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New Light on the Iron Industry of the Forest of Dean

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NEW LIGHT ON THE IRON INDUSTRY OF THE FOREST OF DEAN

by B. L. C. JOHNSON, M.A.

IN 1672 Paul Foley of Stoke Edith, Hereford, purchased the 'whole of the materials of the King's works' in the Forest of Dean.¹

This date marks the beginning of a period of over seventy-five years during which the Foley family were actively engaged in the iron industry of the Forest of Dean, and for considerable parts of which manuscript accounts exist. It is probable, however, that the family's interest in the Forest iron trade began at an earlier date, as is suggested by the purchase in 1659 by Thomas Foley (Paul's father) of a share in the manor of Newent.² There was a furnace at Newent, known also as Elmbridge Furnace, in 1692, but evidence is not yet available whether this was erected by Thomas Foley, or whether it attracted him to Newent in the first place.

Through the courtesy of Major H. T. H. Foley, M.B.E., J.P. I have been able to consult a considerable fund of material relating to the trade from the Stoke Edith Muniments. The manuscripts, mostly business accounts in the form of annual summaries of production and sales at various works, refer chiefly to the period 1692-1717, though a few important items date from 1672-3, and for certain works the record extends to 1751. All the iron works covered by the accounts, together with contemporary works mentioned therein or elsewhere, are shown in the map accompanying this paper.

¹ Rhys Jenkins, 'Ironmaking in the Forest of Dean', *Newcomen Society Trans.*, vol. VI, 1925-6.

² *Lydney Park Muniments (Glos. Records Office) D.421/T.34.* Deed 1659-60 re purchase by Thos. Foley of a share in the Newent Manor.

Apart from this main source of information, which will be referred to as the Foley MSS, some additional and corroborative evidence has come from papers held by the Gloucester Records Office.¹

A further invaluable aid to the study of the iron trade at this period is the earliest contemporary list of furnaces and forges—the '1717 List'—published by E. W. Hulme.² The List has been found to be reasonably reliable, and it indicates both the significance of the Forest of Dean in the iron industry of England and Wales as a whole, and the extent of the Foley interests in the Forest relative to those of other iron masters.

The material will be dealt with in three sections—firstly the period up to 1692, secondly 1692-1717, and thirdly from 1717 onwards.

(i) 1672-1692

The accounts available for this period are sporadic in occurrence and very uneven in the detail they provide of the activities and organization of the works. The following works are covered:

Tintern Furnace and Forges: 1672-3, 1675-6.

Tintern and Whitbrook Wire Works: 1674-7.

St. Weonards ('Waynards') Furnace

Llancillo, Pontrilas and Peterchurch Forges

Monmouth Storehouse

} 1677-8

It is not clear whether Tintern Furnace was in continuous production between 1672 and 1676, but the high rate of output, the period the furnace was maintained in blast, and the quantities of 'sow' or pig iron remaining in stock suggest that production was intermittent, though probably not interrupted for as long as the incidence of the accounts would indicate. Thus in 1672-3, 1142 tons were cast in a total of 67 weeks,

¹ The writer desires to record his appreciation of the facilities and assistance provided by Mr Irvine Gray and his staff.

² E. W. Hulme, 'Statistical History of the Iron Trade', *Newcomen Soc. Trans.*, vol. x, 1929-30.

though 'of this time' the furnace was 'stopped up 5 weeks,' giving an average yield of 18 tons 8 cwt per week. Again in 1675-6 the 'blow' lasted 61 weeks producing 1034 tons. Tintern Furnace was therefore a large and efficient one for its time. It depended for its iron on a mixed charge of cinders and 'myne' (ore) in the ratio of two to one, no separate flux being required. The myne came in part from the Forest, in part from 'Prasseck.'¹

Naturally the two Tintern Forges were among the principal users of the iron made, but large consignments went to local forge masters such as Sir Robert Clayton² and even greater amounts, thanks to Tintern's tidewater situation, left the Forest by boat for South Wales and the Midlands. William Morgan of Tredegar imported Tintern pig via Ebboth Pill, i.e. the mouth of the Ebbw, now part of Newport. Richard Hart, at the Machen Forges probably used the same route, while Joshua Newborough, a partner of the Foleys in the Stour Valley had his iron carried up the Severn. In common with other Forest furnaces, Tintern cast a small quantity of miscellaneous goods, firebacks and the like, most of which were marketed through the Bristol warehouse of Samuel Wallis.

