IRON MANUFACTURE IN TONBRIDGE PARISH, WITH SPECIAL REFERENCE TO BARDEN FURNACE c. 1552-1771

CHRISTOPHER CHALKLIN

The English iron industry was transformed by new techniques of production beginning in Sussex in the early sixteenth century. By the ‘indirect’ method iron ore was melted into cast iron in a blast furnace driven by bellows. It was converted in a forge into wrought iron (that is, purified of carbon and made malleable) by great hammers. Power came from wheels driven by water dammed in ponds. As a separate bay was needed for each wheel, the furnace and forge lay apart.

It is well known that in the sixteenth and early seventeenth centuries the Weald of Sussex, Kent and Surrey, high ground measuring some 65 miles E-W and 25 miles N-S, was the main centre of English manufacture. The streams in the deep valleys were suitable for damming. There was plentiful timber for charcoal in a thickly wooded and not very fertile area. Ironstone was mined locally in pits a few feet deep. Artisans from nearby northern France and Flanders introduced the new skills in the early sixteenth century. From the 1540s the Crown’s demand for armaments for fortifications and warships helped expansion; in 1543 iron guns were successfully cast at Buxted, of superior quality to the wrought-iron cannon produced by the old (direct bloomery) method. Merchant shipping to the Levant and later the Indian Ocean needed armaments, and there were foreign sales, legal and illegal, especially to the Dutch. Even more important was the demand for bar iron by smiths in London and its neighbourhood, the population of the capital tripling from about 120,000 in 1550 to 375,000 in 1650, being by far the largest English town. The Weald was relatively near London, being accessible by the Rivers Rother, Medway and Thames, the Sussex coast, and roads usable at least in summer.

The industry was largest in the later sixteenth century. By 1550 there were about 50 furnaces and forges in the Weald. In 1574 there were 51 furnaces alone, the only other furnaces in the country being
four in South Wales and three in the Midlands. About 1600 no less than 49 out of 85 active furnaces were in the Weald.

There was a long, slow decline during the seventeenth century, punctuated by occasional revival with wartime demand for armaments. In 1653, 36 out of 73 furnaces were blowing in the Weald, including seven in Kent. Eleven furnaces and nine forges
were working in Sussex in 1717, with three furnaces and one forge in Kent. Production was now much greater elsewhere, in areas like south Wales, the Forest of Dean and Staffordshire, output in the Weald now being sustained particularly by the market for armaments. By at least the 1650s and 1660s west Midland and Swedish bar iron was cheaper than that made in the South-East. A few works continued through the eighteenth century, including furnaces and forges supplying small local needs. The working of government contracts such as those of the Fuller family of Heathfield lasted into the 1760s, helped by tradition, until costs in Staffordshire were lowered by the use of coking coal, and new methods there of casting and boring guns triumphed during the American War.

The major outlay of ironmasters was not in labour but in charcoal. Although supply became efficient with the general use of coppiced wood felled every 12 or 15 years, the cost of wood was steady on account of its other uses, such as hop-poles by about 1600, building, domestic fuel, and the dyeing vats of clothiers. Although ore was relatively cheap, its quality was poorer than in some other regions. Furnaces were often idle in summer because of the lack of sufficient water power, the early eighteenth century being particularly dry. The roads of the Weald were practically impassable in winter. While the Medway was finally made navigable between Yalding and Tonbridge in the early 1740s, it came very late and still only helped transport in part of the Kentish Weald.1

The modern study of the Wealden iron industry in print began with the publication of Wealden Iron by Ernest Straker in 1931. In it a historical survey was followed by chapters on themes such as furnaces, forges, cinders, fuel, guns, transport and finance; the rest of the text was a historical and descriptive survey with maps and pictures. Straker’s work drew on the study of printed sources, manuscripts, field names and careful examination of sites. Recently knowledge has been greatly extended by H. Cleere and D. Crossley’s The Iron Industry of the Weald (1985 and 1995) which is chiefly a thorough, scholarly history of the development of the industry in the area since prehistoric times, to which is added a study of the archaeology and technology of the blast furnaces and forges, and gazetteer of the sites and their history; in addition to further study of the sites, much new material was drawn from manuscripts in the Public Record Office and the Sussex, Kent and Surrey record repositories. Although armaments were only a small part of sixteenth-century output, E.B. Teesdale Gunfounding in the Weald in the Sixteenth Century (1991) is a short but useful study of Tudor gunfounders. There have also been helpful essays in journals such as the Economic History Review,
This paper shows that more research on individual sites can add much to our knowledge of the history of the industry. In the case of Tonbridge parish a careful study of the remains at Rats Castle by B. Herbert in 1986 decided that it was not a later sixteenth-century forge, as Cleere and Crossley suggested. Again, documentary evidence seen by this writer shows that Vauxhall and Bournemill Furnaces were separate ironworks, despite the claim in Cleere and Crossley (p. 362) that they were the same. Using new evidence this writer is able to add greatly to our knowledge of the history of Barden Furnace. The other sources of income and employment, and the social background, of the ironmasters and workers, which are relatively neglected in these books and papers about the manufacture, are described in this essay. Finally, the effects on the local economy and society are also discussed.

Ironmaking by the indirect method began in Kent about 1550, followed by rapid expansion in the next 25 years. By 1574 there were between 15 and 18 furnaces and forges in the county. Altogether about 28 sites working between 1550 and about 1750 have been identified in Kent, stretching from Cowden and Bough Beech in the west to Biddenden and Hawkhurst in the east.

