding a plentiful and constant supply, rather than from

mere surface drainage, so supply of water was probably not a great problem, though we cannot be sure in all cases that 15th century conditions were the same as those of today.

The situation in the flat, marshy area between Forges and Gournay was quite different. In the Middle Ages much of it was under water and the huge *viviers* or fish-ponds of the Andelle, Bray and Mont-Louvet covered many acres. It was perhaps due to population pressure in the 16th century that it was thought advisable to dispense with the fish supply and to turn the area into arable land and pasture. The three works so far located in this area perhaps did not survive beyond the 15th century, certainly not beyond 1550. The bay at Mont-Louvet is almost as impressive as that at Glinay; the one at the Etang de Bray probably even more so. On the Andelle the works so far found is above the main *vivier*, and the upper pond seem to have remained in water into the 19th century, though the main *vivier* had been drained in the 16th century.

Iron Ore

The Pays de Bray originated as part of the Wealden system. To quote from Worssam in Cleere and Crossley: ‘Throughout the deposition of the Wealden beds, for the first 20 million years or so of the Cretaceous, the Weald was part of a vast freshwater-to-brackish swamp or lake an arm of it extended south-eastwards through the Pays de Bray’. The Pays de Bray is perhaps a quarter the area of the Weald, being only half as long and approximately half as wide. Denudation has perhaps been carried further than in the Weald with more erosion of the Wealden beds exposing more of the Upper Jurassic layers.

Sufficient mineral deposits remain to have led to a proposal by a *Société Minière du Bray* in 1899 for reviving the iron industry in the area. The proposal ran into widespread opposition from the

ceramics industry and was dropped in the face of the argument that the deposits contained not more than 30% of iron. In the 1920s E. Barbier found deposits of iron oxides, pyrites and carbonates to be widespread, varying in iron content from 20% to 35%, but since the samples taken were small, he was unable to show commercially exploitable beds were available. The iron and silica contents of the Bray ores probably varied as widely as those in the Weald. The richest of them may well have been largely worked out by the second half of the 16th century. It is also possible that, again as in the Weald, the phosphorous content of much of the ore made it more suitable for the production of castings than for bar iron. Unfortunately all the evidence indicates that the works in the Pays de Bray were geared to the production of wrought iron in the form of bars, though around 1540 one third of the wrought iron produced at Neuville-Ferrières may have been hammered into plates weighing around 125lb. In this respect, the decision of Francis I to establish a cannon foundry at Breteuil in the Pays d'Ouche in 1540, rather than in the Pays de Bray, could have been a most unfortunate one.

Charcoal

The works established in the Beauvaisis early in the period were no doubt favoured by the fact that, for nearly 30 years up to 1449, much of the area had formed a kind of no-man's-land between the French garrison at Beauvais and the English garrisons at Gisors and Gournay. Wood must have been plentiful from reclaimed arable and pasture and from newly assarted land.

The Béthune valley was particularly well-situated between forest land. To the north were the Lower and Upper Forests of the county of Eu; north west were the forests of Aliersont and Croixdalle, belonging to the Archbishop of Rouen; the Royal Forests of the Hellet and of Eawy were north west and west respectively; to the

south the Bois de l'Abbaye and the Bois de Leon belonged to the Abbey of Beaubec; south east the Forest de Bray and the Bois du Fayel belonged to the Duke of Longueville, Viscount of Gournay.

As in England, beech was a favourite wood for charcoal making. Smaller pieces of woodland were often designated as *taillis* or coppice, but the ironmasters will have had competition for this from the manufacturers of glass and of pottery. As the 16th century drew on and wood became scarcer, ironmasters were often involved together with other merchants in large purchases from the royal forests. Here, agreements with woodcutters show that the wood was cut into logs, cordwood and various kinds of firewood, with the bark being taken by the tanners.

But this woodland was surrounded by large towns such as Beauvais, Rouen and Dieppe, where the prosperity of the late 15th and early 16th centuries brought increasing demands for building timber and wood for furniture. Rouen and Dieppe both needed timber for shipbuilding and in the 1520s and 1530s the creation of le Havre de Grace, a new port facing the waters of the Atlantic, with few sources of wood in its immediate vicinity, was probably sufficient to upset completely what can at best have been a precarious balance between supply and prices. During the 1530s the price of wood appears to have doubled whilst the price of iron hardly changed. Between 1542 and 1553 we have no evidence that any iron was sold from the forges of the area but when sales revived in 1553, the evidence is that a 60% increase in iron prices had set the forges at work again.

Geology and Iron Ore in the Pays de Bray

B.C. Worssam

1. Structure and Succession

The Pays de Bray is an elongated hollow within the extensive Chalk upland of northern France, formed by erosion of an anticline that brings Lower Cretaceous and Jurassic rocks to the surface. It is analogous to the Weald, though much simpler in structure. It is bounded on each side by a Chalk escarpment that attains heights of 220 to 235m (around 750ft) above sea level.

On the south-west side of the anticline at the foot of the Chalk scarp is a shelf 1km to 2km wide on beds corresponding to the Lower Chalk and Upper Greensand, edged by springs thrown out by the underlying Gault. There is then a wider, undulating belt on the outcrop of Lower Cretaceous sands and clays corresponding to the Lower Greensand and Wealden Beds. This tract was formerly largely afforested. The Wealden clays have long been worked for pottery and refractory ware, and the Wealden sands are the presumed source of ore for the iron industry.