The lower Forge at Tintern refined and drew out Merchant Bar iron, having an average output of 150 tons. The Upper Forge in 1672-3 at any rate, showed itself to be capable of the more specialized work of making 'Osmund' or wire iron, for which it used Redbrook Furnace sows as well as Tintern. Rather more charcoal (3 loads 2½ sacks as against 2 loads 10 sacks) was used in making Osmund iron than for merchant bar, and as later accounts show, greater labour was involved. While the Osmund iron went to the wire works nearby, most of the bar was dispatched to Bristol merchants, e.g. Richard Tayler, Walter Gunter, Sam Wallis.

St. Weonards Furnace, with the three forges of Llancillo,

¹ Possibly 'Porth Gaseg' a farm two miles south of Tintern?

² Clayton's works at this time are not known, but Rhys Jenkins (*op. cit.*) mentions him as holding some of the King's works in the Forest, prior to Paul Foley.

Pontrilas and Peterchurch, formed an operational unit separate from the Tintern works. Only a single year's accounts are available, for 1677-8, in which year, the furnace did not blow but disbursed a small part of its balance of sow iron, 956 tons, to Llancillo and Pontrilas. No doubt Peterchurch, far from any alternative source, normally drew its sow from St. Weonards, but in this year the balance in hand was sufficient to cover the make of 53 tons of bar. Pontrilas and Llancillo were somewhat larger forges on the evidence of these accounts, producing 89 and 150 tons of bar respectively. All three forges shared the facilities provided by Monmouth Storehouse, through which a large proportion of the total make was forwarded to Bristol. In its more isolated position, Peterchurch supplied a larger local market, including Hereford, and sent only three tons of bar to Monmouth. A feature common to these and to the Tintern forges was their dependence on a Midlands furnace—Hales Furnace in the Stour Valley—for supplies of forge-hammers and anvils, for the manufacture of which the tough yet pliable Forest iron was unsuited.¹ Heavy hammers and anvils were the essential working tools of the forges. They weighed 5 to 10 cwt. each, and an average forge would use six hammers and two anvils in a year.

When one turns from the making of pig and the refining of bar iron to the manufacture of wire, one enters a trade at once more diverse in the range of its products and in its technical vocabulary. Thomas Foley had wireworks in 1672, probably the same as those for which accounts exist, viz. Tintern and Whitbrook. The use by the wireworks of Redbrook and Tintern Furnace pig, refined into Osmund iron at Tintern Upper Forge has already been noted. Another important source of Osmund iron was Richard Hart's Machen Forges, in Glamorgan, where again the basis was Redbrook pig, brought in by sea via Newport. In contrast to the Forest forges, but in common with slitting mills in the West Midlands, the wireworks used pit coal

¹ For details of the hammer trade, and maps illustrating the iron trade in general see B. L. C. Johnson, 'The Charcoal Iron Trade in the Early Eighteenth Century', *Geographical Journal*, vol. cxvii, part ii, June 1951, p. 167 ff.

(from Bristol) in drawing the wire. Indeed the wireworks also rolled and slit bars into nailrods as a sideline. The scale of payments to the wiredrawer for various grades of wire is some index of the range of qualities produced, and of the number of workings necessary. The prices charged at Bristol are given alongside in brackets.