Hoadly Forge was built in Lamberhurst on the Sussex border in 1548. By the end of 1552 the Vauxhall Furnace and Old Forge were working on a stream running roughly north-south within the western edge of Southfrith Park in Tonbridge parish. Two more furnaces and another forge probably began to work in the parish during the next decade. While field names show that ore was mined locally, a principal attraction of this huge parish of 15,378 acres was extensive woodland. In 1550 there were four paled deer parks, the largest being Southfrith, described as of 5,000 acres in 1571, which extended on undulating ground from the Sussex border of the parish on the south almost to the Medway five miles to the north; in 1541 it included a ‘Great Lodge’ of 15 rooms and a chapel, which had once housed the keeper and huntsmen, and two barns, suggesting that clearance for farming had begun.

To the east of the town, in the Medway floodplain and on the gently rising land immediately to the south, was the Postern Park, in Tonbridge and Hadlow parishes. A survey of 1521 described it as well wooded with oaks and beeches, containing 300 fallow deer, and with a gentleman’s lodge. To the north of the town lay another ‘great park’, the Cage, again with a lodge, and red and fallow deer. The area
of these two parks were at least 800 and 340 acres respectively, according to evidence in 1625. Northfrith Forest in Tonbridge, Hadlow and Shipbourne was probably at least 2,000 acres and in three sections, stretching from Hildenborough eastwards to beyond the top of Starvecrow Hill; in 1521 it was 'well and pleasantly set with oaks and beeches', with red and fallow deer, and with an eyrie of goshawks 20 years later. These woods provided charcoal for two furnaces and two forges in or adjoining Southfrith and Postern Parks. Like the bigger Ashdown Forest with its ironworks in Sussex they largely explain the clustering of these Tonbridge ironmills. Barden Furnace in the far west of the parish probably drew much of its fuel from nearby Penshurst Park.\textsuperscript{5} As wood was coaled where it was felled, and charcoal powdered easily in carriage, it needed to be within three or four miles of the ironworks.

The Southfrith furnace and forge, parts of the same undertaking between 1552 and 1573, lay three-quarters of a mile apart, the forge at the modern Old Forge Farm (TQ 594 428), and the furnace to the north at Vauxhall (TQ 593 440). In 1552 the owner was the Duke of Northumberland, lord of the manor of Southfrith, the most powerful man in England as regent for the young Edward VI, who had bought the parks and other local properties from the Crown. Enterprises in iron were often begun by wealthy landowners on their estates, such as Sir William Sidney at Robertsbridge Abbey and Panningbridge in 1541-2, and the Duke of Norfolk at Sheffield and Worth, also in Sussex. Although Northumberland's building expenditure is unknown, considerable capital was needed, £254 being paid for the Robertsbridge furnace and forge. They might be worked by their servants or leased to an ironmaster. According to the earliest Tonbridge evidence, that for Vauxhall Furnace, on 1 November 1552 Northumberland's local agent, Andrew Formenger (or Firminger), hired an ironfounder, Richard True, to blow 'certen foundays of iron'. True said he was promised 15s. for every founday (a period of six days) he should blow or cast. He claimed to have blown 13 foundays and two days for £10, hiring two men besides working himself for 11 weeks. He said that Firminger had not paid him, while Firminger said he had agreed for nine foundays and had paid True; if any work had been done since it was not his business to pay, as True had been discharged from oversight of the works. Firminger's claim for an agreement for nine foundays' work is more likely.\textsuperscript{6}

Having used an ironfounder, on 27 December the Duke and his agent made a 40-year lease of the furnace and forge, with the forest of Southfrith, to Sir George Harper of Sutton Valence, former sheriff of Kent, and Thomas Culpepper, Esquire of Goudhurst, member of an ancient Kentish landowning family. They were also given the right to
erect a forge on the Postern lands, could use wood from the Postern, Cage and Northfrith, and take as much ore as they needed from the other estates of the Duke in Kent. For this they were to pay a rent of £500. Since Southfrith Forest was valued in 1571 (without the ironworks) when its timber was nearly exhausted, at £31 16s. 9d., it was clearly for the ironworks, the timber and ore for which they were paying this huge rent. Yet instead of working the estate themselves, Harper and Culpepper sub-leased it to a local yeoman and ironmaster, Davy Willard, for 20 years at the higher rent of £600. Perhaps the excess of £100 was to pay the costs of periodic supervision of the property. As by 1571 the timber of Southfrith had mostly gone, it could presumably no longer be run at a profit with £600 rent. Culpepper surrendered the premises to the Queen, then the owner, at the end of 1573, exercising an option in his original lease by which the property could be given up after 21 years. The sub-lease to Willard had already expired. During his term he had built seven cottages for the colliers and workmen. Among the employees in 1572 were six foreigners, the use at other works of men of French families settled in England continuing for many years.7

Little is known about the later history of the Southfrith works. The only evidence, from a Star Chamber suit of 1610, is conflicting about its management, though interesting in its comments on the structure and aspects of local life. Elizabeth widow of John Levet, whom she called 'Esquire', claimed that for many years she and her predecessors had been tenants of the forge and forest, park and manor of Southfrith, refining iron. On 7 January her workmen at the forge had been attacked by an armed person at 10 o'clock at night, driving them to hide in the adjoining wood; tools had been broken and the floodgate opened to let the water out of the pond. She was bound to do the repairs under the terms of her lease. The defendants, one Collins, a borsholder, and one Mercer answered that on that day they had been doing business at the market in Tonbridge, going home between four and five o'clock in the afternoon. Passing the forge they saw two or three people inside whom Collins knew had not been workmen there during the four or five weeks since he himself had been discharged. He knew that vagrants sheltered there as the forge was open day and night and they might wish to avoid being caught by local constables. Collins with the help of Mercer and John Martin who lived nearby investigated. The men in the forge said that they came from Sussex and had been hired to work there by Francis Couchman, a Tonbridge yeoman. The comment that they were Sussex men is understandable and Couchman was a well-known local figure. Collins replied that it was customary not to carry on work which someone else, that is he himself, had been doing until he was discharged by Clanricard as the
owner and lord of the manor of Southfrith, or his officials. He was thus implying that the works were run directly by the owner and that Elizabeth Levet was not the tenant. While the men broke up a tiny amount of iron, they left quietly. One does not know who was operating the forge despite both the suggested managers being wealthy and well-known people.  

