



Map of Rotherfield Manor c1597.
Courtesy of East Sussex Record Office ACC 0363-111

Field Notes

The Wealden 'Double Tuyere'

A Contemporary Illustration of 16th Century Ironworks

Witley Park Furnace, Witley, Surrey

The Landscape of Witley Park Furnace Site

Anthony Fowle: Wealden Ironmaster and Lawyer

Index

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**Wealden
Iron**

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FIELD NOTES

Compiled by J. S. HODGKINSON

Two Bloomery sites in Hadlow Down, East Sussex

Vivienne Blandford

Waste Wood has been split into different plots and thus the wood has been split into multiple ownership. The part of the wood surveyed is called Garth Wood. The underlying geology is the Ashdown Beds and the wood is on a fairly gentle slope from the main track. To the north and east the wood is incised by a typical deep woodland gill whereby the ground drops abruptly away to a small stream. In two locations where the ground had been disturbed by rabbit burrows, slag was found on the surface. In this area the ground has been levelled over a considerable area, approx 150 metres by 90 metres, forming a sizeable platform. On the lower edge of this area, at TQ 5217 2356, slag spreads out along the top edge of the gill stream for approximately 20 metres, possibly from two separate sources. This may not be the case as the slag was most evident at the surface where there had been animal activity. The ground drops steeply away to the valley bottom at an angle of 45 degrees for about 8-10 metres where the slag has been tipped over and spread out.

Another possible bloomery site was located at TQ 5195 2318, some 100 metres to the north-west at 0.25 metres above present stream level. There was a sub-circular spread of about 6m of darkened, fine burnt soil with some large lumps of tap slag.

A Bloomery site in Mountfield, East Sussex

Tap slag has been found in considerable concentration along the bed of the Glottenham Stream from TQ 72319 22297, where the largest pieces are to be seen, for a distance of about 100 metres downstream to the north-east. The slag is notably dense, with few bubbles except on the surface, and some large slabs measuring as much as 300mm across are to be seen. A piece of furnace lining, about 200mm x 150mm, was also noted. Despite the concentration in the stream there was no evidence of slag in either bank. The south bank was heavily eroded, and it is suggested that the site had been completely eroded into the stream. The stream had formerly been covered by a pond, and the north bank is likely to have been covered with a layer of silt.

Toll Wood Bloomery, Battle, East Sussex - correction

The location of the above bloomery site, noted in *WIRG Bulletin* 2nd ser. 28 (2008), 5, is corrected to TQ 7156 1797, with the woodland more accurately identified at Brickhouse Shaw. The slag heap is visible on the west bank of the stream and can be exposed once the surface is broken. The site lies on Ashdown Beds, with Sand in Wadhurst Clay just to the west.

A Bloomery site in Hartfield, East Sussex

Vivienne Blandford

A small concentration of bloomery slag, including some tap slag, has been discovered at TQ 4440 3229, on the north side of Tabell Ghyll, on Ashdown Forest. The site, which measures about 6m N-S and about 5m E-W, lies on gently sloping ground approximately 30m north of the stream. Uneven disturbed ground approx N-S 6m, E-W 5m and some tap slag and possibly part of the furnace lining was found in a tree throw. Another site

has been identified previously on the same side of the stream at TQ 4455 3236.

The geology is the Ashdown Beds and the stream cuts through the woodland, dropping steeply for 500 metres after which the ground levels out. This stream is upstream of the early post-medieval iron working site at Newbridge. The woodland cover now is young, mixed woodland mainly of young birch but with older stands of yew. To the north of the gill is coppiced chestnut woodland. Along the stream boundary bank is evidence of older, managed trees of coppiced hornbeam, beech, some yew and holly. The bracken cover is fairly light except to the south where the tree cover is less and the ground levels out at the top of the woodland gill limits.

It is interesting to note, that both bloomery sites had, in close proximity, both a charcoal platform and a circular platform which showed no evidence of burning. It is possible that these could be either working or living areas. Evidence of more than fifteen charcoal platforms were found. A boundary bank ran alongside the stream and along the top of the gill edge. On the stream side, running roughly in an east-west direction, was an older hollow way which dropped down to stream level at an obvious crossing point where three to four hollow ways from the south converged at this point. There was possibly a sandstone slab in the stream (at some depth) and a single hollow way ran in a north-easterly direction uphill towards the road. At this point, on the north side of the stream was a raised sub-rectangular level platform area, about 7m by 5m, surrounded on two sides by a trackway/hollow way. The soil on the platform was dark and contained pieces of charcoal. Whilst this was not a charcoal platform it may have been where charcoal was stored before being carted away. The soil in the hollow way was, in places, very dark with some evidence of charcoal leading to the conclusion that charcoal had been carted out of the immediate area, in some quantity. Also noted in the survey area were a couple of saw pits and possible military dug outs.

A Bloomery site in Benenden, Kent

David Brown

Some large masses of slag had been located in a stream in Strawberry Wood having appeared since the winter's rains of 2009-10. This site is close to two other bloomery sites found in March 2009 at New Barn Shaw¹ and sharing similar geology, lying on a narrow outcrop of the Ashdown Beds with Wadhurst Clay (a probable source of the ore) immediately to the north. The lumps of slag, the largest of which were in excess of 250mm in length, were located in the stream bed within 10m upstream of the newly-restored culvert at TQ 8133 3190. A slag heap approximately 0.3m thick and measuring 2.5m long by 1.5m wide was seen in the eroded bank of the stream on its N-W side. No tap slag was noted, and the masses of slag, which bore the marks of having flowed over lengths of wood, appeared to have formed at the bottoms of hearths. No other slag was found within 50m upstream. The search was not continued further upstream as it was considered the geology did not warrant it. Pieces of the slag were subsequently removed by Victor Kellett, a WIRG member, for cleaning and closer examination.

South of Benenden, Dr Ernie Pollard, a local historian, had located a Furnace Field on a 19th century map. A visit by B. Herbert and R. Houghton some years ago failed to find any evidence of a furnace. The opportunity was taken to see if a second search would shed light on the origin of the name. The geological memoir for Tenterden states, "A 5ft seam of red and grey-green silty clay has been traced above the base of the formation [Tunbridge Wells Sand] in the outcrops south of Iden Green ... A more strongly developed seam, 20ft thick, crops out in the valleys of the small streams around Dingledden ... The clay is grey-green in colour when weathered and is generally reddened in the upper few feet; it commonly contains numerous small granules of sphaerosiderite. A number of old pits are sited on its outcrop in the valley of Dingledden Farm. The remains of a dam in the valley probably marks the site of a former hammer-pond associated with the old Wealden iron industry." ²

The stream to the east of Furnace Field was searched for slag from about 100m downstream (south) of the southern edge of the field to the

northern edge of the field. No slag was found. An earthwork in the form of a sinuous bank, approximately 1m in height running N-S adjacent to the stream from TQ 8205 3068 to TQ 8204 3070 appears to have been spoil from excavations on the east bank. A further earthwork having the appearance of and position appropriate for a pond bay, would have dammed the stream at the northern end of Furnace Field. Furnace Field itself could have been the site of a quarry, as its profile did not match that of the bank on the east side of the stream, and a certain amount of quarrying had taken place to the south of Furnace Field on the same side of the stream.

It was considered unlikely that Furnace Field had any connection with the iron industry. Possible sources of the name included a corruption of a local family name, Furner.

A Bloomery site in Brede, East Sussex

Jonathan Prus

There is a small system of pits in Little Park Wood running from TQ 815 187 on Brede Lane/Pottery Lane, Brede and TQ 814 186 at the edge of the wood, down hill towards the River Brede. Near the road the pits are of the small shaft type, but there is a much larger pit with a highly irregular shape at the southern end of this line. This large pit has a spoil heap, dividing it into two, at its centre. There is no drainage channel to allow water to escape from this pit, so we may guess that, sitting on the lower edge of the Wadhurst Clay, it drains naturally through the sand below. There is, however, a cart access at the southern end of this large pit that looks as if it may have joined a hollow-way heading south.

There is ore present at the surface over the pitted area and also in the surface of the hill-wash below. Nodules of ore are also present in the bottom of the large pit near the cart access. These pits were examined in detail because it seemed likely that they may have fed Brede furnace. There are pits apparently connected to Brede Furnace, in the same geology, about 500 metres away. However, the Little Park Wood pits are surrounded by bloomery slag which makes it

most likely that they fed a very local bloomery at an earlier date. This slag, mostly tap-slag, is exposed close to the lane where foot traffic on an informal footpath has scraped the earth bare. It is difficult to map the extent of this slag because the amount of fly-tipping and agricultural waste precludes the use of a metal detector. More slag is exposed along the line of the pits, partly through the wear of the informal footpath and partly in the spoil of a badger set. A large piece of slagged waste, probably furnace wall, can be seen at TQ 814 186 and this may mark the approximate location of the bloomery.

The tap-slag exposure near the lane is uphill from the road itself which makes it unlikely that this slag was introduced as road-metal. There was, also, a single surface find of blast furnace slag at road level, so it is possible that some of the material from Brede Furnace was used to make Brede Lane/Pottery Lane, or perhaps dropped from a cart as it was transported elsewhere for some other purpose.

A Bloomery in Brightling, East Sussex

Jonathan Prus

A scatter of slag has been noted above the confluence of two un-named streams at TQ 6774 2004 in the south-east corner of Purchase Wood, about 1.1km south west of Brightling church. Located after finding fist-sized lumps of slag in the bed of the larger stream, slag has been found on the surface over several metres, although the full extent of site has not been ascertained. Finds appear to include little or no tap-slag.

Notes and References

1. Brown, D., 2009, 'Two bloomery sites in Benenden, Kent', *Wealden Iron*, 2nd ser., **29**, 5-6.
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THE WEALDEN ‘DOUBLE TUYERE’

JONATHAN PRUS

In 1963 Henry Cleere described a ‘double tuyere’ found in association with a bloomery furnace. This artefact may be regarded as the type-specimen for a number of similar finds made in the decades since. The purpose of this note is to highlight some problems with the interpretation of this class of object.

A key fact about double tuyeres is that they are a good shape for their imputed purpose: all examples appear to have flared ends. Aerodynamic theory predicts that if a jet of air is blown into the flared end, that its curvature will accelerate the jet and reduce its pressure to a point where it may be below atmospheric pressure: it may even draw extra air into the furnace. This is the Venturi effect, also known in some of the literature as the *Bernoulli* effect.

Flared tuyeres have been tested experimentally by the writer, using wooden models.¹ The results of these experiments suggest that, although a flared tuyere does obviate the need for a seal between bellows and tuyere, the interpretation of Cleere’s double tuyere remains problematic.

Experimental tests

The following ideas were tested:

1. that the Venturi effect is real and measurable at scales relevant to a plausible tuyere system
2. that the size of the tuyere flare relative to the width of the air jet are variables that effect the efficiency of the tuyere system

that tuyere and bellows-nozzle bore are critical to the volume of air flow.

The following parameters were measured:

1. maximum air pressure delivered by board bellows
2. maximum air pressure delivered by bag bellows.

Table 1. The model tuyeres, measurement in mm.

model	bore	Flare width	Flare depth	Model length
I	20	40	22	160
II	20	30	18	160
III	13	30	18	160
IV	9	28	15	160

Table 2. Tuyere-nozzle combination where below-atmospheric pressure was detected using a manometer connected to the flare of the tuyere.

	Nozzle:		
model	16 mm.	9 mm.	6 mm.
I	Y	Y	Y
II	N	Y	Y
III	N	N	Y
IV	N	N	N

Table 3. Recorded air throughput for differing nozzle-tuyere combinations.