The central part of the Pays de Bray is an upland, the Haut Bray, rising to 200m (650ft) in places, composed of Jurassic (Portlandian and Kimmeridgian) beds. On the north-east side of the anticline the dip (at 20° to 40°) is much steeper than on the south-west side, and the Lower Cretaceous beds form a narrow faulted belt, only 0.5km to 1km wide, at the foot of the Chalk escarpment.

Geological boundaries are indicated on Figs. 1, 2 and 3. On French geological maps, beds are grouped according to age, using 'stage' names such as Kimmeridgian.

Kimmeridgian and Portlandian

The Kimmeridgian consists of clay and has a restricted outcrop. At the base of the Portlandian is a 4m thick hard lithographic limestone, the outcrop of which forms hill tops in the southern part of the Haut Bray. The middle part of the Portlandian consists mainly of clays and marls, but includes a bed of hard, shelly calcareous sandstone. We found this to have been dug in a little quarry at the south end of the bay of Glinay Furnace, and in another at Hodeng Furnace, and used at each place for construction of the furnaces. Some sands at the top of the Portlandian are ferruginous, and may have been a source of iron ore.

Neocomian and Barremian

These are fresh- to brackish-water sediments corresponding to the Upper Purbeck and Wealden Beds of southern England, but the whole sequence is much thinner. The Neocomian consists of white sands and ferruginous sandstones, with lenses of grey clay. There is no persistent clay formation like the Wadhurst Clay of the Weald. The Barremian corresponds in age to the upper part of the Weald Clay. It is described as an 'argile panachée' or variegated clay, mottled grey, yellow and red. It dies out north of the latitude of Gaillefontaine.

Aptian

The Aptian comprises only a thin development of clays, at the extreme southern end of the Pays de Bray.

Albian

South of the latitude of Gaillefontaine the lower part of the Albian consists of glauconitic sandstone, like the Folkestone Beds of Folkestone, and the upper part of the Gault clay, much like that in England. North of Gaillefontaine the sand dies out, and the Albian consists wholly of clay.