Although the furnace and forge are mentioned in seventeenth-century title deeds relating to Southfrith there is no evidence that they were working from the 1620s, or indeed that the furnace was casting iron after 1573. The building of the railway viaduct in 1846 destroyed any surviving remains of the forge. At the furnace site the bay and pond and the tail-race allowing the water to drain from the wheel pit are there.  

Although Willard was allowed to use the wood in Southfrith, the Crown as owner after Northumberland’s reconveyance in 1553 was selling wood in April 1555. As Dr Jack has shown, the Crown began by trying to supervise Willard’s woodcutting. In Hilary 1555 a royal commission was asked to survey ‘the lodges, park and pales, the iron mills and what wood master Davy has cut for the iron mills and what hurt and waste the same do and to see how the woods already cut are closed and fenced for their continuance’. Despite this attempt to replace felled woodland with coppices, near the end of Willard’s sub-lease in 1571 another royal commission found ‘a forest or park, containing no meadow, 45 acres of arable, 52 acres of pasture, 810 acres called ‘High bushe’, being rough ground covered with birch and thorns, and the rest as heath and barren lands’. During the following decades farms and woodland emerged on the estate, Somerhill mansion being built around 1613. A final concord of Hilary 1623 described ‘the manor of South .... and park .... and forest of Southfryth ....and 40 messuages, 20 cottages, two mills, 40 gardens, 20 orchards, 1000 acres of land, 300 acres of meadow, 800 acres of pasture, 1,000 acres of wood and 2,000 acres of heath’. Presumably coppices were created with young trees emerging as part of the heath was fenced from cattle to allow shoots to grow from the stumps. Farms were still being cleared of woods in 1652 by relatively long 40-year leases. By 1664 three-quarters was in holdings. A sale particular of 1664 described the manor of Southfrith or Somerhill as covering 5,279 acres, comprising 50 holdings totalling 4,065 acres; the rest, 1,214 acres, being coppiced woodland sold every 14 years. In the place of the original park which had been disparked by about 1610, there was a modest one, of 414 acres, ‘well paled and wooded’, with ‘two good lodges’ adjoining Somerhill mansion.

Bournemill Furnace (TQ 594 443) lay on the same stream as Vauxhall Furnace and Old Forge half a mile to the north of Vauxhall
Furnace, outside Southfrith Park. It is first mentioned in 1574 as owned by Sir Thomas Fane of Badsell in Tudeley, the tenant being Davy Willard. In 1563 he was alleged by John Wybarne, a Tudeley gentleman, to be not only working the Vauxhall and Old Forge ironworks, but to have built two ironworks and leased two more. One of these, the tenanted works, is almost certainly Bournemill. Thus a Fane owner was presumably the builder. As Willard’s heirs, Abraham and Edmund Willard, were working it in 1599, he may have continued as lessee until his death, probably in 1587. In 1588 when a Robert Turner was ironfounder at ‘Forde mill’ or ‘Borne mill’ Furnace, ‘thear ar caste only sowes of yron and not any one peec of ordnance’, so the furnace was confined to non-warlike uses.12 It was inactive, being called ‘the Old Furnace’ by 1615, when the Bournemill estate was sold. While the buyer was one of the Dyke family of Frant who were ironmasters, it is unknown whether it was used again. ‘Furnace Shaw’ and ‘Furnace Field’ are shown just to the south on the tithe map of 1842. While the works has been known as ‘the Old Furnace’ until the present, the supposed site off a grass footpath has not been excavated, being unknown to Straker as well as Cleere and Crossley.13

As this works lay near the Vauxhall Furnace, Willard may have found it convenient to switch his skilled labour from one furnace to another between blowings. On the other hand a possible disadvantage of works on the same stream was that power for both may have been lost in a dry summer. In the 1550s and 1560s Willard was able to use wood from Southfrith, the Postern and Cage Parks at the Bournemill Furnace as well as at the two Southfrith works. A small supply came from 200 or 300 acres of copyhold land attached to the manor of Southfrith, though the manorial tenants claimed that it belonged to them as a customary right for house and property repairs. He also used Northfrith. By October 1553 he was leasing part of its woods. In 1561 under the terms of Culpepper’s and Harper’s lease of 1552 he was allowed to fell wood there, and oaks in the outwood and the little park which were part of Northfrith Park for 19 years from 1573; the only exceptions were pollards and stades previously reserved, timber for the paling of the park, 100 oaks in the outwood after he felled 300, and 30 stades in the outwood.14