Model	Blower nozzle bore (mm)	Tuyere bore (mm)	Tuyere bore (mm)	Jet towards flared end?	Optimum jet Position* (mm)	Blower pressure in Pa.	Max. airflow (litres sec ⁻¹)**
I	16	20	20	yes	12	1120	6.5
I	16	20	20	no	contact	1120	6.5
II	16	20	20	yes	5	1120	6.25
II	16	20	20	no	5	1120	6.5
III	16	13	13	yes	contact	1120	3.5
III	16	13	13	no	contact	1120	3.75
IV	16	9	9	yes	contact	1120	2
IV	16	9	9	no	contact	1120	2
I	9	20	20	yes	42	1550	3.5
I	9	20	20	no	20	1550	3.0
II	9	20	20	yes	18	1550	3.5
II	9	20	20	no	0	1550	3.5
III	9	13	13	yes	5	1550	1.5
III	9	13	13	no	contact	1550	2.0
IV	9	9	9	yes	contact	1550	1.0
IV	9	9	9	no	contact	1550	1.5
I	6	20	20	yes	No data	1800	<1
I	6	20	20	no	No data	1800	<1
II	6	20	20	yes	No data	1800	<1
II	6	20	20	no	No data	1800	<1
III	6	13	13	yes	No data	1800	<1
III	6	13	13	no	No data	1800	<1
IV	6	9	9	yes	No data	1800	<1
IV	6	9	9	no	No data	1800	<1

* The position of the nozzle relative to the tuyere is measured from the beginning of the bore, not the beginning of the flare.

Table 4. Pressure developed by different bellows types (1): maximum plausible.

Type	Cross-sectional area (m ²)	Maximum plausible Pressure (Pa)	Downward force implied (N)
board	0.22	3300	726
bag (1)	0.14	5100	714
bag (2)	0.15	4200	630

Discussion

From the results reported above it is clear that the Venturi effect is real and significant at scales relevant to bloomery furnaces, and with rough surfaces and slightly irregular shapes consistent with those expected in a bloomery context. It is also clear that the juxtaposition of a nozzle and a short tuyere with a flared end obviates the need for a sealed conduit between bellows and furnace. Given a plausible arrangement of nozzle and flare, near maximum efficiency can be achieved even without contact between them. Indeed, the result of blowing from a 9mm nozzle into a 20mm tuyere appears to confirm that the Venturi effect may draw additional air into the system. However, it is also clear that a nozzle smaller in bore than the tuyere is required and that the smaller the nozzle the harder the work pumping air into the system. Using (say) a 9mm tuyere would be challenging, even if a airtight seal could be achieved. Achieving an airtight seal (using wet clay perhaps?) for the duration of a long smelt might well be difficult. Further, if such an airtight seal was created, the flare of a double tuyere would appear to be redundant.

Cleere (1963) was careful to note that the flared end of his double tuyere was slagged. In order to gain the benefits of the Venturi effect, the flared

end of a tuyere should be on the outside of the furnace to receive a jet of air. The simplest explanation of this anomaly is that the object is not a tuyere and that it had some other function that required it to face wide-end inwards. However, we might posit other possible histories for it, and/or invoke the possible existence of an air-tight seal between the bellows nozzle and the tuyere. Apparent use of Venturi effect has been reported in modern ethnographic studies, but we know little or nothing about the use of tuyeres in Roman Britain. It would be rash to re-classify the Cleere artefact on the basis that it seems to have been used back-to-front.

More puzzling are the very small bores of the Cleere artefacts. The amount of work required to pump air through a pipe is not proportional to its diameter: it increases exponentially as the diameter decreases, and although the relationship is complicated by turbulence, compressibility and the internal characteristics of the bellows and nozzle, this exponent is about 4. Thus, at a first approximation, reducing the bore of the tuyere from 20mm to 10mm could require about 16 times as much work to get the same throughput of air. At a first approximation the working pressure (P) required varies with the diameter of the tuyere (d) thus:

$$P \propto d^{-2}$$

It is this, rather than the work done in moving the air, that would make a small bore tuyere inconvenient. In addition to the constriction of a small bore tuyere, the question of the air jet from the bellows nozzle may not be ignored: the results reported above suggest that a small bore tuyere should be matched to a smaller bellows-nozzle, increasing the work required still further. During the reconstructive experiments reported above an attempt was made to use a 6mm nozzle to utilise the Venturi effect with the 9mm model tuyere. The airflow available was less than 1 litre per second with every configuration tested and could not be measured with the airflow meter used. Where a larger bore nozzle was used in conjunction with the unflared end of the 9mm model, airflow was small (see results table above). Thus although small-bore nozzles and tuyeres *might* be used to conduct a successful smelt, there would have to be several to each furnace, with working space imposing a severe

constraint.

Using the theoretical rather than practical results, a pressure of 3300 Pa should drive approximately 2.7 litres per second through a short 9mm pipe, but this is premised upon an airtight seal between bellows and pipe, and upon continuous rather than pulsed pumping.

The “doubleness” of the artefacts is another puzzle. If they were used by pairs of bellows operators, then the nozzles would have to have been remarkably long to allow sufficient working space for bag bellows. If paired pot bellows were used by single operators we would expect to find the ceramic evidence at many bloomery sites, but such evidence is signally absent. (However, if we continue to interpret these artefacts as tuyeres, an inescapable conclusion is that the gas pressure within the furnace must have been below atmospheric pressure: otherwise there would have been a constant problem with the escape of hot gas into the bellows.)

Understanding the nature of the air inlets to bloomery furnaces is not, however, simply a matter of understanding the technology used to make iron in pre-modern ages. Tuyere size affects the number of people required to operate a furnace and therefore affects the relationship between iron production, the natural environment, agriculture and the social and economic structures within which it occurs.

If we judge that these artefacts are not tuyeres some alternative interpretation will be needed. Although any alternative will have to be tested experimentally before it can be accepted, three candidate re-interpretations exist:

- that the objects are inspection holes whose function was to allow the operator to judge the temperature of the process
- that the holes allow air into a space above the charge but well below to furnace top, causing residual carbon monoxide to burn inside the furnace, hence increasing the stack effect and increasing air throughput

- that the holes introduced additional air to the charge creating an additional hotspot around which the bloom could begin to coalesce.

These conjectures are not mutually exclusive. Each explanation is consistent with the artefacts being baked *in situ* around tapered pieces of wood. It will not escape the attention of students of the Wealden iron industry that the frequently occurring pieces of slag sometimes called ‘tuyere plugs’ may be casts of the interior parts of Cleere-type artefacts from contexts where the furnace wall fabric has not been ceramicised. Such casts could have formed if the flared ends were on the inside of the furnace or if the narrow ends faced inwards and were (inadvertently?) positioned to collect slag.

Conclusion

Whilst it is not impossible that tuyeres with diameters as small as 9 mm were used in bloomery smelting at some time and in some places, it is probably incorrect to interpret a Wealden double tuyere as the principal air inlet for a pumped system.

Appendix: Apparatus, accuracy and procedure

Pressure measurements were made using a *Testo* 510 digital manometer connected to the various test points by flexible 4mm tube. The meter was set to read pressure in Pascal. The accuracy claimed by the manufacturer is ± 3 Pa at the relevant pressures, but this level of accuracy is immaterial given the variations in observed blowing rates and the likely error levels in distance and airflow measurements.

Airflow was measured using a meter built by Brian Herbert and previously calibrated. The existing calibration was checked using an orifice plate with the manometer and appeared consistent to ± 0.5 litres per second in the range 0.5 to 7 litres per second.

The tuyeres were modelled in wood with small apertures at either end (perpendicular to airflow direction) through which system pressure could be measured.

Air was blown continuously by an electrically powered blower.

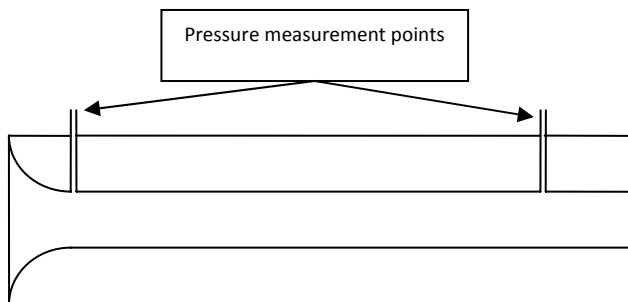


Figure 1. Generalised view of model tuyere

Airflow measurement: A blower was connected to a straight-pipe nozzle. The model tuyere was then connected to the airflow meter and the jet from the nozzle directed at the end of the tuyere. The relative positions of the nozzle and the tuyere were then adjusted by hand until a maximum airflow was achieved. The distance between the nozzle and the tuyere was measured with reference to a 300mm rule, but the recorded measurement may be regarded as accurate to ± 5 mm, except where there is no separation and the maximum was recorded at zero.

Venturi effect detection: A jet of air was blown at the ends of the model tuyeres with the manometer connected to nipples at either end of the model. The criterion for identifying Venturi effect was a pressure reading negative with respect to atmospheric pressure.

Bellows pressure measurement: The manometer was connected to the discharge nozzle of the bellows so that, except for leaks from the bellows, air could not escape. The bellows were then plied with an effort thought to be the maximum likely in practice and the resulting pressure maxima recorded.

Note

1. Tristan Bareham is thanked for the use of the bag bellows, and for the time and effort he put into helping to test them. Brian Herbert is also thanked for providing an air-flow meter and pumping the board bellows he provided.

Reference

Cleere, H., 1963, 'A note on Roman bloomery tuyeres'. *Sussex Archaeological Collections* 101, 48-53.



Fig. 1 A personification of Mars, engraved by Jan Sadeler after Marten de Vos 1585 (©Trustees of the British Museum)

A CONTEMPORARY ILLUSTRATION OF A SIXTEENTH-CENTURY IRONWORKS

J. S. HODGKINSON

A set of late sixteenth-century engravings illustrating personifications of the planets then known was the source for designs on some early eighteenth-century English firebacks.¹ The collection of engravings was entitled, *Planetarum effectus et eorum in signis zodiaci*, and were the work of Marten de Vos (1532-1603), an important Mannerist painter and prolific draughtsman based in Antwerp.² Engraved by Jan Sadeler, they were published by him in 1585 under a dedication to Alessandro Farnese, Duke of Parma and Governor of the Spanish Netherlands.

Each of the seven planets portrayed, which included the Sun and the Moon (Uranus, Neptune and Pluto having yet to be discovered), was shown driving across the heavens on a chariot drawn by associated figures, birds or beasts. Beneath was a landscape populated by examples of humanity engaged in activities relevant to the supposed astrological qualities of the particular planet. On the engraving depicting Mars (Fig. 1), as might be expected, the landscape is dominated by scenes associated with warfare: sieges, sea and land battles, rape and pillage. Of particular interest in the bottom left corner is a group of buildings for the production of guns identifiable as a blast furnace and forge (Fig. 2).

Contemporary illustrations of sixteenth-century ironworks are largely confined to the works of a few painters of whom Lucas van Valckenborch, Herri met de Bles and Jan Breughel the Elder are best known.³ However, van Valckenborch and Bles, respectively, tended to depict the same furnaces in each of the pictures where they appear,⁴ and



Fig. 2 Detail of Fig. 1 (©Trustees of the British Museum)

only one painting of an ironworks is known by Breughel.⁵ Contemporary illustrations of Wealden ironworks are scarce and insubstantial.⁶ The ironworks portrayed by van Valckenborch and Bles are likely to be ones located along the River Meuse or its tributaries, and there is every reason to suppose that Marten de Vos drew his inspiration from the same region.