Reeven	48 stone	@	3d.	a stone	(32/- per Bundle)
Clavent	212½	„	@	4d.	„ (40/- „)
Bastard	„	„	@	7d.	„ (40/- „)
Coarse Fire	484	„	@	10d.	„ (42/- „)
Fine Wire	6050	„	@	12d.	„ (46/- „)
Super Fine	25½	„	@	18d.	„ (49/- „)

Other qualities mentioned were:

Boltack	27/-	a bundle	at Bristol.
Buckle	27/-	„	„
Twobend wire	32/-	„	„
Round Wire	—		
Nayle Rods	£20	per ton	
Crapps	£18	„	
Black Ends	21/8	per cwt	
Strayled Ends	28/-	„	
Throbands ends	28/-	„	

The only clue to the grade of the wire is a comment that a bundle of Bastard wire costing £2, 'used to make horse trace for 7 horses,' was sent to Kidderminster for a pattern.

Most of the finished wire went to Bristol where it was handled by Samuel Wallis's storehouse, which forwarded big consignments to London by land and by sea, amounting to 596 bundles in 1674-5 (cf. Bristol sales of 674).¹

Apart from Bristol and London, there were agencies at Gloucester and Bewdley for the retail of wire, Thomas Mee and John Balwin respectively holding stocks at these river ports.

The Foley's interest in the Wire Trade persisted in the Forest of Dean until at least 1712, when Thomas Foley certainly held Whitbrook works. By 1715, however, Thomas Dix (Dicks) was at the Tintern works.

¹ By sea, transport costs were 9d a bundle including customs charges, as against 1s 6d by land.

(ii) 1692-1717

At Michaelmas 1692 there came into being a partnership with very widespread influence and ramifications in the iron trade. On the financial side the partnership was biased towards the West Midlands, in particular to the Stour Valley, where initially it controlled two furnaces and a number of forges and slitting mills.¹ The three large furnaces which the partnership held in the Forest of Dean were, however, of basic importance to its activities, as these supplied high grade 'tough' pig iron for blending in the Stour forges with 'coldshort' iron of local manufacture. During the period 1692-1717 the Forest side of the business increased in importance, both relatively and absolutely. More furnaces were brought within the partnership's control, so that by 1710-11 there were six in blast, and forges were added. At the same time, the partnership's direct interest in works in the Stour Valley decreased, and although this area continued to draw the bulk of its pig iron as previously, from the Forest of Dean, by 1705 the Stour forges were in other hands. One important trade connection remained firm right into the 1730's. This was Bewdley Storehouse, through which much of the partnership's Forest production found its way to the forge masters and merchants of the Midlands.

The three furnaces in blast in 1692 were at Blakeney, Bishopswood and Elmbridge. The accounts record the existence of a fourth at Linton, then out of action and in process of disposing of its stock of raw materials. Linton never came into blast under the partnership, and disappears from the books after 1698. Blakeney was a large and efficient furnace by contemporary standards, with an output of 1,251 tons in its best year, and a weekly average of around 20 tons while in blast. Its raw materials consisted mainly of 'cinders,' only a third of the furnace charge being ironstone—a fairly constant proportion at all the Forest furnaces at this time. Situated on

¹ The Stour Valley side of the partnership is treated more fully in B. L. C. Johnson, 'Stour Valley Iron Industry in the Late 17th century', in *Trans. Worcs. Arch. Soc.*, vol. xxvii, 1950, p. 35.

the fringe of the Forest, it was able to obtain all its requirements of charcoal, cinders and ore from within a radius of five or six miles. The disposal of its pig iron was facilitated by proximity to tidewater at Gatcombe, whence the pig travelled by boat to Bristol, or up the Severn to Bewdley.

Bishopswood Furnace differed from Blakeney only in despatching its product to the Midland market through the river port of Newnham. This is an indication of the ineffectiveness of the Wye as a transport medium above the tidal limit at Brockweir. The Wye was used, particularly between Redbrook and Brockweir, and of course in the lower tidal reaches, but the costs of transport were higher than on the Severn, and this together with the apparent necessity to tranship cargoes at Brockweir, probably made land carriage from Bishopswood to Newnham a more economic proposition.¹