In January 1553 the Duke had made another 40-year lease of a large local estate including, with much other property, Northfrith, the Cage and Postern Parks, to Thomas Culpepper and Sir George Harper. When Culpepper died some time before 1561, Harper assigned it to Culpepper’s son and heir, Sir Alexander, Richard Lewkenor, lawyer of the Middle Temple, and Davy Willard. In August 1574 Culpepper passed his share to Willard and Richard Lewkenor of Northfrith, the
latter later assigning his share to his cousin just mentioned. The two held the lease until 1581. The fact that in 1586 they were accused of not having coppiced the woods confirms that Willard had an ample source of fuel from the three parks until 1581. Whether the 1561 lease to Willard of the wood of Northfrith from 1573 to 1592 continued is uncertain.15

The Postern Forge (TQ 606 462) was built by Willard under the terms of his sub-lease from Harper and Culpepper in January 1553. It is presumably one of the works mentioned to have been built in the lawsuit of 1563. Again the Postern, Cage and Northfrith woods were available for fuel. According to the Tonbridge manorial rental of January 1587 Willard and his partner Richard Lewkenor were paying £5 rent 'for the iron mylne now standing'; in another hand, written some months later, was added 'of the Willardes [the heirs of Davy] for the rent of the poole of the mylne decaied 40s'. Despite the size of the rent the use of the mill is doubtful. At least by 1600 it was working, when sows were brought from Riverhall Furnace eight miles to the south.16

A Chancery lawsuit of 1622 adds to the history of the forge. The lord of the manor, Sir Peter Vanlore, leased it to Walter Kipping, a Tudeley gentleman. According to the latter, in March 1620 he communicated with Robert Wenborne, a Wadhurst gentleman, about the letting of the forge and two small workmen's houses; Wenborne said that it was then agreed that he should rent it until Michaelmas for £8 10s., with him paying £17 annually if Kipping took a further lease. Kipping said that instead in July 1621 his son-in-law Thomas Jeffery, another gentleman living in Tudeley, became Wenborne's partner in working the forge. As Jeffery in his will left £200 to each of his children, and owned small farms in Yalding and property in Cliffe, he was well able to bear considerable costs. Kipping went on to claim that Jeffery paid for coals and their carriage instead of Wenborne. In December 1621 at Woodsgate they decided to end the partnership since the stock of iron had been 'wrought out' and Wenborne had not paid for the coals. Not only had Wenborne removed six tons of iron from their joint stock early in 1622 but he had also not paid his share of the rent during the partnership. In his defence Wenborne said he had found the mill 'much decayed', with the hammerbeam 'most doubled' and ready to break; they had agreed in the presence of the hammerman, one Burdit, that if it broke Wenborne should pay no more than 6s. 8d. rent. He had spent over £15 on repairs, with much going on the floodgate, in the winter of 1621. He said they intended to provide a stock of coals and iron sows. Fuel was obviously the major expense. He claimed that Jeffery was to pay Nicholas Collin

103
£120 for coals in August 1621. Wood was also bought for £12 from Sir Thomas Smith, probably from his estate in Southborough and Bidborough. He also said that in the forge was a piece of iron weighing half a hundredweight, iron 'loops' (the meaning being obscure), a pair of great tongs and iron lying in finished bars about three feet long called 'anconies'. No more information has been found about this forge: the increasing competition of imported and Midland bar iron probably ended its working. The remains include a bay about 150 yards long forming the present Postern Lane and a pond, now dry, with a spillway, forge bottoms, cinders and cannon balls.¹⁷

Of the five Tonbridge ironworks in the later sixteenth century most is known about the Barden Furnace (TQ 546 425) which has the longest history. It lay on the demesne of the manor of Southborough, owned by the Duke of Northumberland as Earl of Warwick until 1549 or 1550, when the manor became Crown property. By 1560 it had passed to Sir Richard Sackville, whose heir Lord Buckhurst conveyed it to Thomas Smith, Esquire of Westenhanger, known as Customer Smith as a farmer of the customs, and City haberdasher, in 1577. In 1621 the works lay on Barden Farm, comprising 258 acres and a meadow. The tenant, William Hubbard, paid rents of £64 for the farmhouse, mill and 216 acres, £10 for 42 acres called Comes, and £3 for 'Taynter mead'. Assuming an average rent of 5s. per acre, the amount for the 216 acres alone would have been £54, leaving £10 for the house, farm buildings and mill. This suggests their capital value was between £120 and £150, with the mill being worth up to £60 or £70. While Barden House Farm and much nearby rural property was sold in 1699, the furnace stayed Smith property until 1716, and perhaps much later.¹⁸ The furnace was probably one of the works said to be leased by Willard in 1563 and was still held by him in 1574. In 1588 the tenants were his heirs Abraham and Edmund Willard. At Michaelmas 1577 he bought 771 loads and six bushels of iron ore at 3d. a load totalling £9 12s. 6d. from Ashour Wood belonging to the Sydney estate in Penshurst, near Barden. In November 1588 it was reported that 'at Barden fornice in Tunbridge ... the cheif workman ...... is one John Phillippes of London gunfounder', who also ran Ashurst Furnace three miles to the south-west. While Barden ironmill seldom cast sows for conversion to bar iron at a forge, it made 'most commonlie peeceis of ordnance'. Thus it was the one Tonbridge furnace to be casting armaments. At the furnace were small cannons comprising 10 sakers, 29 minions and 12 falcons: and at Cage Green, said to be in Hadlow, 'to be carredy to the water side at Milhale [on the Medway below Maidstone] and from thenc to Tower Wharfe at
Edward Browne's Sketch.

Gloucester Furnace, Lamberhurst.
From Swedenborg's "De Ferro," 1724.