The group of buildings is shown fronting a watercourse, with a mill leat flowing into it from a water wheel adjacent to the building on the far left of the picture. This appears to be a forge as there is a figure hammering on an anvil in front of it, and what may be a mechanical hammer also visible. Typically open-fronted, its roof is partially open to the sky although the reason for this is not clear. The furnace, identified by the flames spouting from the top, is the building behind and offset to the right, with its own water wheel although without any obvious tail race. Both the furnace and the forge would seem to be thatched, a common

feature of the buildings that comprise ironworks in several of the other illustrations of the period. To the right of the forge stands a blacksmith's, again open-fronted and with a chimney apparently spouting flames, and a group of smiths at the front hammering at an anvil; there is no water wheel associated with this building. There is another mill with its own launder and water wheel behind the furnace, and other associated buildings, all of indeterminate purpose.

The two cannon lying on the ground in front of the forge look as though they still have their cores in place, so perhaps one of the other buildings houses a boring mill. The continental practice in the late sixteenth and early seventeenth centuries was to ream the barrels of cast guns on a horse-driven, vertical mill, while the English practice was to use a water-driven, horizontal mechanism.

The water course in front of the buildings flows from right to left, the main stream tumbling over a low weir close to the two figures on the opposite bank, with the tailrace from the forge wheel turning sharply to the left, presumably to merge with the main stream just below the bottom of the picture.

The accuracy of this scene, given that its purpose was to illustrate a broad theme rather than the details of ironworking, should not be given too much credence, yet contemporary eyes would have been critical if it had strayed too far from what may have been a familiar sight. With a paucity of illustrations of ironworks in the Weald, any opportunity to view period examples, albeit foreign ones, can be instructive.

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3. Cleere, H. F. & Crossley, D. W., 2nd ed. 1995, *The Iron Industry of the Weald* (Cardiff, Merton Priory Press), 221.

4. For an example see Hodgkinson, J. S., 2008, *The Wealden Iron Industry* (Stroud, The History Press), 96.
5. Brueghel, Jan 'the Elder', *Landscape with foundry*, oil on copper, 13 x 18cm, Galleria Doria Pamphilj, Rome.
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WITLEY PARK FURNACE

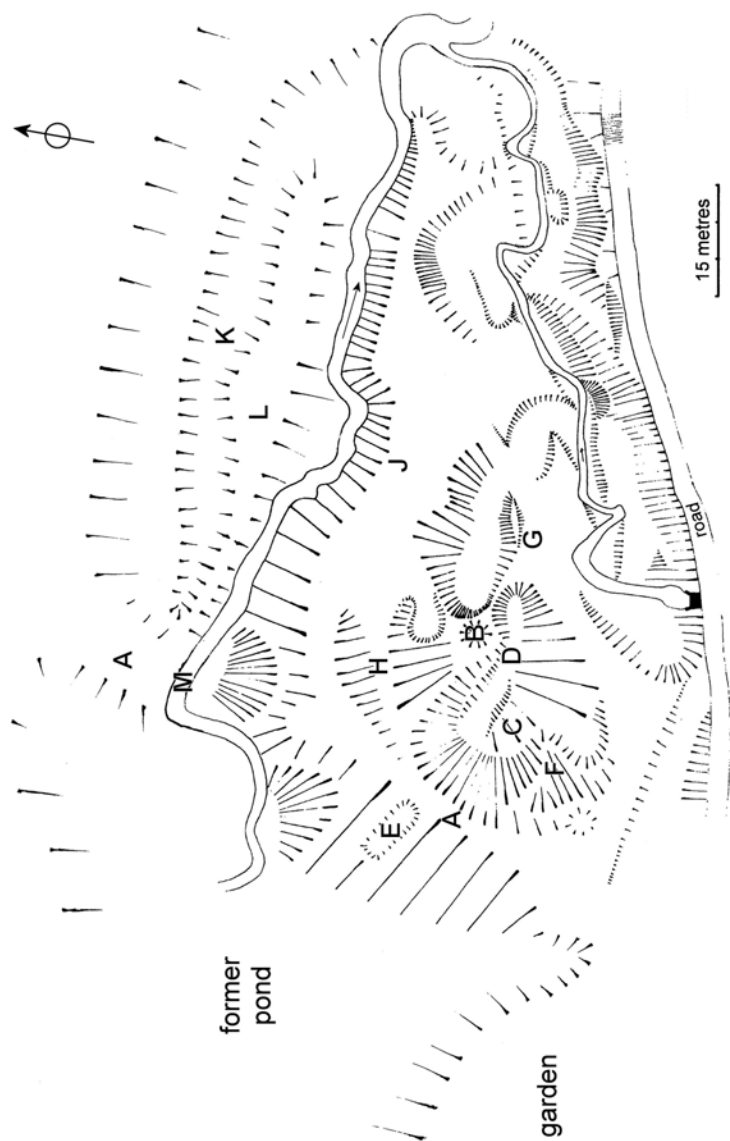
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corrected to SU 9275 3740

J. S. HODGKINSON

This site was first noted by Felix Holling, having been missed by Straker, and although recorded by Cleere and Crossley they offered no individual operational history for the works.¹ Despite the relevant documentary records being somewhat confusing, particularly in the differentiation of individual forges and furnaces, it is likely that the furnace formed a group with the forges at Thursley² and was worked contemporaneously, in part at least, as there is a significant quantity of blast furnace slag at the site indicating sustained operation. In fact, Straker noted that “in 1730 ... there was enough iron in Witley Park (on the clay) for two forges”.³ The site description given by Cleere and Crossley was based on the report by Tebbutt following a site visit published in 1977.⁴ In 1980, Haslemere Archaeological Group carried out a detailed topographical survey of the site (Fig. 1), a copy of which was placed in the WIRG sites archive. From it, the features described in 1977 can be identified but the survey itself was not annotated. The site was revisited by members of the WIRG Field Group in February 2011, and what follows is a reconsideration of the layout of the site related to the 1980 survey which objectively recorded the surface features.

The 1977 report indicated that the bay (A) is about 65m long and unusually high at about 3.5m on the upstream side and 4.5m downstream. The reason for this may be because the valley upstream is relatively narrow and a high bay would allow as great a surface area as possible for the pond were the water for the bellows wheel to be drawn from the top. Draw-off might have been at a lower level; however, no evidence was seen of an entry point for such an arrangement. Where it was breached at



the northern end the dam appeared to have been made of clay, which is the natural sub-soil on the site. Material for the construction of the bay may have been derived from the south side of the site, to the west of the small tributary stream.

The circular hollow (B) described by Tebbutt as the possible site of the furnace is still evident, although the fact that the material into which it was formed was furnace slag, in common with the surrounding area, makes this identification less likely. The hollow appears to be on top of a small rise, but this can be accounted for by the quarrying away of quantities of slag, with which most of the site is covered, leaving the hollows of various sizes that can be seen on the plan. A more likely site for the furnace is a more-or-less level area (C) immediately to the south west of the channel that Tebbutt identified as the wheel pit and tailrace (D). This elongated depression, at right angles to the bay, lies opposite a hollow (E) on the upstream side of the top of the bay, possibly the site of a sluice. Probing into the level area revealed pieces of brick or burnt stone, from which a furnace structure might have been composed. Further evidence that this was the site of the furnace was black-stained soil on the slope (F) adjacent to it, the likely site of the charging bridge. This dark soil had been recorded in the site archive following the 1977 visit. It has been noticed on other sites that charcoal was often stored and loaded into the furnace from a high point close by. Examination of the soil above this bank did not, however, show the same black staining, although the presence of a building (now a garage) suggests that some movement of the soil may have taken place since the furnace was in operation. As Tebbutt described, the water channel appears to have been culverted along part of its length (G), although this may also be where the channel was filled in subsequently to facilitate access when slag was being dug away from areas within the site for use elsewhere.

The slope from the top of the bay (H), which Tebbutt suggested might have been the loading ramp for the furnace were it in the hollow (B), is

Opposite page:

Fig. 1 Plan of Witley Park furnace (Haslemere Archaeological Group 1980, with additions 2011)



Fig. 2 Witley Park furnace site – view looking NE from the bay

more likely to have been used as access for the dispersal of the considerable quantities of slag that was spread along the north side, and much of the rest of the site (J). The surface of this area of slag is noticeably level, it probably being made so deliberately to give ease of access for slag dumping farther down the site as the volume being disposed of increased over the operating life of the furnace.

Neither mentioned by Tebbutt, nor shown on the 1980 survey, possibly because it lies on land that is not in the same ownership as most of the furnace site, is a channel (K) to the north of the present stream, which has been surveyed for this report and incorporated with the earlier plan. This channel, which is separated from the stream by a bank (L), merges with it near the end of the site close to the eastern extremity of the slag bank. On many furnace sites there is a channel along which surplus water from the

pond was directed, and separated from the working area by a substantial bank to prevent the site being flooded at times of heavy water flow. Where the location of this particular channel is problematical is in the apparent absence of evidence of a former spillway at its western end, close to the end of the bay and north of the breach where the present stream flows through (M). It has been postulated that the channel (K) might have been a natural feature, predating the creation of the furnace site. The bank (L), however, seems to be man-made, possibly utilising the natural slope on the north side of the site to form the channel. A small amount of slag was noted on the top of the bank, possibly indicating measures to reinforce it.

The assumption in Tebbutt's description was that the original spillway was where the bay is breached by the stream. It may well be that the stream follows its original course but that the creation of the pond bay reduced it to a dry bed while the furnace site was in use. Possibly diverted to some extent by the encroachment of the slag bank that extends along much of its length, it became an active watercourse again when the pond bay collapsed. From the degree to which the stream has scoured its present bed this is likely to have occurred not long after the furnace went out of use (if it did not actually precipitate its demise). Significantly, perhaps, the pond is not shown on John Rocque's map of Surrey of 1768.

The bays of two former pen ponds have been noted on the furnace stream at SU 9205 3720 and SU 9231 3732. Tebbutt noted minepits in Wareham Rew, which is the wood to the south of the tributary stream, and in the Tithe Award for Witley parish a group of fields called Little Minepits, Great Minepits and Little Minepit Row has been noted to the north east of Witley Farm, centred on SU 9205 3695, where Worssam noted that the uneven surface of the ground suggested that it may have been dug over.⁵ He also noted minepits adjacent to these fields in Denyards Copse (SU 926371) and Hopkiln Reeds (SU 936373) and, further to the east, in Minepit Copse (SU 955373), Hambledon Hurst (SU 963373) and Blunden's Wood (SU 974373).

The discussions which took place during the recent visit to this site have been central to the interpretation in the above report, and I must record

my thanks to Gerald Baker, Robin Barnes, David Brown, John Collett, Tim Smith and, in particular, Bernard Worssam, all of whom contributed to those discussions. I am also grateful to Mr and Mrs S. Prichard for permission to examine the site.

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THE LANDSCAPE OF THE WITLEY PARK FURNACE SITE

B. C. WORSSAM

The site of Witley Park Furnace is interesting from the point of view of landscape development, in that its furnace pond would have been created by the damming-up of a valley over-deepened in the geologically recent past as a result of an episode of river-capture.¹ There must originally have been a broad and shallow valley here, draining eastwards into the River Wey, a north-flowing tributary of the Thames, at the site of what is now Dunsfold Common, 8km (5miles) downstream from the furnace. The floor of this shallow valley is indicated by patches of river-terrace gravel at 80m (260ft) OD close to the furnace site (at SU 9240 3720 and 9290 3725 to be exact). These would have graded gradually down into First-Terrace gravel of the River Wey at 55m (180ft) OD at Dunsfold Common, but are now 12m (40ft) or so above the valley bottom, while the stream, instead of flowing into the River Wey, turns south-eastwards at Dunsfold to join the south-flowing River Arun.