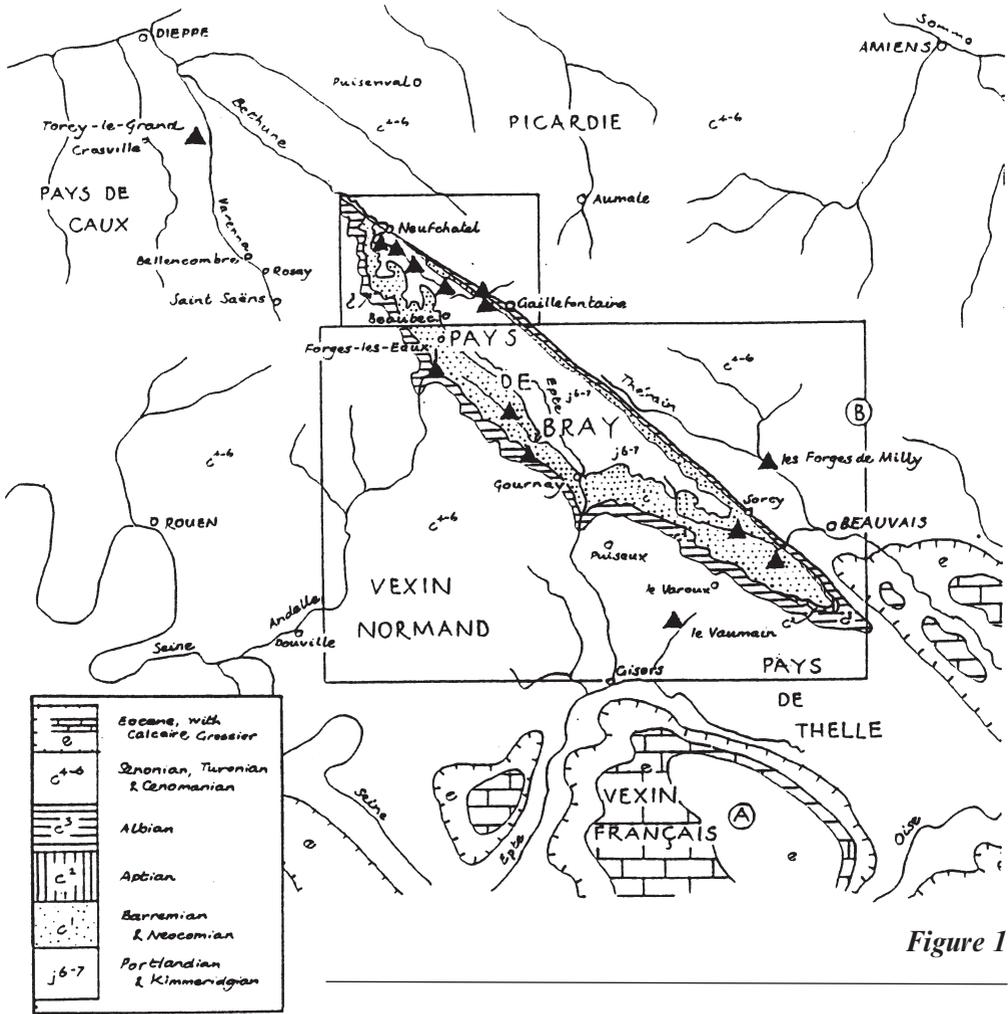


Figure 1

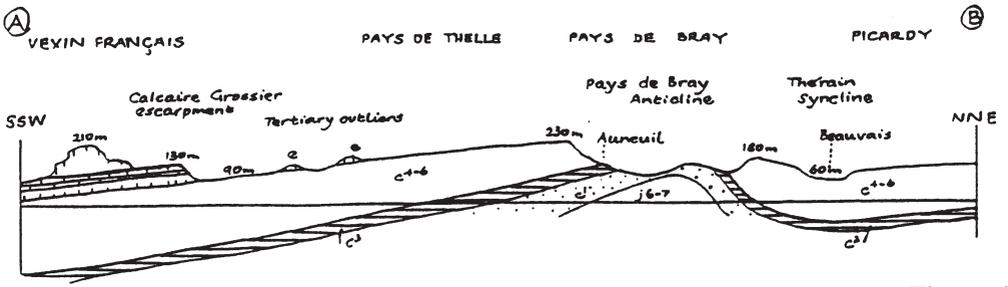


Figure 4

Cenomanian, Turonian and Senonian

These together make up the Chalk, including a basal layer of ‘gaize’, described as a lightly-cemented siliceous rock with abundant sponge spicules, rather like the Upper Greensand of southern England.

Tertiary

The Chalk upland of Picardy and the Pays de Caux has a number of small outliers of Tertiary clays and sands, but these are omitted from Fig.1. In the south-east part of Fig.1 appears the main Tertiary outcrop of the Paris Basin, essentially a plateau formed by the thick and extensive Calcaire Grossier limestone. This limestone includes freestones much used for building in Paris.

The above account is based on the thesis by Mlle Arribet, on the ‘notices explicatives’ of French 1:80,000 geological maps, and on Pomerol and Feugueur’s 1974 geological guide ‘Bassin de Paris’ (Guides Géologiques Régionaux; Paris: Masson et Cie). The section, Fig. 4, on the line AB of Fig. 1, is based on Pomerol and Feugueur’s Fig. 95.

2. Iron ore and slag

We were able to see an exposure of Neocomian sandstone at Rainvilliers, in a small disused quarry that showed about 4m of gently dipping yellow-brown medium-grained soft sandstone, consisting of subangular quartz grains (about 4mm diameter) in a limonitic (iron oxide) matrix. The limonite is concentrated in places, to form thin layers and thicker irregular masses of a hard orange-brown sandy ironstone. M. Jean Cartier explained that a lower part of the quarry, now filled, had provided building stone used in Beauvais.

Ironstone as sandy as that seen in the quarry would have rated as ore of inferior quality in the Weald. A similar stone was possibly used for bloomeries at the isolated localities of Lenham Heath and Hollingbourne in Kent. It occurs in quantity in the Lower Greensand

of Surrey and West Sussex, but seems to have been totally ignored, with Weald Clay ironstone from minepits being used for preference in blast furnaces in that region.

Red Barremian clay in a roadside exposure near the entrance to Le Moulin du Fourneau included some small nodules of a dark red to yellow-brown, limonitic, slightly micaceous sandy siltstone. This type of material might have served as an ore, if it occurred in sufficient quantity.

Most of the slag fragments to be seen were of a greenish glassy type; some fragments displayed an iridescent blue colour. Slag at Le Vaumain and Le Pont de Fayal included chips of flint which, unless they were picked up as the slag flowed across a gravelly surface, may indicate that chalk was used as a flux.

3. Building stone

As well as being used in Beauvais, ferruginous sandstone from the Neocomian was used for construction of the medieval church at Rainvilliers. An unexpected discovery was that an excellent stone for furnace construction existed in the Portlandian – the hard, shelly calcareous sandstone mentioned above. Some blocks of it used at Glinay were 1m long and 0.5m thick, according to workmen who had dismantled the mill (the successor to the furnace at Glinay), some 20 years ago. Similar stone appears in stone walls in the nearby picturesque village of Beaussault and was used for the church in Neufchatel market place.