Fig. 1 (a) Rough drawing of the interior of the Horsmonden Furnace in 1669 and (b) an illustration of the outside of the Gloucester Furnace, Lamberhurst in 1724. Their structure was basically similar to that of the Barden furnace. No stacks survive in the Weald.

London: mynnions .... vi, fawcons .... vi’ [i.e. 6 minions, 6 falcons]. In August 1589 the furnace had eight sakers, 15 minions and 11 falcons; eight buyers in Thames Street and elsewhere in London who were presumably selling to merchant captains and overseas were listed. The year before Phillips exceeded a licence to cast 12 best culverins to sell to a Dutchman for defending Middleburg by exporting more guns illicitly, some of which may have come from Barden and Ashurst works.¹⁹

From this time until the Civil War and its aftermath in the 1640s evidence of gunmaking at Barden furnace ends. It was casting cooking pots in 1629-30. In April 1630 William Hubbard (now Hubbert) and six other local people were presented at Kent Quarter Sessions under the act 39 Elizabeth c.19 for damaging four miles of road by carrying a total of 26 loads of pots from Barden Furnace to Tonbridge town since 12 October, that is during the winter when highway surfaces were particularly bad. Presumably for casting them the same people had carried 216 loads of coals from Hurst Hill in Hadlow, a distance said to be seven miles, again damaging the roads.²⁰

By 1645 the furnace was used by John Browne to make ordnance for Parliament. Sir James Hope’s diary account of March 1646 is by far the best contemporary description of any Wealden ironworks. He found four sorts of ore: ‘one there was a blackish blew much lyke the colour of a loadstone ..... ... ane uthr riddish, much lyke a marl stonne’, a third resembled soft clayey limestone and the fourth was like slates. Lying in heaps, these were roasted with charcoal from one side to another. To blow there were ‘bot tuo bellies [bellows] bot varie large ones, being about 13 or 14 footts long’; the wheel with an attached revolving shaft was driven by water from the dam above it. The sandstone furnace was at least 20 feet high, rectangular shaped about five by six feet with the hearth two by three feet and the structure three feet thick at the mouth. ‘The metall is putt in above at the tope of the fornace lyke as the charcoall also by turnes.... They fill her up thus, 15 or 16 times in the 24 hours’. At the bottom was a slag vent and pan; ‘when the panne is full of metall they pearce ane hole... and lets it so runne out into the moulds; everie 24 hours they cast a gunne of 2100 weight’. Turning to costs Hope learnt that ‘the chieffe melter [founder] said he had 20 ss. a weeke, the caster [moulder] als much; the under workmen to the number of 8, some 8 some 10 ss’. These payments to a melter and moulder for a foundry were slightly less than those to a founder and filler at Waldron Furnace in 1633 and 1690-1; the workmen earning a little more than the 1s. a day usually paid to farm labourers. One might expect some of the assistants to have been colliers. Probably the load of coal of 11 or 12 quarters costing 30s. was typical, as it was the same price as at Bedgebury and
Cranbrook in 1657. The charge of running the mill annually totalled about £2,000. While the furnace had been blowing continuously for 45 weeks, it was likely to stop through lack of fuel. On resumption ‘they would make her yeild metal againe after 24 hourses workeing, but that shee would not come to her ryght temper in lesse than a mounthe’. Hope also saw some disused minepits about two miles away, probably never more than 12 or 16 feet deep, tapping a level vein. A four-wheel carriage like a waggone drawn by six horses transported two guns. Curiously he was told that it ‘will go 16 mylles a day in winter and 24 in summer; bad winter way’; one doubts the truth of part of this remark in view of the reputation of the muddy Wealden roads in winter; in Michaelmas 1665 it was said to be impossible to transport guns from Bedgebury and Horsmonden to Yalding until the following April.\(^{21}\)

Although the furnace was working in 1653 it was discontinued before 1664. In February 1664 George Browne leased it for £25 a year, the tools being worth £3; 400 loads of ore at 5s. a load (£100) and 361 loads of coals at 30s. a load, the same price as in 1646, worth £541 10s. By 14 September guns and shot weighing 104 tons 8 cwt. 2 qrs. had been cast, probably worth much more than £1000. The rent suggests a capital value of perhaps £350 on £400. As the value in 1621 was about £60 or £70 the furnace had probably been rebuilt in the early 1640s to cast ordnance. £400 was probably typical of the value of a furnace making ordnance between the 1640s and 1690s.\(^{22}\)

By 1670 Edward Herbert, a local gentleman, was ironmaster. The probate inventory made at his death in March 1683 valued his equipment and stock, including pots and ordnance sent for sale. He had ore worth £6, and he was going to pay £12 19s. 6d. to several workmen for cutting wood for the next blowing. Among his equipment was a pair of furnace bellows worth £5, ‘noell barrs, boreing barrs and other iron tackling belonging to gunning and potting’, valued at £22 10s., and a boreing carriage. In stock at the furnace were ‘about 5 tubs of pots’ worth £100. At Millhall were 21 ‘granade shells’ (£10) and ‘guns on Mr Paul Lymbey’s wharf at Woolwich’ (£170). ‘Owing at London and divers other places in hopeful and desperate debts’ totalled £2,259, a sum which because of its size and link with London suggests money owing for ordnance, the value of the annual gun output of a typical furnace running to at least several thousand pounds. There was also a smith’s forge on the site.\(^{23}\)