This drastic change of the stream's course must have happened during the Last Glaciation, which reached its peak 20,000 years ago. Although the ice then got no farther south than the north coast of Norfolk, the whole of southern England would have been a tundra region with the ground deeply frozen. During warming-up of the climate, as ice-sheets farther north retreated, excessive flooding must have affected all Wealden rivers. This is evidenced by the presence on the Weald Clay outcrop of extensive sheets of river gravel that originated as solifluction deposits on the slopes of bordering high ground, in the case of Witley Park the nearby Lower Greensand escarpment.

The whole of the River Wey valley is higher than that of the Arun. This is because the Wey has a much longer course, via the Thames, to reach sea-level than does the Arun, which flows directly southwards into the English Channel. It is then quite conceivable that flood-water building up at Dunsfold may have overtopped a low watershed separating the Wey valley from that of the Arun, to eventually establish a permanent course into the lower-lying river. This type of river-diversion is described in geography text-books as river capture, though it could equally well and more accurately be called river surrender. The stream that has lost its headwaters is spoken of as beheaded. Beheading of the Wey has incidentally provided an ideal site for Dunsfold Aerodrome, which occupies the former Wey floodplain just to the east of Dunsfold Common, now merely a level tract of ground, free from flooding because its river has dwindled to become little more than a drainage-ditch.

As for Witley Park Furnace, a high bay was necessitated by the original valley having been deepened to grade into that of the Arun. And a high bay built of Weald Clay may have presented a stability problem, for there is no evidence of the bay where it would have crossed the present stream. This could suggest a sudden collapse, as catastrophic in its way as the overflow that led to diversion of the river five miles downstream.

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ANTHONY FOWLE (1567-1647): WEALDEN IRONMASTER AND LAWYER

PAMELA COMBES

Introduction

The gazetteer in the latest edition of *The Iron Industry of the Weald* notes the interests of Anthony Fowle in various ironworks, including Markly Furnace in Warbleton, Maynards Gate Furnace in Rotherfield and Maresfield Forge, all of which are mentioned in his will.¹ That document also reveals something of the extent of his landed property as well as the marriage alliances made by some of his thirteen children. Those connections demonstrate that the Fowles continued the tradition of intermarriage with the families of other ironmasters that was noted by Jeremy Goring as a trait of the immediate family of Anthony's uncle Nicholas Fowle (see Appendix 2, table 1).² Nicholas Fowle and his family are frequently cited as notable ironmasters, possibly because Nicholas built the ostentatious Riverhall mansion house near their furnace in Frant that can still be seen today. It is curious that Anthony Fowle has remained comparatively unnoticed since there is no doubt that his influence within the wider community was significant. During his long and active life Anthony was not only a major ironmaster but also a lawyer, serving for many years as a JP, as sheriff of Sussex in 1637/8, and on the county committee during the Commonwealth.³ His son Richard, who inherited his Newick property, was also of some standing in the county community, serving as a grand juror at the Assizes on five occasions between 1653 and 1659.⁴

This note seeks to demonstrate the position of Anthony Fowle in county society and particularly draws attention to the marriage connections of his children and of his sisters, especially those with other ironmasters. His will is of particular interest to members of WIRG and a transcription is included here as an appendix. The will itself identifies many of the family relationships. Where possible others have been researched in detail, but some information has been derived from secondary sources. It is clear that family relationships were important to Anthony Fowle, all his surviving children and his then living grandchildren received some remembrance in his will. After Anthony's time the story is one of slow decline. In the longer term only the Rotherfield branch of the family flourished – and then only into the mid 18th century.

As was customary, his will records only the land he held on lease. His major estate at Newick, does not appear, and there may have been other property which remains invisible for the same reason. Where possible his property has been located, not only that named in his will, but also some that is recorded in other sources but which he may no longer have owned in 1647. His interest in ironworks, in particular at Maynards Gate in Crowborough (formerly Rotherfield) and also Little Forge and furnace in Buxted, is of particular interest and is considered in detail.

The family

Anthony Fowle was the sixth child and only son of Anthony Fowle of Rotherfield and his wife Margery (sometimes recorded as Margaret) Shurlock, daughter and heir of Richard Shurlock of Shurlocks Farm in Withyham. The precise role of Anthony Fowle the elder in the iron industry is open to debate and the evidence is insubstantial, but it is possible that he worked both the furnace at Maynards Gate in Rotherfield from as early as 1562 and Little Forge and furnace at Buxted from about the same date.⁵ It is clear is that the elder Anthony Fowle was a wealthy man. On his death his estate was valued at over £1500. Aware of his wife's pregnancy, Anthony made provision for the unborn child in the will. If a son the child was to succeed to his father's Rotherfield property

at the age of 21.⁶ An inquisition post mortem also records a substantial 120 acre freehold at Fordbrook, which lies to the north and north east of Little Furnace and Forge. Anthony Fowle the younger was baptised in December 1567, a few months after his father's death. Eighteen months later, his mother Margery married the ironmaster Arthur Middleton of Bewbush in Crawley, who by 1574 was recorded as holding not only Maynards Gate in Rotherfield but also Huggets Furnace and Little Forge and furnace in Buxted.⁷

Three of Anthony's five elder sisters married ironmasters. Barbara married Stephen French of Stream Furnace in Chiddingly; Elizabeth, Thomas Hay who had interests in several ironworks including Panningridge Furnace, Beech Furnace, and Kitchenham Forge; and Frances, John Middleton of Horsham, an MP for the borough in 1614 and 1623-28, her stepfather's nephew and heir (see Appendix 2, table 2).⁸ Anthony appears to have maintained business links with members of his sisters' families, leasing Dedisham Forge and Gosden Furnace in partnership with Thomas French and Thomas Middleton in 1597. The French family also claimed an interest in a London property left by Fowle to his youngest son Samuel. In 1649 the family brought a case in Chancery against Anthony's widow Elizabeth and his sons Richard and Christopher, as executors of Anthony's will, claiming that they had advanced some of the money to purchase the property, and therefore had an interest in it.⁹

Anthony initially studied at St John's College, Oxford and was recorded as a student at Gray's Inn by 1588. As a barrister he was frequently consulted by the litigious Sir Thomas Pelham and his legal training would have been as asset to him while serving in his various public roles within the county.¹⁰ Although married three times Anthony Fowle did not select any of his brides from the families of ironmasters. His family was large; he fathered thirteen children of whom nine survived to maturity.

Marriages and children

Anthony's first wife was Margaret, daughter of William Widnall of Tandridge in Surrey. Margaret died shortly after the birth of their only child, a son Nicholas, who was baptised in January 1594 and was eventually to inherit the family property in Rotherfield. Humphrey, the last member of the Fowle family to live as 'squire' in Rotherfield was his grandson (see Appendix 2, table3).¹¹

Elizabeth Austen, daughter and co-heir of William Austen of Twisden in Goudhurst, was Anthony's second wife. They had four children, Austen and Elizabeth, who both died young, and Anthony and Mary.¹² When in 1598 Elizabeth died, their son Anthony inherited her estate at Twisden and, presumably because of this, did not benefit substantially from his father's will. He married Margaret Jefferay, daughter of Thomas Jefferay of Chiddingly, another lawyer. By 1632 the younger Anthony was acting as an exchequer commissioner overseeing the purchase and sale of debt.¹³ Their daughter Elizabeth was left five shillings in her grandfather Fowle's will. When Thomas Jefferay died in 1663 he left his legal books, and a copy of Hollinshead, as well as a choice of his personal papers and maps to his son-in-law, and to his granddaughter 'Betty' a silver goblet, part gilt, and a silver porringer. His daughter Margaret Fowle was one of his executors (see Appendix 2, table 4).¹⁴

Mary, the younger of Anthony's surviving children by his second wife, married a neighbour, Alexander Fermor of Walsh Manor in Rotherfield (now Crowborough), in 1617. Alexander's grandfather Alexander, who was married to Elizabeth sister of Nicholas Fowle of Riverhall, was an ironmaster, casting guns at Hamsell Furnace.¹⁵ Alexander and Mary Fermor had seven children, the eldest four of whom were born before the death of their grandfather and were therefore remembered in his will. Their eldest son William was the father of Henry Fermor, the benefactor who provided the chapel and the school in Crowborough that still bears his name. It is a curious coincidence that the land that was eventually purchased to create an endowment for the chapel and school, now Charity Farm, Crowborough, was owned by Anthony Fowle in 1597 (see

Appendix 2, table 4).¹⁶

Shortly after the death of his second wife, Anthony, by then a JP, was married for a third time to Elizabeth, daughter of Richard Porter of Bayham. By this marriage Anthony had a further eight children, Anne, John, Jane, William, Richard, Christopher, William and Samuel, of whom two, John and the first William, died young (see Appendix 2, table 5).¹⁷

His daughter Anne, who was baptised in 1607, was married twice, first to John Cooper Penkhurst and secondly to Robert Baker. Both the Penkhurst and the Baker families were associated with the iron industry. John's father, Stephen Penkhurst, owned Freshfield Forge in Horsted Keynes and the family also had an interest in Coushopley Forge which, interestingly, in 1693 passed to a nephew of Robert and Anne, another Robert Baker.¹⁸ By her first marriage Anne had two children - Elizabeth and Stephen Penkhurst - both of whom were remembered by their Fowle grandfather when he died. In 1651 Elizabeth married William Dyke.¹⁹ That marriage not only kept alive the family associations with the iron industry but also, through her daughter Sarah, who married Humphrey Fowle of Rotherfield in 1675, provided not only an heir to the Fowle estate in Rotherfield but also, in due course, a coheir of the Penkherst family's extensive landed and business interests.

By her second husband, Robert Baker of Groombridge in Speldhurst, whom she married in 1633, Anne had three children, John, Robert and Mary, who were all left a remembrance by their grandfather.²⁰ Although many of the Baker family were prominent ironmasters there is no evidence that Robert and Mary or their children were actively involved in the industry. The father of Mary's first husband, Stephen Penkhurst, appears to have considered Robert to be untrustworthy, warning in his will that he feared 'they [Mary and Robert Baker] will make but short accompt' of the land at Leigh left by him in trust for Mary's son Stephen.²¹

In 1636 Anthony Fowle's younger daughter Jane married William Wyvill of Osgodby in Yorkshire, having sold the land she owned in Rotherfield

to her brothers, Anthony and Richard, a few days before her marriage. The Wyvills were recusants and supported the Royalist cause in the Civil Wars, initially forfeiting their estate under the Commonwealth, but eventually recovering it. William Wyvill died in 1663 and his estate passed to a cousin, suggesting that there were no children of the marriage and, since Jane was not remembered in her father's will, it is likely she predeceased him.²²

None of Anthony's daughters benefited substantially from his will, but it is possible that provision had been made for them during their father's lifetime, either by him or some other member of the family. That Jane was able to dispose of property to her brothers before her marriage suggests that might have been the case. Indeed, when their grandmother Margery Middleton died in 1612 she left £20 apiece to Jane and Anne, Anthony's only daughters by his third wife, who were then aged two and five respectively. So from an early age they both enjoyed some degree of financial independence and other daughters may have enjoyed similar benefits.²³

Richard, the eldest surviving son of Anthony's third marriage, was born in 1615. He married Martha Caldecott of East Grinstead, the daughter of Matthias Caldecott of Sherrington in Selmeaton and his first wife Anne, who was a daughter of Sackville Turner of Tablehurst (see Appendix 2, table 6). Richard and Martha lived at Newick, first at Tilde House and later, after the death of his father, probably at Newick Park.²⁴ The first four of their nine children, Anthony, Matthias, Elizabeth and Martha, were born before the death of their grandfather Fowle and were all left five shillings in his will. Richard himself inherited a substantial share of his father's property. He had previously agreed to purchase the stock on his father's land in Newick and Barcombe for which he was to pay £250 into the estate. Richard also inherited Maynards Gate furnace, a further modest share in the Knight's Place estate, leasehold properties in Rotherfield and elsewhere and a share of the residual money which was divided between Richard and his brother Christopher as executors of their father's will. He sold his interest in the Rotherfield property to his brother Nicholas in 1652. By 1668 he had sold his property in Newick to John

Millington and by 1673 he was living at Gatton in Surrey.²⁵ When he was buried in Newick in 1679, he was said to be of Maresfield.