Elmbridge Furnace was in one respect untypical of Forest furnaces generally. In part, it is true, Elmbridge drew its cinders and iron ore from the Forest—cinders from Cannop, Hope (Hopeswood) and Mitcheldean, and 'myne' as well, but in many years, 'myne' from nearer at hand in Newents Wood and Aston, was utilized with or in place of the true Forest iron ore. The Forest 'myne' was no doubt Carboniferous 'limonite,' ironstone, but such material does not occur in the Newent-Aston area, where limestones of Silurian age outcrop. The 1746-8 accounts for Elmbridge suggest that the material obtained from Newents Wood was not in fact ironstone, but limestone for use as a flux in the furnace charge, these later accounts referring to the material as 'flux myne.' It may have been due to the use of this flux, rather than of Forest ore in admixture with cinders, that Elmbridge made both the tough iron characteristic of the region, and ordinary or 'coldshort' iron, more commonly associated with the Midlands and other areas using a Coal Measure ironstone. Elmbridge Furnace's metallurgical problem awaits a satisfactory solution.

¹ Transport costs on the Wye averaged about 3*d* per ton per mile; on the Severn 1*d*; overland from Bishopswood to Newnham, 7½*d* per mile.

Elmbridge pig iron was supplied regularly to the nearby forge at Upleadon, not however one of the partnership's concerns,¹ but the bulk went by road to Ashleworth, to be shipped up the Severn, to Bewdley and Wilden, or via the Avon to Stratford.

The record for Bishopswood and Elmbridge remains unbroken up to 1717, when there comes a general gap in the accounts. Blakeney after 23 years' continuous production went out of blast in 1715. The partnership had interests in three further furnaces for shorter periods. Redbrook was the biggest of these, and was in production from 1702-3 under the direct management of the partnership. Prior to this it had been in blast for a number of years under Benedict Hall, who sold what must have been the greater part of the produce to the Partnership. It is possible there may have been two furnaces at Redbrook in 1699. A summary furnace account in the name of Will Johnson, covering the blast beginning 11 Sept. 1699 and ending 6 May 1700, is preserved in the Gloucester Record Office.² The possible existence of two furnaces is suggested by the lack of correspondence between the receipts of pig iron from Hall by the Partnership and the disposal of iron given in Will Johnson's account. The latter shows a total of 563 tons delivered to a 'Forge,' the remainder of the stock being carried forward. The Partnerships' receipt in that year amounted to 722 tons, 160 tons of which went to Wilden on the Stour, and 342 tons to various local forgemasters. There may well be a simple book-keeping explanation to this quandary, and no other evidence is known to suggest more than a single furnace at Redbrook.

In one technical detail Redbrook was unique among the Forest furnaces of the time. Possibly independently of other ironmasters, possibly at the suggestion of Abraham Darby with

¹ Upleadon Forge was held by Humfry Soley in 1697/8, and from 1703/4 by John Soley. After 1715 George Draper was in occupation. All these men appear to have held Mitton Forge on the lower Stour, concurrently with Upleadon.

² *Lydney Park Muniments*. D.421/E.9.

whom the partnership had some commercial dealings, and at any rate in keeping with experiments which had been proceeding elsewhere from time to time over the 17th century, Redbrook Furnace produced a small quantity of coke-smelted iron in 1716-17. The fact is not applauded in the account, and the discontinuance of the practice in later years suggests that the experiment was not commercially or perhaps technically successful.

In the inventory for 1716-17 appears this item:

'Sow Iron 159T. at £7 15s *od* per ton.

M^o.y^t.; made Wth. Stone Cole 4T. at £6 0s *od*. . . .'

and among the 'common charges' for running the furnace, the expenditure of £6 19s 5*d*,

'pd. for Stone Cole Charkt.'

There can be little doubt that iron had been smelted using coke—'charked' coal—but the value of the metal is placed somewhat lower than the charcoal-smelted iron, and its quality cannot have appealed to masters of tough Forest pig.

Gunn's Mill Furnace, two miles south of Mitcheldean, had a somewhat erratic career. It first appears on the partnership's books in 1705-6, with a 'make' of 779 tons, but for three years running 1707-8-10 and from 1712-13 it stood idle. St. Weonards, already mentioned as in existence in 1677, came into the partnership's control as an active furnace in 1707-8, and continued to produce till 1717, albeit fitfully. On occasion it made 733 tons in a year, but production was erratic, and from 1712-14, there was no make at all.