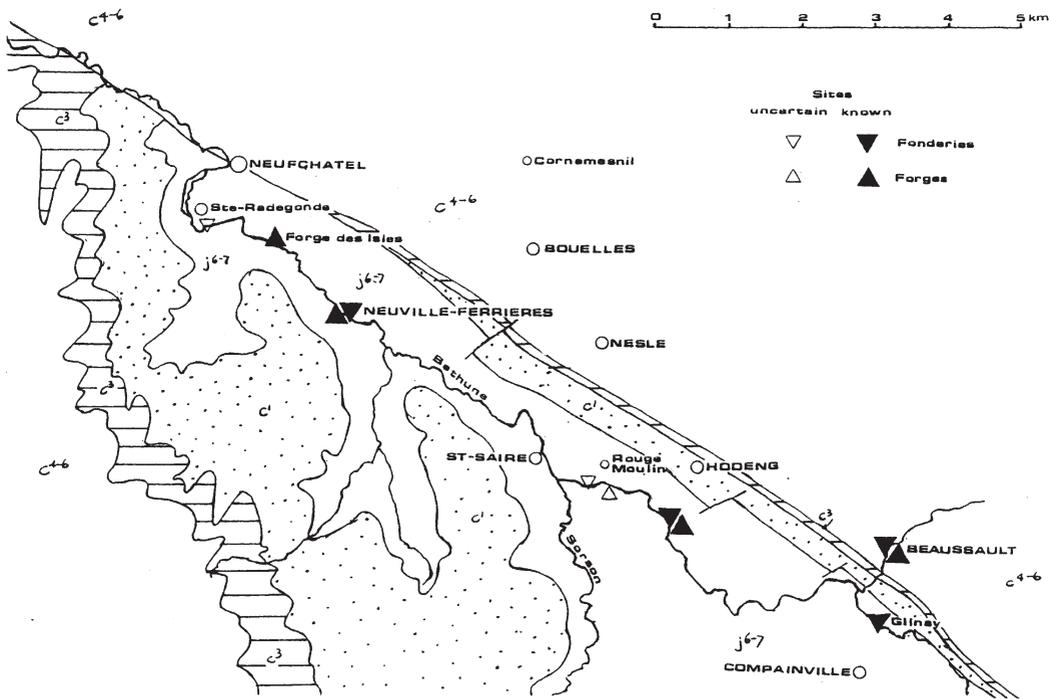


Figure 2

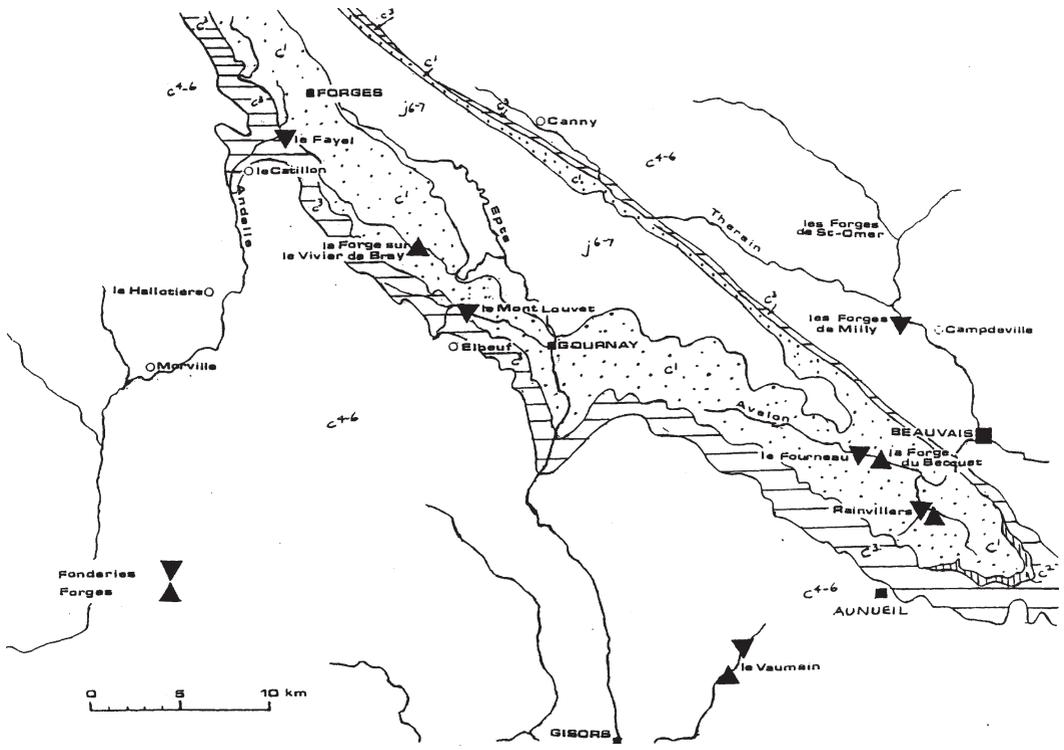


Figure 3

Gazetteer of Furnaces and Forges in the Pays de Bray, France

1. Les forges de Milly

Blast furnace and possibly finery forge.

Location 1km S of the D133 between Milly sur Thérain and Herchies, 11km NE of Beauvais.

Site Below the confluence of the Petit-Thérain with the Thérain. The mills are now replaced by a factory. The proprietor recalls black, shiny slag being unearthed during work on the site. ‘Two or three wheelbarrow-fulls of slag were found when the foundations for a house were being excavated just below the site. Blue slag has also been found, and it seems that heavy cinders may have occurred. A fall of water in the vicinity of the factory may indicate the water-powered site.

History Since this site was well away from the area dominated by the English up to 1449, this works could be earlier than any within the Pays de Bray. The proximity of Campdeville, whose lord was Jean de Candeville who set up Hodeng *fonderie* around 1480, suggests that de Candeville was also involved here.

2. La fonderie et forge de Rainvillers

Furnace and forge.

Location 1km NW of the N181 on the outskirts of Rainvillers, approx. 5km SW. of Beauvais.

Site Delineated on a plan of 1508 made for Thibault Le Batier, canon of Beauvais cathedral. The *fonderie* was on *le petit vivier* fed by the stream of Friancourt, the

forge on le grant vivier, fed by the stream from St-Leger. The vestiges of the bay of the *Grant Vivier* are planted with trees. The field below contains heavy cinders and prominent features covered with brambles could conceal remains of the forge buildings. Black blast furnace slag has been found in the garden of the farm situated at La Forge.