Richard's children enjoyed varied fortunes. Anthony, his eldest son, lived at another small estate at Tarring Neville that had been acquired by his grandfather Anthony in 1621 and which had then passed to his son. The younger Anthony mortgaged the property heavily and in 1716 it was acquired by his cousin Humphrey Fowle who, with George Goring, immediately sold it to Thomas Medley of Conyborough in Barcombe. Anthony and his wife Lydia must have remained as tenants since he was described as 'Anthony Fowle gentleman of Tarring Neville' when he made his will in 1724. Compared with his grandfather he left only a modest estate valued at just over £222.²⁶ Richard's third son, another Richard, continued to live in Newick, with his wife Anne (Rootes), and several of their children were baptised in the church but he predeceased his father dying in 1678. Later some of the family, Matthias, Martha and Grace lived in Chailey.²⁷

Anthony's second surviving son of this marriage, Christopher, was born in 1616. He attended St Alban's Hall in Oxford, was awarded his BA in 1633 and by 1635 was a fellow of Merton College. He was appointed Reader in Greek in 1641, and Third Bursar in 1643, but at a meeting held on 2 August 1647, when the fellows were 'gathered in the great hall, at the ninth hour, [he was] deprived of all college emoluments for having taken up arms against the high Court of Parliament'. He was buried, at the college charge, near the senior chaplain's desk in the choir of the chapel at Merton in 1660, a few weeks before he was due to be reinstated to his fellowship.²⁸ He did not inherit any landed property from his father: he inherited his father's books, together with his share in the residual value of the stock at various ironworks, in the remainder of the payment for the stock at Newick and, as an executor, in the final surplus of the will.

Anthony Fowle's third son William also did not inherit any landed property. His legacy was similar to his brother Christopher's, but since he was not an executor, it amounted to a smaller share of their father's estate. He is a shadowy figure, who does not appear to have married and was

probably the William Fowle who was buried in Newick in 1663.²⁹

Finally Samuel, the youngest son, was baptised in 1624. Anthony's London property, the sign of The White Swan in Poulteney in the parish of St Mary Abchurch in the city, had already been settled on Samuel when the undated codicil to his will was added. Samuel was buried at Rotherfield in October 1663 and his son Anthony was buried in the following month. Some time after Samuel's death his daughter Elizabeth married John, the second son of Captain John Fuller of Tanners in Waldron. She enjoyed the benefit of a substantial marriage settlement which included not only her father's London property, but also other land inherited from her mother who was probably Jane Shirley. Elizabeth was buried at Waldron in 1729.³⁰

Curiously, on his death in 1756, Humphrey Fowle the last of the family to live on the family estate at Rotherfield, chose not to leave his property to his surviving daughter Eleanor. Instead he left it to Thomas, son of William Peckham and his wife Mary who was the daughter of John Newnham of Maresfield Park, on condition that Thomas changed his name to Fowle. Thomas complied with the conditions of the will and as Thomas Fowle served as sheriff of Sussex in 1764. He was buried at Rotherfield in 1770. He was childless, and several years after his death John Newnham of Maresfield Park claimed his right to the estate.³¹

Property - Iron works

Of the ironworks in which Anthony Fowle had an interest during his lifetime only three, Maynards Gate Furnace, Markly Furnace and Maresfield Forge (the two latter named respectively as Rushlake and Marshfield in his will) remained in hand as part of his estate in 1647.³²

Earlier Anthony Fowle had owned or been associated with several other works. In 1597, in partnership with Thomas French and Thomas Middleton, he had an interest in Dedisham Forge in Rudgwick, which they were running in conjunction with Gosden Furnace in Lower

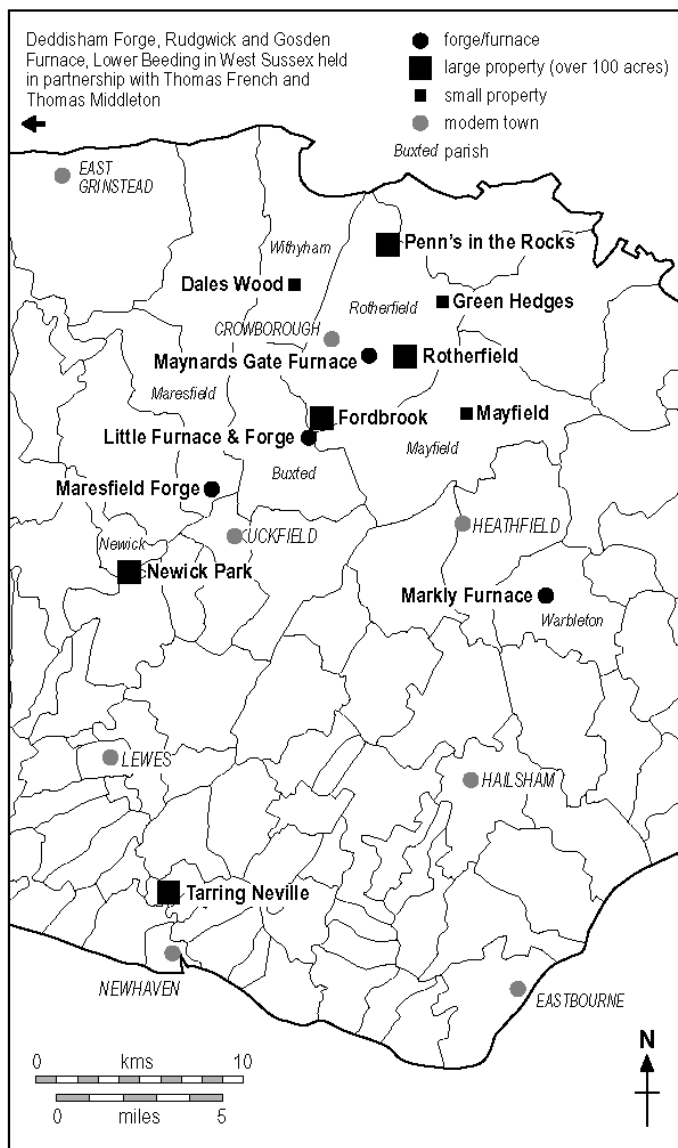


Fig 1. Sussex property owned by Anthony Fowle and ironworks that he owned or in which he had an interest 1588 – 1647 (Sue Rowland)

Beeding.³³ He was also the owner of Little Furnace and Forge in Buxted in 1611, his interest in that site is discussed more fully below.

Of the ironworks in which he still had an interest at his death Markly in Warbleton has the most obscure history. Little is known of the furnace there although Fowle's interest is noted in the latest edition of *The Iron Industry of the Weald*. It may be significant that Anthony Fowle's eldest son Nicholas, who was recorded as Captain of the Rape of Hastings in 1634, was noted as a former resident of The Chantry, Warbleton when an agreement was drawn up in 1639 between Thomas Stolion and the trustees of the Smith's charity regarding the sale of the lease on the Chantry and other property in Warbleton.³⁴ Nicholas had moved back to his family home in Rotherfield at about that time. The same lease records that Anthony Fowle and his partner William Dun (or Pun) held 'Rushlake Furnace, house and pond, waterways and coal places, bayes, banks, waste grounds and wood ground'. Since Stolion himself had lived in the house and another resident was Robert Baker it appears that the owner of The Chantry was usually associated with the local ironworks. It is probable that while Nicholas was resident in Warbleton he was representing his father's interest in Markly Furnace.

Fowle's interest in the works at Maresfield predated 1645. In that year Thomas Berry took a 21-year lease on Maresfield Park from which part of the property was exempt: some woodland, which appears to have been retained by the manorial lords, and also 'the iron-forge called Maresfield Forge, with all watercourses, sluices and the forgermen's houses and iron house, in the tenure of Anthony Fowle'.³⁵

Possibly most significantly he may have inherited from his father, via his stepfather Arthur Middleton, an interest in both Little Buxted Furnace and forge as well as the better recorded Fowle furnace at Maynards Gate. Middleton and Fowle the younger were recorded respectively as owners of Little Forge and furnace in 1574 and 1611.³⁶ But, tantalisingly, Anthony Fowle the elder had owned three tenements of freehold land, all called Fordbrook, lying not far from the works. Two, of 50 and 40 acres apiece, were held from Lord Abergavenny's manor of Rotherfield and the

other, of 30 acres, was held from the Buckhurst manor of Alchornes.³⁷ The latter tenement is described as adjoining the pond and the river running south to Little Buxted Forge and the other land lies almost adjacent to the north-east. His ownership of a significant area of land almost adjoining the works suggests that, although it is not recorded, the elder Anthony Fowle may have had an interest in Little Forge and furnace during his lifetime. Since the works are known to have been in existence by about 1560 it is possible that they, like Maynards Gate, passed from father to son, and were in the hands of Anthony's stepfather Middleton only during his minority.³⁸ Interestingly the two Abergavenny tenements paid a rent of one arrow apiece which suggests that their association with ironworking was longstanding.

Maynards Gate Furnace in Rotherfield was the ironworking site with which the Fowles were most closely associated. Again, the duration of their association with the furnace is not clear and some of the published sources are misleading. Schubert noted that in 1562 woodland in the manor of Rotherfield held by Nicholas and Anthony Fowle was exempted from a grant of other woodland there to the developers of Cowford Furnace. From that somewhat insubstantial evidence he deduced that their respective furnaces, Riverhall and Maynards Gate, were working by 1562. As a result of that claim Anthony Fowle the elder has been assumed to have owned and worked the furnace at Maynards Gate from that date. Although that could be the case, regrettably there is no clear support for Schubert's reading of the evidence.³⁹

The next certain mention of the site is in one version of the 1574 lists of Wealden Ironworks where a furnace, assumed to be Maynards Gate in Rotherfield, is described as "The Lord Buckhurst's furnace or else Arthur Middleton's in the parish of Rotherfield Sussex".⁴⁰

The wording of the entry appears to suggest there was some doubt as to who was holding the furnace, which in every other version of the list is attributed to Middleton, and in some copies identified as Maynards Gate. The list in question is the one made by Christopher Baker before the Privy Council messenger had visited the ironworks. The wording of the entry

might imply that Buckhurst had a financial interest in the furnace that was known to Baker's informants. Straker interpreted the entry, without any real consideration of the implication of the omission of Buckhurst from all the other lists, as Middleton holding the furnace as a tenant of Buckhurst. His version was perpetuated and appears still in *The Iron Industry of the Weald*. It is more likely that Middleton was the owner by 1574. He remained the owner until, on his death in 1591, the property, a tenement called Knight's Place, which included Maynards Gate Furnace, passed from him to his stepson Anthony Fowle.⁴¹ That Arthur Middleton was still paying the rent for Knight's Place until his death is problematic since Anthony should have inherited his father's property when he came of age in 1588. However, since Anthony was still completing his education at Gray's Inn at that time it is conceivable that Middleton continued to manage his property for him as he had done when he was still a minor. Middleton himself left no property in Rotherfield and neither does his will mention his stepson. The Rotherfield manor court books record that Anthony had been admitted to his father's copyhold tenements when he came of age and it is reasonable to assume he inherited his leasehold property at the same time.⁴²

There is no further clear documentary evidence for the furnace until 1615 when a new lease for three lives was granted to the younger Anthony Fowle. From then the ownership of the whole tenement undoubtedly remained in the hands of the Fowle family.⁴³

In 1652 Anthony's son Nicholas bought out his brother Richard's share of the Rotherfield property which included the furnace at Maynards Gate. The furnace was working in 1653 but was out of use by 1664.⁴⁴ If the association of the works with Anthony Fowle the elder is accepted the family had owned the works for over 100 years.