His son George ran the furnace and accompanying farm until 1700. In May 1700 when Tonbridge poor rates were 2s. in the pound, the overseer charged ‘Mr Herbert as occupier of the house and land £1 10s, and for furnace £1 6s’. In December it was ‘Mr Harbert as occupier 15s, and for the furnace ground the furnas not going 3s’. Between May and
December 1712 the farm and furnace site passed to two separate occupiers. While the rates do not survive between 1714 and 1728, another source shows that it was working in 1717. In May 1728 it was also in use. From May 1729 it was run by William Bowen, who also bought Cowden Furnace in 1741. Although between 1745 and 1770 he was one of the principal suppliers of iron cannon to the Ordnance Office, it is not known whether Barden Furnace was used for this purpose. He worked it until he died in 1771, followed by his wife’s niece’s husband, the ‘Rev. Doct.’ Warren (1772-85) who lived in Worcestershire as an archdeacon, a Richard Young (1786-90), and a Thomas Ashby in the early 1790s. It thus lasted as late as the several remaining Sussex furnaces which were in use. Its output is unknown; like other works it probably still made ordnance for various customers, and perhaps graveslabs, firebacks, andirons, pots and tools such as anvils.24

The Entrepreneurs and their Men

Two, perhaps three, of the ironworks were built by the Duke of Northumberland; with an annual rental income of around £6,000 their cost will have been a tiny item of expenditure for him. Sir Thomas Fane was a minor gentleman with a rental in 1574 from eight parishes across south Kent of £171, thus the cost of Bournemill Furnace would have been a considerable burden. As we have seen, the other forge was built by Willard as tenant.25

Apart from supplying the capital involved in building, the role of the landowners was most often passive as recipients of rent. In fact the key figure was the tenant ironmaster, the entrepreneur who supplied the working capital in the form of fuel, raw materials and wages. As has been seen, assuming the allegation of John Wybarne in 1563 is true, Willard was then running six ironworks. Three were certainly in Tonbridge parish, two were presumably in it, and the whereabouts of the last, a forge, is unknown; probably it was in Pembury or Frant. After surrendering Vauxhall Furnace and Old Forge, in 1574 he was still running two furnaces and two forges.

Willard came from a local family. He was highly assessed to goods in the lay subsidy tax of 1545-46. He took part in the Wyatt rebellion against Queen Mary’s marriage to King Philip of Spain in 1554, for which he was pardoned on payment of a fine; his action suggests committed Protestantism. As well as his Tonbridge ironworks he partnered Sir Henry Sydney in trying to start a steelworks at Robertsbridge in the later 1560s. From 1576 he ran a furnace at Brede with two other well-known ironmasters.26
Yet he was more often described as yeoman than as ironmaster, with some reason. About 1551 he owned land called Clayden near Penshurst. At the end of his career in 1587 his properties in Tonbridge included an inn called The George at the corner of the High Street and Church Lane, and another substantial house. He probably farmed for at least part of his career. In 1563 he was claimed to have sold wood he had felled. In 1586 he was said to have been lessee of the parsonages of Tonbridge and Hadlow, insisting that the tenants in Northfrith, Cage and Postern Parks paid tithes in kind in perpetuity, whereas only a rate had been paid before; the reason was presumably that the woods were being cleared for farming. The share of the 40-year lease of January 1553 which he acquired between 1557 and 1561 included not only the three parks but also the manors of Tonbridge, Hadlow and Sevenoaks, Tonbridge Castle, and the local hundreds of Washlingstone, Barnfield and Littlefield. He and his partner Richard Lewkenor were accused of ignoring the covenants in the lease requiring them to coppice, and for repairs to property including the Castle. They had neglected the woods and not left any timber for repairs of buildings, destroyed the forest pales, houses and other structures, and uncovered the Castle and sold materials from it so that the Queen and peers could no longer lodge there. Willard and Lewkenor claimed in reply that the Castle had been damaged by Cardinal Wolsey and the injury to the rest of the estate was done after they assigned it in 1581. The lease of the estate was expensive for Lewkenor and Willard to buy. Their purchase in 1574 of Culpepper’s third share cost £590 5s., the annual value of the whole property then being £227 5s. The profit came from making ‘divers leases of parcels to sundry people’, according to Willard. His record suggests that he was most successful: his activities occurred over more than three decades and were very varied, his heirs in 1592 being described as ‘very rich men’. He had the benefit of a propertied background; while sixteenth-century legal accusations need to be treated with caution, his fortunes were probably helped by unscrupulousness. No doubt he did damage the woodlands and forest pales, at least to some extent. The local economy and society were changing in the later sixteenth century more rapidly than in the past; he took full advantage of the emergence of the demand for iron and the growth of population in the area.\(^{27}\)

Willard dominated the local iron industry and undertook business activities between the 1550s and 1580s in a way that no ironmaster was to do later. Yet like him the other ironmasters had other sources of livelihood. Elizabeth Levet, perhaps tenant of Old Forge in 1610, was the widow of the wealthy John Levett (Levet) whose will of 1606 shows that he had property in nine parishes in Sussex and Kent, left
legacies of £300 and expected Elizabeth if she remarried to sign a bond in £5,000 to settle his debts.28 The other possible manager, the Earl of Clanricard, probably had Irish estates besides the large Southfrith property on which he was soon to build Somerhill mansion. Again, of the two shortlived partners working Postern Forge in 1621, Thomas Jeffery of Tudeley owned farms and Robert Wenborne of Wadhurst presumably also owned real estate as he was also termed 'gentleman'.