History unknown.

Diagrammatic representation

Circular section furnace (?), with 6 or 7 steps leading to the throat. Undershot wheel (?). Charcoal (?) basket. Forge has two wheels.

3. La forge du Becquet

Finery forge.

Location On a minor road N of, and parallel with the N31, 7.5km W of Beauvais.

Site The *chemin des rotons* was possibly the bay below or adjacent to which the forge was built. Very little cinder has been found.

History There is no copy of the first deed dated 4 January 1451, by which Renaud de Corbie (probably the son of a former Chancellor of France), lord of Courcelles, sold to *Henry le Feron* of Jausse-le-Feron in the county of Namur and *Pierre le Fondeur* of the *terre de Franquimont* now at Beauvais, an empty place adjoining the bay and sluice of the *vivier* of Courcelles and the place extending below this, to construct a house and a *moulin à faire fer*. A copy made in 1478 exists of a second act of 27 April 1451, which gave Henry Malerbe, hammerman of Liege, then also present at Beauvais, a third share in the *moulin à faire fer*. No copy survives of the further act of 1466

by which Renaud de Corbie confirmed to *Hennedric Laffineur* the place and bay of the *vivier* of Courcelles where the *ferronnerie* is.

In 1486 the Abbey of St-Paul bought de Corbie's estates from de Corbie's daughter and son-in-law. In 1554 Guillaume la Folie asked permission to convert the forge into a corn mill, because of the scarcity of wood. By 1556, when he sold the mill to Pierre de Canonne of Beauvais, he is described as 'affineur de fer demeurant aux forges Vuatigny, pays de Thiérache'.

4. Le moulin du Fourneau (Les Rouges Eaux)

Blast furnace.

Location To the north of the N31, 100m E of the layby 8km W of Beauvais.

Site Between *Le Pont de Forest* and *Les Bonhommes*. According to Mlle Arribet the present mill was built during the 19th century near the end of the *rue du fourneau au champ de Taillis* and opposite the *chaussé de l'étang de la Rouge Eau* (which formed part of a now disused section of the old road from Beauvais to Rouen). However, part of the furnace structure can be discerned in the south-east corner of the mill, behind the millwheel. Surviving stone courses indicate that the furnace was approximately 5.2m square at the top of the casting arch. There is blast furnace slag in the garden below the mill buildings. A flat, low-lying stretch of ground above the buildings may indicate a former mill pond.

History Copies exist of a 1454 *vidimus* (census) of the diocese of Beauvais which relates that 4 *arpents* of land on the Avelon between the *Pont de Forest* and *Les Bonhommes*

had recently (*nouvel*) been leased to *Henry le Feron* and *Pierre le Fondeur* to pound the water and build a *fonderie ou feronnerie*. In 1507 their heirs are stated to have been Francois Maixence, Robechon Maixence, Jehan Poulssin on behalf of (blank) his wife, Marion de La Folie and Henry Baillet (curator and tutor of the children of *grant* Jehan Maixence). The Maixence family sold the *fonderie* or a 20 *livres* rent on it to Jean de Caen, a Beauvais merchant, in 1520, which is perhaps when they moved to England. The later history is bound up with *La forge du Becquet*.

Personnel Robert (Robechon) Maxence, *fondeur de fer*, 1515.

5. Les forges du Vaumain

Blast furnace and finery forge.

Locations Furnace: 1km NE of Le Vaumain, on the N side of D166, where a track from La Fonderie crosses the Aunette.

Forge: At le Moulin de la Forge S of the D166, 0.5km north of Boutencourt.

Sites On the Aunette, south of the Pays de Bray. The forge, where a large number of heavy cinders (mossers or forge bottoms) can be seen beside the drive, was in the commune of Boutencourt. The furnace was situated below the village of La Fonderie; black, glassy slag has been found, and a large heap of agglomerations of cinder, similar to ‘bears’, lie in the field beside the site. Other bears are to be found in the stream. Their iron content appears lower and their weight less than that of genuine bears.

History These works are frequently mentioned from 1489 to 1503 in a published volume of notarial acts from

Chamont-en-Vexin.

Personnel Forgemaster – Jean Langlois; founders – Oudin Franc Coq, Robinet Lienart; finer – Jean Louvet; hammerman – Toussaint la Caille.

6. Le Mont Louvet

Blast furnace.

Location About 6km NE of Gournay-en-Bray, off the W side of the N15, just N of the *hippodrome* (race course).

Site Mlle Arribet has found green, glassy slag on the bank of the Morette, somewhat below where it now breaks through the former *chaussée* of the Etang de Mont Louvet. There are now three breaches in this *chaussée* to the west of a medieval motte, and the fact that slag is concentrated below the middle breach suggests that the furnace may have been supplied with water from this point, rather than from the western-most breach, through which the Morette currently flows.

History Potin de la Mairie (1844) suggested the Etang de Mont Louvet activated a forge in the Middle Ages. The furnace probably dates from the second half of the 15th century, but there is no documentary record. It may have belonged to the Viscounty of Gournay.

7. La forge du petit vivier de Bray

Forge.

Location About 11km NW of Gournay en Bray, to the W of the N15, 1.5km N of the turning to Dampierre en Bray.