A further question arises regarding the existence of the forge site that was identified from slag by the field group close to the furnace at Maynards Gate.⁴⁵ None of the documentary sources refer to a forge. The site is only ever described as Maynards Gate Furnace. If there was a forge associated with the furnace at Maynards Gate, why did Anthony Fowle need to take

a lease on the forge at Maresfield? Originally he had also owned Little Forge; was it when he gave up his interest there that he took out the lease at Maresfield?

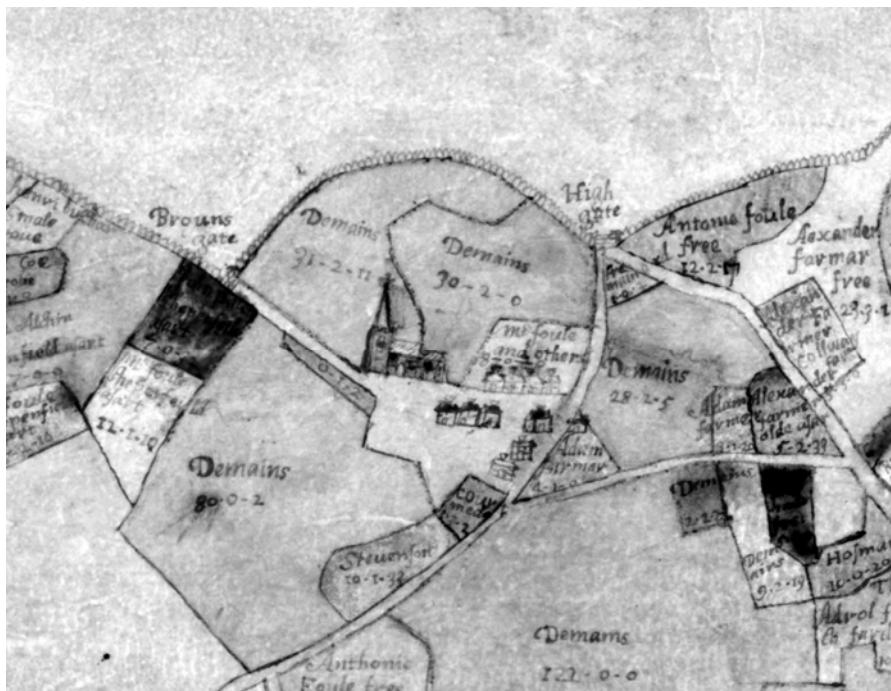


Fig 2. Detail of Rotherfield manor map c1597 showing the Fowle's house north of the church and the surrounding demesne land much of which the family leased (ESRO ACC/0363/111R reproduced by kind permission of East Sussex Record Office)

Landed property

Although we can roughly identify the position of the landed property owned by Anthony Fowle at his death in 1647 it is impossible to quantify

its exact extent, but it was undoubtedly both various and extensive. It is also clear that he dealt in the land market throughout his adult life. The Rotherfield manor map records that he held several dispersed parcels of land within the parish in 1597 and he also owned several other copyhold tenements in the manor that are recorded in the court books.⁴⁶

The family's principal residence in Rotherfield has not survived. The descriptions of their land there, some of which was enfranchised in 1607 and some of which was leased from the demesne, confirms that their residence was the house depicted on the manor map of 1597 lying north of the church amidst manorial demesne.⁴⁷

A further substantial leasehold tenement was Green Hedges an enclosure taken from the lord's park in Rotherfield.⁴⁸ The holding was quite extensive, although the central area with the dwellings lies within the parish of Rotherfield, other associated land extended into Frant. Another leasehold tenement held by Fowle from the manor of Buckhurst was Dales Wood in the parish of Withyham which probably comprised the 47 acres of land now known as Morris's Wood (TQ505330).⁴⁹

In 1638, the year in which he served as sheriff, Fowle commissioned a map of a property of 173 acres lying in Withyham and Rotherfield, now known as Penn's Rocks. The property adjoins Shurlocks Farm to which his mother was joint heir and part of which she still owned in 1597.⁵⁰ He also owned rights in the commons and wastes of the manor of Mayfield which included the rights to take marl and other minerals from pits on the waste. The form of the surviving deeds suggests that Fowle farmed the rights to all the waste within the manor.⁵¹

In about 1637-8 Anthony Fowle moved to Newick and his eldest son Nicholas established himself at the family home in Rotherfield. Regrettably the surviving sources never name Anthony's property in Newick which cannot be identified with absolute certainty; the evidence used here is purely circumstantial. Anthony's status in the county community suggests that his property would have been substantial. His will records that the land associated with his Newick property extended

into Barcombe and in addition his son Richard, who had purchased the stock on Anthony's estate before his death, and probably succeeded to his Newick property, was taxed for no fewer than 19 hearths in 1662. The mansion house at Newick Park has architectural features dating to the mid 17th century, and the estate extended into both Newick and Barcombe. It was, and still remains, the only house in the parish large enough to contain 19 hearths. This combination of evidence suggests that Newick Park was likely to have been Anthony Fowle's residence. A full archaeological survey of this interesting house is long overdue and might help to resolve the problem of identification.⁵²



Fig 3. South front of Newick Park showing rustication and surviving giant pilasters in the westernmost bay.

Other business interests

Since he owned property in the city it appears that Anthony Fowle also had business interests in London. Regrettably, once again the mention in

his will is the only surviving record that has been identified. It is unlikely that the ownership of one tenement was his only interest in the city, but since no other property can be identified the full nature and extent of his business there is impossible to quantify. However, it is clear that his son Samuel enjoyed some standing in the community and the estate inherited by his widow Jane eventually provided an ample marriage settlement for their daughter.⁵³

Exchequer depositions of the first half of the 17th century also record that members of the family, Anthony himself, his son Nicholas and his son-in-law Alexander Fermor, were actively dealing in debt. Further study of those sources may well yield some significant information regarding the family involvement in such a lucrative market.⁵⁴

Anthony Fowle was a significant member of the East Sussex county community during the first half of the 17th century. He was not only a distinguished lawyer serving in various capacities during the Civil Wars, but also a substantial businessman with associations with various Wealden ironworks, including what may have been a remarkable and possibly unique family interest in Maynards Gate Furnace. Having inherited a valuable estate in Rotherfield from his father he was able, later in life, to acquire a further substantial landed property in Newick. Thanks in part to advantageous marriages he was also able to make substantial provision for his family, either during his lifetime or after his death. The next generation of his family, certainly those who remained in Sussex, were well established and appear wealthy and successful, but none enjoyed quite the status in the county community that their father had achieved.

Acknowledgements

I would particularly like to thank Sue Rowland for preparing the distribution map, and Christopher Whittick, David Crossley and Jeremy Hodgkinson for all the generous help, advice and support they have given me in the course of the preparation of this article.

Appendix 1

Will of Anthony Fowle, Ironmaster, 1647 (TNA PROB/11/201)

Transcript – spelling modernised

In the name of God amen.

I Anthony Fowle of Newick in the county of Sussex Esquire being now sick in body but of sound and perfect memory and understanding, thanks be given to almighty god, considering the frailty of man the certainty of death and uncertainty of the time And being therefore desirous to settle and dispose of such estate as god of his infinite mercy hath in this world made me steward of in such manner as my debts may be justly and truly paid, my legacies hereby given discharged and that a brotherly love and peace may be and continue amongst my children...

...first and principally I give and bequeath my soul to god that gave it me in sure and certain hope by the merits of Jesus Christ my Saviour and Redeemer to be partaker of eternal joy and happiness with his saints in heaven. And my body to the earth from whence it came there to be decently buried in the parish church of Newick.

Item I give and bequeath unto the poor of the parish of Rotherfield in the said county of Sussex to be distributed among them within one year of my decease the sum of £5.

Item I give and bequeath unto the poor of the parish of Newick aforesaid to be distributed among them within one year of my decease the sum of £5.

Item I give to such a godly minister as shall preach at my funeral for his pains therein the sum of 40s.

Item whereas I have certain stock of sows, mine, and coles at Rushlake furnace in the parish of Warbleton And of stock of sows, mine and coles at Maynards Gate furnace in the parish of Rotherfield And also a stock of coles and sows at the forge in the parish of Marshfield [Maresfield].

My will and meaning is that my sons Richard Fowle and Christopher Fowle shall have the disposing of all the stocks of the said sows, coles and mine afore mentioned and all such iron as shall be made at the said

forge and to be sold by the said Richard and Christopher for the payment of my debts and legacies.

And the remainder of the money arising of the said stock to be distributed the one half to my dearly beloved wife and the other moiety to be to be equally divided between my two sons Christopher and William Fowle.

Item I will and devise unto the said Richard Fowle my son all that mine interest or term for years yet to come in certain lands with houses and buildings thereupon erected parcel of the disparted park of Green Hedges lying in Rotherfield and Frant in the county of Sussex.

Item I will and bequeath unto the said Richard all that mine interest in or term of years yet to come in certain lands called by the name of Dales Wood lying in the parish of Withyham in the county aforesaid excepting and reserving the next felling of the said woods upon the said land to my own use.

Item whereas I hold a capital messuage called Knightes Place with lands thereunto belonging containing by estimation 120 acres from the Rt Hon Henry Lord Abergavenny and the Lady Katherine his wife by deed indented the 22 May 10 Charles [1634] belonging situate and being in the parish of Rotherfield aforesaid, I do hereby give and devise unto my dearly beloved wife all these parcels of land hereafter named being part and parcel of the said lands and tenements being now in the occupation of Nicholas Fowle my son (viz) The Great Mead, the Wet Mead, the Pippins Croft, the Milk Lodge, the Moores, the South Field, the two Pett Fields, the two Fryers Fields, and the Horse Pen during her natural life and after her decease to the said Nicholas Fowle and his assigns.

Item I give and bequeath unto the said Richard Fowle my son the other parcel of the said lands and tenements of the said Knightes Place (viz) the Court Mead, the five acres now in the occupation of Abraham Austin the younger of Rotherfield aforesaid, also the furnace at Maynards Gate with the other buildings thereto belonging and the lands now in the occupation of Richard Wickins of Rotherfield aforesaid, my said wife paying yearly 50s part of the rent of the said lease and my said son Richard paying 40s the residue of the said rent being in all £4 10s yearly.

Item whereas I have bargained for and sold unto my said son Richard all

my stock of corn and cattle being upon my lands in the parish of Newick and Barcombe in the county aforesaid for and in consideration of the sum of £250 to be paid by the said Richard unto me upon bond within one year after the date hereof, my will and meaning is that the said £250 shall be disposed of by the said Richard and Christopher my sons towards the payment of my debts and legacies and the residue to be divided between my said wife and my two sons Christopher and William according to the manner before specified.