A little evidence is forthcoming from the Foley MSS on other furnaces in the Forest at this time. Flaxley is mentioned in 1695 and again in 1710, as in the possession of Richard Knight, of the family who became so powerful in the Stour Valley in the 1730's. John Hanbury, of Pontypool, had Tintern Furnace in 1707-8, while the Wintours held Lydney, where they also had two forges.¹

¹ *Lydney Muniments*, D.421/T.18. 'New Forge', Lydney is mentioned in 1663 and New and Pill Forges in 1723. Another group of papers (L.14) dating from 1714 concerns the sale of iron from Lydney 'Furnace and Forge' to Bristol merchants.

The large share of the Forest pig iron production that was in the hands of the Foleys and their partners can be shown by reference to the 1717 list of furnaces and forges mentioned above. Nine active furnaces are listed in 1717, of which six were in the partnership's control between 1707 and 1712. A producing capacity of about 3,500 tons of pig iron out of the region's total of 4,950 was thus in their hands. Their share of the refinery and chafery forge capacity was never so great, and the main function of their activity in the Forest of Dean was obviously the manufacture of tough pig iron for use in forges elsewhere, in the Stour Valley in particular. Taking all the Forest forges, both those within and outside the partnership, we find their capacity to consume pig iron less than half that of the furnaces to produce pig. Thus the forges could utilize 2300 tons of pig, leaving 2650 tons surplus to local requirements, most of which went to supply the pig iron deficiencies of the Birmingham-Stour Valley region (2500 tons) and the Central Shropshire region (1440 tons).

Pig iron for the local and Forest forges was thus the main product of the furnaces, only a small proportion of their make—firebacks, pots, plates, weights, troughs, etc.—being in the form of light castings. The location of the forgemasters to whom pig iron was sent is rarely indicated, but in some cases transport costs give a clue, and in others, locations have come to light from contemporary MSS in a number of collections. The main pattern of trade as indicated above is indisputable. The Forest of Dean, producing much more pig iron than could be processed in its own forges, sent the bulk of its output up the Severn, where the Stour Valley Forges constituted the chief consuming market. A little pig went further up Severn to Coalbrookdale and beyond Shrewsbury to Pool Quay and Dolobran. Via the Avon there was a regular flow of iron to Clifford Forge near Stratford, and to the Redditch Forges. In the opposite direction, Tredegar, Machen, and forges further west in Carmarthen and in Pembrokeshire (particularly Blackpool or Slebech) were regularly supplied.

Until 1701-2, the partnership had no forges in the Forest of

Dean, but had concentrated on their Stour Valley works. Their first Forest forge was a diminutive one at Barnedge, with an output hovering between 18 and 29 tons per year. Barnedge, and Rowley Forge which produced for only one year, were situated in a small valley between Blakeney and Chepstow, served, for the purposes of pig iron imports and bar iron exports, by the river port of Cunpill, or Conepill. These works were of little note, however, beside Monmouth Forge (held from 1704 to 1709) and the Lydbrook forges (held from 1708-9). Both Monmouth and the Lydbrook group could make over 200 tons a year.

The common functions of all these forges was the refining and drawing out (in charcoal-burning hearths) of Merchant bar iron, which was sold in Bristol, and the Severn towns of Gloucester, Tewkesbury, and Bewdley. The Upper Forge at Lydbrook specialized in the manufacture of Osmund iron for the wireworks at Tintern and Whitbrook, though it customarily made bar iron also.

Other forges in and near the Forest, to which reference is made in the Accounts are listed below:

New Weir: on the Wye below Lydbrook: held by George in 1710-12 and by John White (1715-17) who concurrently held Monmouth.

Upleadon, near Newent, mentioned above.

Tintern (two forges listed in 1717).

Lydney (two forges listed in 1717).

Peterchurch (in the Golden Valley) and Strangeworth (near Kington) were linked through the name of Thomas Jukes, probably a Stour Valley man, who bought his pig iron from Bishopswood and Elmbridge, and sold bar from Strangeworth to Bewdley Storehouse.