Site A very complicated site. The forge appears to have been activated by the *petit vivier*, which was separated from the *grant vivier de Bray* by a large *chaussée* the middle section of which ‘will have been constructed of stone’,

the water flowing through its arches into a channel or basin, the *petit vivier*, which extends as far as the *moulin de Bray*.

The mill had disappeared by the start of the 19th century and the *moulin de Bray* is now the appellation of a large mansion near the site. Cinder is found surrounding this mansion and is used as decoration in the masonry. It can also be found along the road on the south side of the property, but the largest deposits are on the opposite side of the stream in a small wood. Above this wood the contours form a mound at right angles to the stream and this could be the remains of the bay. A few dozen metres below, a sort of plinth, entirely formed of cinder, about 3.5m long, projects 20cm out into the course of the stream. Near this area are heavy cinders (forge bottoms?) rich in iron content, but also a few fragments of blast furnace slag.

There is also cinder in the area below the *chaussée* of the *grant vivier*, where it was also possible that ironworking was carried on.

History Potin de la Mairie (1844) also mentioned the *Forge du petit vivier de Bray*. In January 1487, Jean Clouet, *ferronnier* at the Forges des Iles near Neufchatel, moved to this forge, which seems to have been held by Vienne de Malinguehen, almost certainly a member of a Beauvais merchant family, on lease from the Comte de Tancarville, who was viscount of Gournay.

8. Le Pont du Fayel

Blast furnace.

Location About 2km SW of Forges les Eaux, at the bridge on the minor road off the D13.

Site The Pont du Fayel is situated on a road which appears

to have formed the bay of a pond which was used at the start of the 19th century to float wood from the Forêt de Bray onto the Andelle and thence down the river to Rouen. Writing in 1607, Pierre la Grousset indicated it as a site of a *martinet* or hammer-mill. However, Mlle Arribet has found grey to green blast furnace slag a few metres below the bridge on the right hand side of the stream at the inside of its bend. No foundations appear to remain.

History Apart from the mention by Le Grousset, none. The stream marks the boundary between the communes of Forges and of La Ferté-en-Bray, which belonged to the Viscounty of Gournay at the end of the Middle Ages.

9. Le moulin de Glinay

Blast furnace (and forge?)

Location On a track leading from the D135 to Compainville, 5km NW of Gaillefontaine.

Site Blast furnace slag and other remains cover a wide area below the largest bay on the Béthune. The furnace was perhaps located at a compacted massif which it was found impracticable to remove when the mill was demolished after the Second World War. Adjacent to the track leading towards Compainville is a quarry which could have furnished the stone for the furnace. Ciszville thought that this was the older of the two Beaussault sites. At this point the Béthune separates the commune of Beaussault from that of Compainville, but though the *fonderies* of Glinay were leased with the forges of Beaussault in 1562 by the Princess of Condé, they were not included in the lease of the Beaussault works made by the Chevalier de Roye in 1509.

History Jean Bridoulet, who bought iron ore from Fronval in

Bouelles in 1486, is mentioned as being *ferronnier* at Glinay in 1495. He was still at Glinay in 1512, when he agreed to complete delivery of 60 *milliers* (30 tons) of iron in rods (*verges*) to Jean Heuze of Rouen for the widow of Jean Hiesse *dit* des Mazis. Later ironmasters, who also worked in partnership with the ironmasters at Beaussault were Nicolas Hué *dit* le Blanc (fl. 1537-42) and Louys Pinguet (1553-64). The 1563 lease assigned the Glinay *fonderies* along with the Beaussault forges to Pierre de Clery, an Aumale merchant, and his son François, from 1564(5?).

10. Les Forges de Beaussault

Blast furnace and forges

Location On the minor road between Beaussault and Petit Beaussault.

Site On the site of the Moulin du Château between Beaussault and Petit Beaussault, not far below the medieval fortress, and not on the Béthune river. The old road from Beaussault to Gaillefontaine probably ran along the bay, and the pond was formed by the stream of Toupray and the *ruisseau des Sources dites du Château*. Both blast furnace slag and forge cinder have been found.

History The *seigneurie* of Beaussault belonged to the chevaliers de Roye, but was inherited by Louis de Bourbon, Prince of Condé through his wife, Lienor de Roye, in the 1550s. Louis de Condé's son, Henri duc D'Enghien, sold Beaussault to the Sieur de Gaillefontaine in 1579.

We know the following ironmasters of Beaussault:

Jean Hiesse dit Desmazis	1493-1502, 1502-1511
Jean Malhortie, Sieur de Villers	1511-1520
Antoine de Beaurains	1529-1538, 1538-1547

Marin le Maurre	1547-1556, 1556-1565
Pierre and François de Clery	1565-1574
Nicolas de Meaulx	<i>fl.</i> 1650

The ironworks is first mentioned in the Neufchâtel notarial records in 1495, when Jean Hiesse held the forge; these records contain a 1512 copy of the lease made in 1509 (but not coming into force until May 1511) to Jean Malhortie. It is this lease that contains the only mention of the *fonderie*. The *seigneurie* of Villers was west of the Seine, but Malhortie's interest in the iron industry probably came through his former wife, Vienne de Malinguehen.

The fact that Peter Borayne worked as a *finer* for Joan Isted in 1549 is a hint that Antoine de Beurains may have actually had ironworking skills. His associate at Glinay, Nicolas Hué *dit* Le Blanc, may have been related to Marquis Hué who was ironmaster at the royal cannon foundry at Breteuil in the Pays d'Ouche around 1540.