Item I give and bequeath unto Joan Chatfield my servant the sum of 40s and to every one of my other household servants which shall be dwelling and abiding at the time of my decease the sum of 20s apiece to be paid to them within one year next after my decease.

Item I will and bequeath unto my loving wife and unto my said son Richard Fowle all my household stuff plate and linen to be equally divided between them.

Item I give and bequeath to my son Nicholas Fowle to my son Anthony Fowle and also to my sons in law Mr Alexander Fermer and Mr Robert Baker and to my daughter Anne his wife 20s apiece to buy each of them a ring to be paid to them within one year next after my decease.

Item I give and bequeath unto my son Christopher all my books.

Item I do constitute and ordain my beloved wife and my two sons Richard and Christopher to be the sole executors of this my last will and testament, which they all in obedience to my will have condescended to undertake.

Item all the rest of my goods not before given, my debts paid, my legacies performed and my funeral expenses discharged, I give and bequeath unto my executors to be equally divided between them. In witness whereof I the said Anthony Fowle the elder have hereunto set my seal and to every sheet of paper thereof being four in number I have subscribed my name the six and twentieth day of August in the year of our Lord god 1647 in the 23rd year of the reign of our sovereign lord Charles etc etc.

Witnesses: John Michelborne, William Durrant, Thomas Coleman, (his mark) John Coppard, George Frye

Codicil:

Item I will and bequest unto Samuel Fowle my son the sum of 20s for his portion of mine estate I having made provision for him by conveyance whereby I have estated him in certain tenements in the City of London.

Item I will and bequest unto my grandchild Stephen Penkherst 20s to buy him a ring.

Item I give and bequest unto Elizabeth daughter of my son Anthony 5 shillings.

Item I give unto Anthony Fowle and Mathias [Matthew] Fowle sons of my son Richard Fowle and to Elizabeth and Martha his daughters 5s apiece.

Item I give unto William Fermor, Henry Fermor, Anthony Fermor and Nicholas Fermor sons of my daughter Mary Fermor deceased and to Elizabeth, Mary and Margaret daughters of the said Mary deceased 5s apiece.

Item I give unto John Baker and Robert Baker, sons of my daughter Anne Baker and to Mary her daughter 5s apiece.

Item I give unto Elizabeth Penkhurst daughter of my said daughter Anne Baker 5s. All the aforesaid legacies to be paid unto them respectively within one year after my decease.

Witness Edward Nicholas Thomas Courthope.

Proved at London 15 September 1647 on the oath of Christopher Fowle one of the executors, power reserved to [blank] Fowle the widow and Richard Fowle the son when they come.

Margin: 17 Nov 1648 proved on the oath of Richard Fowle, power reserved to the widow.

Appendix 2

Fowle family relationships

These tables are intended to help to clarify the complex Fowle family relationships especially in the principal lines that are discussed in the paper. Although every effort has been made to ensure that the lists are complete, in the later tables where the family had scattered into several parishes, that may not be the case and the lists of names of lesser known siblings may not record their actual position in the family.