Willard's two heirs Abraham and Edmund, who succeeded as tenants of Bournemill and Barden Furnaces, were not only very rich but also called 'gentlemen'. Probably William Hubbert drew his income mainly from his 260-acre Barden Farm rather than from casting pots. His will of 1653 refers to him as 'yeoman'; as he left his four daughters legacies of £40 each he is likely to have been moderately prosperous.29 When Edward Herbert died in March 1683 he was a large farmer as well as a considerable manufacturer of ordnance. Although he lived in the Weald where most holdings had modest acreages, he had 14 acres of wheat sown the previous autumn worth £28, and oats, wheat, tares and barley in the barn valued at £31 10s. As well as 21 sheep (£8 10s.) and five horses (£15) he owned 26 young buds and heifers, oxen, steers and cows worth £73 10s., with 30 loads of hay (£30) for feeding. His Barden farmhouse had over 20 rooms in two storeys and attics. The room with the dearest furniture (worth £19 17s.) was the 'great parlour chamber', with a bedstead, curtains and valence, featherbed, bolster and two blankets, a close stool, chest of drawers, eight chairs and six chair covers, and 'hangings culler greene', all suggesting a comfortable and modern lifestyle. He also owned Holden Farm of 27 acres, adjoining Southborough Common.30

The son George may have lived until 1741. Before he gave up the furnace Tonbridge parish rate books show that more of his income came from farming than from casting ironware; thus in May 1691 when the rates were one shilling in the pound he was charged 34s. for agricultural land and 13s. for the furnace. While he was certainly farming on a considerable scale, it is possible that the output of ironware was less than in 1683. Apart from renting the principal holding until 1712, he made money buying wood and charcoal burning. In a Chancery lawsuit he said that in the summer of 1703 he had corded 105 cords 5 feet of coppice wood for coaling in Burchen Coppice, Tonbridge at 8s. a cord, thus owing £42 3s., while the owner claimed that the amount was 127 cords 4 feet costing £50 8s. With no gunpowder works near at this time the charcoal was presumably for casting or refining iron or drying hops.31

William Bowen rented or held as owner occupier a growing amount
of land. According to the rate assessments from 1729 to 1736 he just held the ‘furnaces’ and surrounding land; in 1737 he also held Holden Farm on which he paid twice as much; and in 1738 he also acquired property called ‘late Thomas Briants’. ‘Vaughans lands’ were added in 1759. Although the rateable value of the furnace may have been artificially low in Bowen’s time, the assessment of the lands shows that much if not the greater part of his local income came from farming. Both George Herbert and Bowen participated normally in local affairs. Herbert was churchwarden in 1691 and Bowen was a grand juror at Kent assizes in July 1740 with three other men described as ‘gentlemen’ and one as ‘esquire’. Two leading Tonbridge property owners, his friends John Children and Thomas Harvey, ‘esquires’, were trustees in his will.32

In addition to the local ironmasters, most of whom made money in other ways, there were a few who were non-resident. The Browne family who worked Barden Furnace as well as other Kentish works were notable in this respect. John Browne who cast guns for the Crown from 1615 and for Parliament in the years before his death in 1652, lived at Brenchley. His grandson George lived on an estate at Buckland in Surrey after his marriage with Elizabeth Brown of nearby Betchworth in 1654. John had a royal monopoly, which presumably means he had substantial capital or recourse to credit. After 1772 Warren and his successors also held Barden Furnace without other Tonbridge properties, paying rates about four times as much as those paid by Bowen. As he lived in Worcestershire Warren’s knowledge of activity at the Furnace would normally have been by correspondence.33

While the principal workmen earned a relatively high wage, they were obviously normally much poorer than the ironmasters. Among the 280 surviving registered wills representing about the most substantial one tenth of the parish population dying between 1560 and 1640 there are four of skilled ironworkers. Richard True was still an iron-founder living in Southfrith in 1560. His will suggests at least a modest sufficiency; he made small bequests to a maidservant and manservant, and instead of the more usual few shillings for the poor at his funeral he left them a cheese weighing 20 pounds and bread and drink. John Langham ‘als’ [alias?] Collin was probably working as a hammerman at the Postern Forge for the Willards in 1588. Being also at least a small farmer, he left substantial money (£210) to his two daughters and two sons, and lived in a sizeable house in the town near the Castle. The other two are among the briefer and less suggestive of wealth holding. Thomas Vinton, a hammerman who died in 1598 left a kinsman one acre of wheat, a maidservant 10s. and the residue to the children of another kinsman. In 1635 the three children of Charles
Hooke, an ironfounder, received 7s. each to buy a sheep. Collin and Vinton but not True or Hooke appear in preceding subsidy assessments which relate to perhaps ten per cent of the wealthiest householders. One deduces that Vinton was a smallholder and Hooke was accustomed to care for or deal in sheep; probably they also did farmwork for wages in months or weeks when their ironworks were not in use. Like the ironmasters, though in a much less influential way, they, and other skilled workers and colliers who were too poor to need to make a will, were part of rural society.34

The relatively early demise of two furnaces and the two forges in Tonbridge parish may be explained partly by the decline in the acreage of local woodland. Not only was much of the Southfrith estate let as farmland, but by 1625 1,219 acres called Trench lands once part of Northfrith and the former Postern and Cage Parks were also cleared.35 As population and settlement grew down to the 1640s more timber was needed, particularly as brick building was still absent in the western Weald. By the early seventeenth century hop growing with its need for poles was widely established in Kent, to a greater extent than in Sussex. From the 1570s cast iron products and bar iron were also made at a few new furnaces and forges in Kent and Sussex, such as the furnaces at Cowden. The end of Postern Forge and Old Forge may also be linked to the growing competition of Swedish and Midland bar iron.