Marin le Maurre was probably related to Huchon Le Maurre, who had a corn-milling background, whilst the de Clerys were Aumale merchants, who purchased iron from the ironworks at Neuville-Ferrières, before acquiring an interest in that ironworks as well as acquiring the lease of Beaussault and Glinay.

The works was probably the last to be laid down near the end of the 17th century.

11. La fonderie de Hodeng

Blast furnace

Location 1km down the minor road S of the D135, 7km SE of Neufchâtel en Bray.

Site Built slightly below the medieval corn mill (then in ruins) by Jean de Candeville around 1480. At this point, the Béthune has a good, rapid and constant flow, so the wheel was driven off a minimal pond, similar to that at Neuville-Ferrières. The later corn mill (now a secondary residence) appears to have been built on the ruins of the blast furnace. At ground level the surviving corner courses showed that the furnace was approximately 5.7m square.

History Jean de Candeville arranged for all the pig iron produced at Hodeng to be fined at the forge at Neuville-Ferrières. However, by 1486 the *fonderie* was being run by Guillaume Houel and Antoine Bourse, de Candeville's stepson, and when Bourse bought out Houel in July of that year, the agreement involved the sale of both bar iron and sow iron to Houel. In consequence the agreement with the Neuville-Ferrières forge needed re-negotiation. From August 1486 only one third of Hodeng sow iron went to Neuville-Ferrières.

In 1537 Jean Langlois, son of Colin Langlois of Beaussault, leased the site of the *fonderie* to a local man at a purely nominal rent. Was this Jean Langlois related to the ironmaster of the 1490s at Le Vaumain? Was he the John Langleys *alias* Margo who came to England in 1526 and was working at Panningridge around 1550?

12. La forge de Hodeng

Finery forge.

Location As No.11.

Site Adjacent to the medieval corn mill and legally transferred with it, and only perhaps 50m or 60m above the *fonderie*.

History May have been built in 1486 following the modification

of the Hodeng arrangement with Neuville-Ferrières forge. It was leased in 1499 (along with the *fonderie*?) by Pierre Pachoult to Robert du Templier *dit* Le Turc for two years at a rent of 60 *livres* t., per annum, 12 *livres* of which had to be paid to Henry Blanche and Gillet de Fontaines (another mortgage?). In 1503 it was the subject of another legal auction at the behest of Thomassin le Couroyer *dit* Cailleu (who had previously had the *fonderie* auctioned!) ‘de l’obligation de Henry Blanche’. This resulted in a lawsuit between Gillet de Fontaines and Clement le Caron, who had purchased the auctioned share, which lasted until 1509, when the whole (?) was purchased by Guillaume du Manoir. The corn mill was now to be repaired, but a lease of half the forge purchased by Jean Bridoulet, and which still had 19 years to run, was to be respected. This would take the history of the forge to 1528, if Bridoulet survived so long, but no further documents mentioning the forge (or mill) survive.

13. La forge d ‘Acher

Steel forge?

Location E of the N314, 0.5km SE of Saint Saire.

Site The precise site has still to be located, but it was erected presumably on the Béthune adjacent to a corn mill to be built on the manor of Rouge Moulin under the terms of a 99-year lease of the manor made by the Abbey of Beaubec in 1476. The corn mill was to be built during the nine years following Christmas 1477, so it was presumably built before Christmas 1486, and indeed the full rent of 19 *livres*, stipulated to be paid only after the building of the mill, was first paid in 1485. At and below Rouge Moulin cinders and slag are distributed over a

wide area on both banks of the Béthune.

History In 1500 Jean de Quenel, *écuyer*, Sieur de Quenel, des Iles et d'Oppilières leased the corn mill, including the site (*siège*) of the forge, to Henry Blanche, whom we have found involved at Hodeng, for 8 *livres* p.a., with a caveat that Blanche was not to impede the flow of water to Quenel's Fonderie de Frenchy, when he wished to use it again, which would be in 18 months time. The forge is mentioned in no other document, nor is it mentioned in the muniments of the Abbey of Beaubec. What is meant by the fact that only the site (*siège*) of the forge is conveyed?

14. La fonderie de Frenchy

Blast furnace

Location As No. 13.

Site On the Béthune at or below the manor of Rouge Moulin, as is suggested by later references to the *moulin de Frenchy* which indicate it lay within the parish of Nesle. This agrees also with the indication given in the deed of 1500 that the flow of water to it could be impeded by the corn mill. It is difficult to detect traces of former leats and ponds, nor are they indicated on surviving maps and plans. Mlle Arribet notes that slag is distributed over a wide section of both banks of the Béthune here. There is a large accumulation of blue blast furnace slag on the north bank of the stream, at the eastern extremity of the manor within the parish of Hodeng, well above the probable site of the *moulin de Frenchy*.

History There is no history beyond the mention in the 1500 lease of the corn mill of Rouge Moulin, which shows that it belonged to Jean de Quenel, who had other

ironworks, and that in 1500 it was not in blast. Like the *forge d 'Acher* it was presumably built after 1476, probably after 1485, and perhaps had a short life. The slag accumulation at the eastern extremity of the manor indicates a further furnace site for which there is no documentary evidence.