Table 1

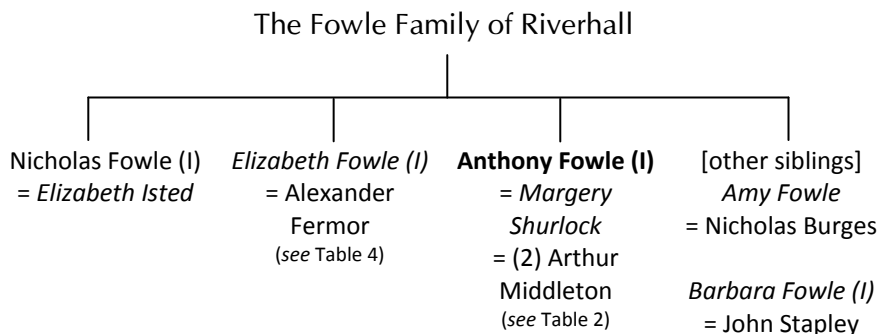


Table 2

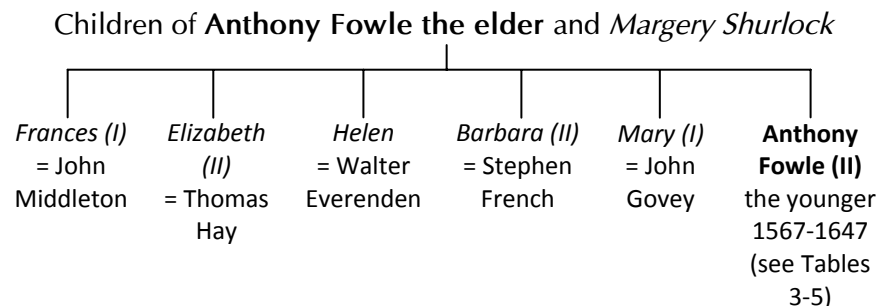


Table 3

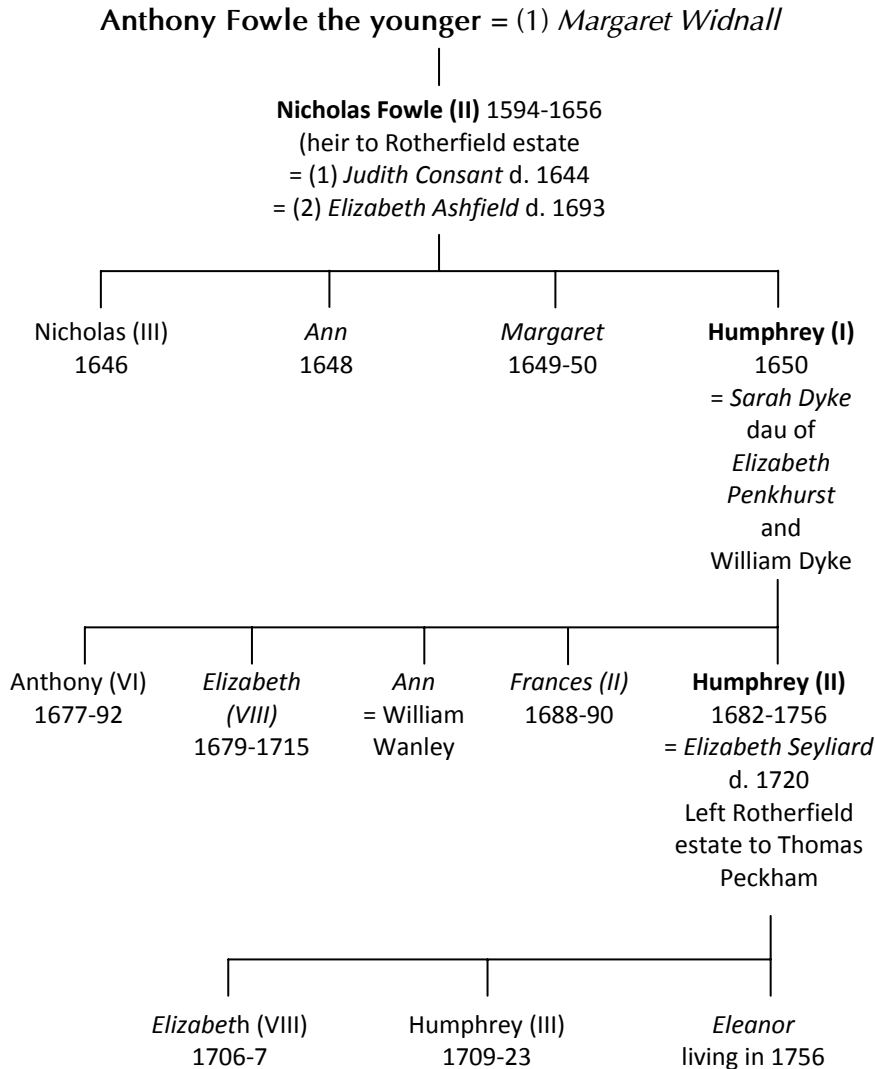


Table 4

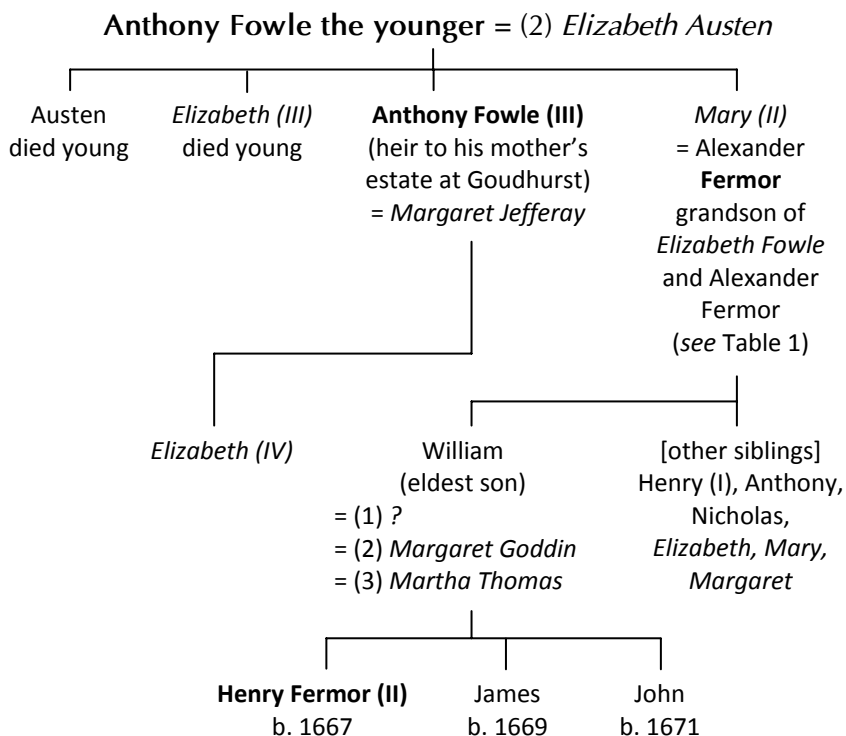


Table 5

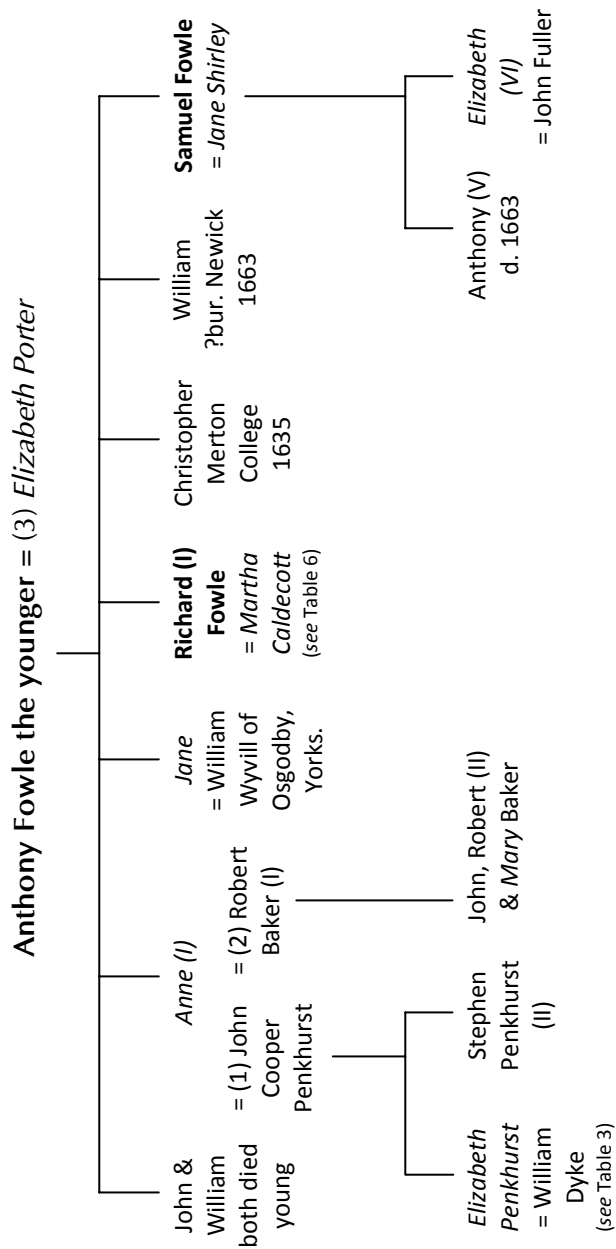
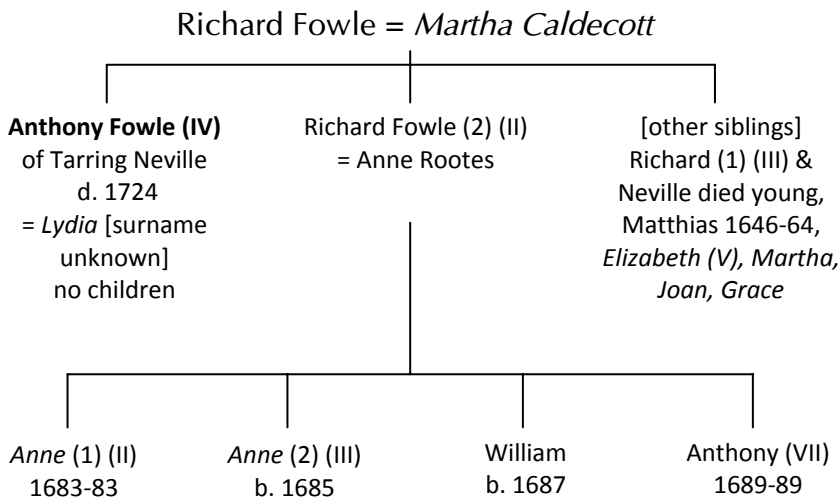


Table 6



Notes and References

1. Henry Cleere & David Crossley (second edition 1995, edited by Jeremy Hodgkinson), *The Iron Industry of the Weald*, Cardiff, 388; The National Archives (hereafter TNA: PRO) PROB 11/201, transcribed as Appendix 1.

2. Jeremy Goring, ‘Wealden Ironmasters in the Age of Elizabeth’ in E. W. Ives, R. J. Knecht, J. J. Scarisbrick (eds) *Wealth and Power in Tudor England* (Athlone Press, 1978) 222.

3. Anthony Fletcher *A County Community at Peace and War, Sussex 1600-1660* (1975), 54, 221, 291, 326, 339, 364.

4. TNA: PRO ASSI 35/94/9, 96/9, 96/10, 98/9 and 100/6 (I am grateful to Diana Hansen for sharing with me information about Richard Fowle’s frequent service as a grand juror at the East Grinstead assizes during the 1650s).

5. C. Pullein, *Rotherfield: The Story of Some Wealden Manors* (Tunbridge Wells, 1928), 383; H. R. Schubert, ‘A Tudor Furnace on Waterdown Forest’, *Journal of the Iron and Steel Institute* 1951, 242.

6. ESRO Lewes A5, 508.

7. Pullein, *Rotherfield*, 374-384; Cleere and Crossley, *The Iron Industry of the Weald*, 150; J. Comber, *Sussex Genealogies (Horsham Centre)* (Cambridge 1932), 273.
8. Cleere and Crossley, *The Iron Industry of the Weald* 340, 349; Ernest Straker, *Wealden Iron* (G. Bell & Sons 1931, reprint Newton Abbot 1969) 325; Goring, 'Wealden Ironmasters', 208; The National Archive (hereafter TNA): PRO STAC5/G4/28; Comber, *Sussex Genealogies*, 274. Jeremy Goring notes Hay's partnership with Thomas Glyde/Glydd. They occupied a furnace in Ashburnham that he does not identify but which was Panningridge. Cleere and Crossley, *The Iron Industry of the Weald* notes their joint interest in the Panningridge but under the entry for Kitchenham. Although Glydd is mentioned the entry for Panningridge does not mention his partnership with Hay. Their joint interest in the furnace may have been overlooked because the gazetteer incorrectly located Panningridge in Dallington.
9. TNA PRO C/9/5/49 (I am grateful to Dr Susanne Jenks for kindly providing me with copies of these documents); the outcome of the case has not been pursued.
10. Fletcher, *A County Community at Peace and War*, 54.
11. Pullein, *Rotherfield*, 387, 390.
12. Pullein, *Rotherfield*, 387.
13. TNA E134/8C1/M29 (I am grateful to Christopher Whittick for making this information available to me).
14. TNA PROB 11/311.
15. Pullein, *Rotherfield*, 359.
16. East Sussex Record Office (hereafter ESRO) ACC 363/111.
17. Pullein, *Rotherfield*, 388.
18. Pullein, *Rotherfield*, 389; Cleere and Crossley, *The Iron Industry of the Weald*, 324.
19. E H W Dunkin, *Sussex Marriage Licences*, SRS 6 (1902) 29.
20. Dunkin, SRS 6, 202.
21. ESRO DYK 844.
22. ESRO SAS/AB/279; F C Rimington (1961), The Deserted Village of Osgodby in the parish of Seamer, *The Transactions of the Scarborough and District Archaeological Society* vol 1 no 4.
23. ESRO Lewes A14, 42.
24. ESRO PAR 428, Transcripts of Newick baptismal register. All Richard's children were baptized at Newick where in the early entries their home is

identified as Tilde House, possibly the present Tile House Farm. It is difficult to know for certain that he lived at Newick Park later, but some circumstantial evidence suggests that he probably did. M. J. Burchall (ed.), *Sussex Hearth Tax Assessments 1662, Lewes Rape, Sussex Genealogical Centre Occasional Papers* (1980) 3.

25. In 1668 Richard surrendered a tenement of the manor of Camois Court called Dorney, which remained part of the Newick Park estate, to John Millington who was described as ‘of Newick Place’ when he made his will in 1686; ESRO SAS/PN/674.

26. ESRO SAS/ PN 668; ESRO SAS/PN/704; ESRO Lewes B16,135r.

27. ESRO PAR 428 Newick and ESRO PAR 289 Chailey, transcripts of parish registers.

28. I am grateful to Julian Read, archivist at Merton College, for supplying this information derived from J. R. L. Highfield (ed.) *Registrum Annalium Collegii Mertonensis*, Boydell Press for the Oxford Historical Society and the Merton Chapel Register (2006).

29. ESRO PAR 428, transcripts of Newick burial register.

30. W. Berry (1830), *County Genealogies: Sussex*, 278-9; ESRO SAS-RF/11/1; Comber, *Sussex Genealogies*, 263; ESRO SAS-RF/11/3. Comber suggests with a query that Jane Shirley married William Fowle. But the second record of Elizabeth’s marriage settlement gives her deceased mother’s name as Jane, and I have assumed that the marriage was actually with William’s younger brother Samuel. After she was widowed Jane had married Sir John Biggs.

31. Pullein, *Rotherfield*, 396-398.

32. Cleere and Crossley, *The Iron Industry of the Weald*, 343. The identification of Marshfield with Maresfield is confirmed by ESRO SAS/G/13/49. Maresfield Forge, which was already held on a 21- year lease by Anthony Fowle, was exempted from the 1645 lease of Maresfield Park to Thomas Berry. In Cleere and Crossley, *The Iron Industry of the Weald*, 342, Berry’s lease is assigned incorrectly to 1654.

33. Cleere and Crossley, *The Iron Industry of the Weald* 328. There is no mention of this association of forge and furnace in the entry for Gosden on page 333.

34. Pullein, *Rotherfield*, 388; Surrey History Centre, ACC 2840. Boxes 19, 27 and 28 contain references to Warbleton. A transcript of the document relating to The Chantry was made when the tenement survey of Warbleton (ESRO P45/44) was being undertaken and had been kindly made available to me by David Martin and Christopher Whittick.

35. ESRO SAS/G/13/49.
36. Cleere and Crossley, *The Iron Industry of the Weald*, 342.
37. E. Straker (1933) *The Buckhurst Terrier*, SRS, **39**, 42. The land was then held by Anthony Fowle the younger. The description of the bounds suggests that the site is represented by land surrounding the modern Fordbrook Farm at TQ 516267. L F Salzmann (1904, reprint 1998) *A Calendar of Post Mortem Inquisitions relating to the county of Sussex 1-25 Elizabeth*, **3**, 57-58. The Buckhurst Terrier claims their holding as 40 acres paying a substantial rent of 14s 5d and one red rose whereas in the IPM it is said to be only 30 acres. Despite the fact that Fowle's Rotherfield freehold is depicted on the manor map it has proved difficult to equate the holdings as the same area shown on the modern OS map does not contain as much as 90 acres.
38. L F Salzmann (1904 reprinted 1998), *Post Mortem Inquisitions relating to the County of Sussex*, Sussex Record Society (hereafter SRS) **3**, 57-58.
39. Schubert, 'A Tudor Furnace on Waterdown Forest', 242.
40. TNA SP12/95/20 f.48r Jeremy Hodgkinson kindly provided me with the reading of the entry from the 1574 list and also made the comparison with the other versions. I am grateful to him for his generous help and advice.
41. ESRO ABER 18R/1.
42. Cleere and Crossley, *The Iron Industry of the Weald*, 341-2.
43. ESRO SAS/AB 369.
44. ESRO SAS/AB/372, J L Parsons, 'The Sussex Ironworks', *SAC* **32** (1882), 21-22. Bedwin, *SAC* **116** records erroneously that they were ruined by 1653. The fact that they continued working into the second half of the century accords well with the evidence for late-17th century demolition recorded in his report.
45. Cleere and Crossley, *The Iron Industry of the Weald*, 344.
46. ESRO ACC 363/111; Pullein, *Rotherfield*, 385-387.
47. ESRO ACC 363/111.
48. ESRO SAS/AB/278, 279, ACC 363/111.
49. Straker *Buckhurst Terrier*, 12, vi.
50. ESRO AMS 6810/1; the property eventually passed to the Springett family and to William Penn after his marriage to Gulielma Springett in 1672; unfortunately we have been unable to establish how the Springett family acquired it. Straker, *Buckhurst Terrier*, 4. Her name was recorded as Margaret Middleton and she held a 23acre freehold tenement of the manor of Buckhurst lying in Rotherfield called Moyses als Shurlocks.
51. ESRO SAS-WH/243.

52. Pevsner gives a late 17th century date for the earlier building phase at Newick Park. However, I am grateful to Nicholas Antram for allowing me to see his text relating to Newick Park for his forthcoming update of Pevsner Sussex and for providing these further comments on the house. 'I would generally suggest giant pilasters and all over rustication indicate a likely late 17th century date. However, there are earlier examples. Lees Court in Kent has giant pilasters and is generally dated to around 1650 and there are other examples. Given the lack of evidence at Newick I certainly think a mid 17th century date is quite possible'.

53. ESRO SAS-RF/11/3.

54. TNA E134/8C1/M29.

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