Finally one must consider the effect of the iron industry on the economy of the parish. The carriage of ironware and coals was potentially damaging to the roads, as the act of 1597 and the presentments to quarter sessions of 1630 imply. It is likely that there were many similar prosecutions in other years which have not survived. In 1625 the five bridges over the River Medway in Tonbridge town were said to often need repairing, not only because of traffic between Rye and London but also because of the carriage of iron to Chatham dockyard and London. Ironworks in Pembury, Frant and neighbouring parishes as well as the Barden Furnace sent wares to Millhall for dispatch down the Medway. Repairs to these bridges usually took years after orders were made.36 Unpaid justices of the peace and local officials were unable to deal satisfactorily with exceptional pressures on the surfaces of roads and bridges.

The help of manufacturing to employment was small. While colliers preparing charcoal and labourers mining ore and transporting them to the works were local, a few skilled foreigners and probably Sussex men previously at other mills assisted to man the works when they were numerous in the later sixteenth century. When they closed the men moved elsewhere or took on another occupation in the district.
Although several ironmasters added appreciably to their incomes from ironfoundry, only Willard made a fortune partly out of it. Yet his property was split between his two heirs and then their descendants, no large landed estate being created.

The most important influence of iron manufacture lay in its demand for fuel. Cleere and Crossley suggest that a furnace needed about 2,500 acres and a forge about 1,500 acres of coppiced woodland, which would cover about a quarter of the area if it lay within a three-mile radius. Conflicting contemporary views prevent an exact assessment of the effect of Willard's wood felling in the mid-sixteenth century. With four ironworks operating between 1553 and 1573 within a distance of about three miles, the temporary shortage of wood by the end of the period was presumably acute. Further, in the Weald and outside it in Kent many of the medieval paled parks were disappearing by the time Lambarde wrote in 1570, under the pressure of demand for farms and rapidly rising food prices. Yet his ironworks clearly hastened the destruction of the four Tonbridge forests by removing timber needed to repair the pales and helped the creation of new farms by clearing sites. Thus the population of Tonbridge parish was able to rise faster than that of some neighbouring parishes such as Pembury and Hadlow without putting pressure on the older cultivated land.\(^37\)

Although the number of ironworks in the parish declined from 1573, and probably fell to one in the early seventeenth century, charcoal continued to be needed for manufacturing in neighbouring parishes such as Frant. In addition to other uses of wood, the industry maintained the extensive coppices, helping to ensure that on poorer soils there was a useful source of income for landowners and farmers. Fortunately this may be shown by a local example. In 1664 the 1,214 acres of woodland saleable after 14 years on the Southfrith Estate produced £2 10s. per acre, or the equivalent of about 3s. 6d. annually. This may be compared with the rent of about 5s. an acre from land including arable and pasture on Barden Farm in 1621.\(^38\)

Then as manufacture continued to decline, the coppices were supported by the growing need of hop-poles and the continuation of building, fencing, domestic fires, and brick and lime burning.

NOTES


3 The study of the Rats Castle site showed the absence of forge bottoms and a bay, while the tail race and ample slag suggested a medieval works. B. Herbert, 'Three Sites in the Tudeley area near Tonbridge, Kent', *BWIRG.*, no. 6, 2nd series (1986), p. 52; this is confirmed by the absence of any specific documentary reference to ironworking here in the later sixteenth century, in contrast to those for the nearby Postern Forge. C/C (1985 and 1995), *op. cit.* p. 362 mention 'Borne Mill furnace, which can hardly be other than Vauxhall'; the evidence about two furnaces is given in notes 12-15.

4 For a survey of the history of Kentish iron manufacture, see C.W. Chalklin, *Seventeenth Century Kent* (1965), pp. 130-37; this book mentions four ironworks in Tonbridge parish, not five as are now known.


8 PRO St. Ch. 8/196/18; PROB 11/107/14.


15 PRO E 112/20/33; this reference is noted in Jack, *op. cit.*, p. 25.

16 PRO Req 2/285/39; CKS U38 M1; C/C 1995, *op. cit.*, p. 351; unlike these authors the writer believes that the reference to ironworks in U38 M1 quoted in the text concerns the Postern Forge, not that at Rats Castle, which was a medieval site – see note 3 above.


18 Hasted Vol. 5, *op. cit.*, p. 229; CKS U442 M67, U840 T95; East Sussex Record Office RAP/F/13/2.


22 Straker, *op. cit.*, p. 61; the furnace seems to have been disused but not ruined as in C/C 1995, *op. cit.*, p. 312, being one of the two possibilities suggested by them; Chalklin, *Kent*, pp. 134-51.

23 PROB 4/14947.


27 Teesdale, *op. cit.*, p. 130; CKS U38 M1; PRO E 112/20/33, Req 2/285/39; B.L. Harl 77 A.10; as in the source PRO E 112/20/33, Willard said that he had cut 'much wood' by warrant from Harper and Sir Alexander Culpepper, whose interest was surrendered at the end of 1573, and Willard's sub-lease also expired by then, he was not working Vauxhall Furnace and the Old Forge in 1574 and the following years.


29 PROB 11/230/276.

30 PROB 4/14947; PRO C 7/25/26.

31 CKS P 371/12/1-2; PRO C 5/225/28.

32 CKS P 371/12/2-8; PRO ASSI 35/180/11; PROB 11/973/469.

33 Straker, *op. cit.*, pp. 162-64; CKS P 371/12/7-8.

34 CKS DRb/_PWR xii 385a, xvii 325b, xix 58a, xxii 167b.


36 CKS U442 Q7 pp. 42-3, 45, 47 and Q/SOW 1 fols 32, 35.