15. La forge de Neuville-Ferrières

Forge, then blast furnace, then both

Location At the sawmill off the D117 on the N side of the village.

Site The place name (Neufville la Feriere, in the 15th century) indicates that ironworking had been carried on at an earlier period, though whether with a water-powered hammer at the same site is quite uncertain. The site is presumably now all covered by the extensive premises of the saw mill. Some of the revetment of the present watercourses could be very ancient. Blast furnace slag of a green and blue colour is distributed over a wide area near the saw mill.

History First mentioned in a notarial document from Rouen of 1479, the forge, which belonged to Aubery Doullé, lord of Neuville-Ferrières, was presumably erected to forge pig iron from Hodeng. After 1486 it presumably also needed another source of pig iron.

The *fonderie* is first mentioned in 1537, when it was worked in conjunction with the forge des Iles (or Vienne?), under a lease held by Guillaume de Fry of Neufchâtel, a merchant. The arrival, from Neuville, of members of the Gerard and Tyler families, who were founders in England during the 1520s suggests that the *fonderie* was established well before then, if not as early

as 1486, at least by 1504, when the *Guerard* family first appears in Neuville-Ferrières.

When leased again in 1551 to Guillaume Lambert, the works seems to have had its own forge. After Lambert broke his right leg in two places and became blind at the end of 1554, Gautier Maistre, a merchant from Pontoise, near Paris, took it over, but he appears to have become bankrupt in 1556. In 1563 the works was in disrepair, and the current ironmasters, Francois de Clery and Louys Pinguet (ironmasters at Beaussault) and Charles le Roy, a Beaussault merchant, were required to repair both the *fonderie*, the forge and their tools.

16. La forge des Iles (subsequently named La forge Vienne?)

Finery forge.

Location Along a track off the W side of the D117, 2km N of Neuville-Ferrières, just S of the railway crossing.

Site On the *pré des Iles* near the present *moulin Gobin*. There is darkened earth and a wide and heavy scatter of forge cinder close to the site of a former bridge about 100m downstream of the *moulin Gobin* (the present bridge is a post-war construction much nearer the mill). Forge bottoms are incorporated in the present sluice gates. At the mill, part of the timber framing is joined by an ‘anchor beam’. More commonly used in forge carpentry and in furniture making, this joint is unknown in external joinery in England, although widely found throughout northern Europe. It appears as the joint used to hold together the framework surrounding the furnace portrayed on the Lenard fireback.

History The forge belonged to Monsieur de Quenel. It was

perhaps built early in the 1580s to convert sow iron from the *fonderie* of Neufchâtel. In 1487, Jean Couet, *feronnier* there, quit the forge and moved to the forge du Vivier de Bray. He was succeeded by Jean Lucas, as *maitre de forges* of M. de Quenel. Lucas had previously lived adjoining the forge of Neuville-Ferrières; he died in 1509. In 1515 the forge was leased to Guillaume de Fry, a Neufchâtel merchant. In the 1530s the forge (de Vienne) was being run by Guillaume's son, Robert de Fry, who got into increasing financial difficulties, was imprisoned for debt in 1537, and died later that year. Guillaume made over a half share in the forge and in the *fonderie* of Neuville-Ferrières to Pierre Gascoing the elder and Pierre Gascoing the younger, who were to pay half the 35 *livres* t. rent on the *fonderie* but only 5 *livres* of the 53 *livres 5 sous* t. due on the forge.

Around 1540 iron from this forge was sold in bars and in 125lb. plates in Neufchâtel to Bures, further down the Béthune river and to Eu, adjoining Tréport.

Personnel Jean Deucquiere *alias* Louvet, 1501-1504. Jean Foulion, hammerman, 1534.

17. La fonderie de Neufchâtel

Blast Furnace

Location Unknown, but in the vicinity of the moulin Bleu on the Béthune, NE of the D1, about 1km SW of Neufchatel-en-Bray.

Site *La terre de la fonderie* was one of the bounds of a three-cornered islet conveyed along with the tanning and fulling mills of Ste-Radegonde to the ironmaster Jean Lucas by M. de Quenel in 1504; the other bounds were the mills and the river which served them. There

is no doubt that the mills, both of which are shown on Cassini's map of 1744, occupied the site of the present moulin Bleu. Mlle Arribet notes small scatters of slag at three points on the right bank of the Béthune between 200m and 500m below the moulin Bleu, but the evidence seems insufficient to confirm the former existence of ironworks.

History

In 1504 the *terre de la fonderie* was held by the heirs of Jean Angreville, who was dead by January of that year. It seems probable that the *fonderie* was designed to provide sow iron for de Quenel's *forge des Iles*. Jean and Aubery (his brother?) Angreville were tenants of M. de Quenel, who moved from Neuville-Ferrières to Neufchâtel-Aubery to Pouvray in February 1483 and Jean to the *rue Ste-Radegonde* before November 1486 (possibly in December 1482). These dates, 1482 and 1483, give us possible dates for the building of the *fonderie*. The 1504 lease of the Ste-Radegonde mills has a clause precluding its lessee from pounding so much water as to impede the water wheel of the *forge des Iles* but makes no reference to the *fonderie's* need of water. This might imply that it was no longer in use and that the forge was now able to obtain sow iron from the *fonderie* at Neuville-Ferrières, which could well have been built at this time.

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