Clytha on the Usk, four miles below Abergavenny in the hands of John Taylor of Bristol.

Llancillo on the upper Monnow, was under Nathaniel Morgan in 1698-9, had pig iron from St. Weonards. Details of its markets at a later date appear below.

Tortworth, over the Severn, where Colonel Moreton had a forge under construction in 1714 and was buying Blakeney pig iron from 1713-14.¹

Apart from its furnace and forge activities the partnership engaged in another but minor branch of the iron trade in the Forest, the making of anvils—the normal blacksmith's anvil, weighing on average 150 lbs. The anvil works were at Lydbrook and near Gatcombe, the former 'standing idle,' but the latter working from 1695 to 1705, though in 1710-11 it was being converted into a cornmill. The technicalities of anvil making are not clearly described in the accounts. Two stages in manufacture are suggested; the first 'building' or 'moulding' the anvil from 'loop' iron cast at the works from scrap iron and cinders; and secondly the 'steeling' of the anvils for which a small amount of steel, about a tenth of the weight of the finished anvil, was required. The 'English Steele' used, came from Bewdley, probably from the Stourbridge steelmaker, Ambrose Crowley. Pit Coal appears to have been the sole fuel used. Gatcombe's output was shared, roughly equally, between Bewdley and Bristol, the 1699-1700 distribution from a make of 87 anvils being:

to Bewdley 31.		
Wm. Turton	16	Bristol
Humfrey Waltmore	7	„
Sam Wallis	6	„
Richd. Taylor	6	„
Willm. Beals	7	?

Among the personalities mentioned in connection with the anvil works were John Hatton, 'the head workman' who received £25 a year, Thomas Pritchett, a caster of loop iron

¹ Tortworth Forge is shown in a map surveyed in 1760, but in a rent-book of 1797 and a Terrier of 1801 the site only is referred to, as part of a farm.

The iron industry at Tortworth predates 1714. A lease of 1660 (*Glos. Records Office, Ducie Papers*, T.30) refers to 'Old Iron Mills', then merely 'water mills', and the field names adjacent to them suggest that the 1714 forge stood on the site of these mills. John Hanbury, the Pontypool iron master, wrote several letters advising Moreton on the construction of the forge.

paid at a piece rate of 12*d* a hundred weight, plus 12*d* a day 'helping to put anvils together,' and John Morgan, presumably a smith, paid 6*s* a week for 'smiteing.'

(iii) FROM 1717-51

A complete gap unfortunately mars the continuity of the Foley MSS from 1717 to 1725. The cause of this hiatus has not been elucidated, but the accounts for 1725-7 suggest there had recently been some changes. On the clerical side the changes produced a new method of accounting much inferior to the detailed and systematized book-keeping up to 1717. The 1725-7 account book had been carefully audited by one of the principles in the concern, and scarce a page lacks its red-ink commentary on the illogicality of the book-keeping. However, despite one's disappointment with their fresh format, the accounts continue to give adequate detail of the works in operation and the persons to whom iron was sent.

In 1725 there were six furnaces and three forges under the control of the new partnership. Four of the furnaces, Elmbridge, Bishopswood, Redbrook and St. Weonards were working, Gunn's Mill (temporarily) and Blakeney Furnaces standing idle. Elmbridge continues in the accounts (which are not complete) up to the last in 1751; Bishopswood drops out from 1728 to reappear in 1748; no accounts for the other furnaces have been studied for the period after 1733.¹

From 1725 to 1733 the furnaces disposed of their pig mainly to the three forges mentioned below, and to Lord Foley at Wilden Forge on the Stour. The general pattern of trade had not altered appreciably. Cinders and local ore remained the basis of smelting industry, though the eventual working out of these sources of iron is foreshadowed in the appearance of 'Lancashire mine' or 'Red Mine' in the furnace charge at Elmbridge, 93 tons in 1725-7 and 50 tons in 1728-9 being imported.

¹ No particular significance should be attached to this fact. A number of account books for the period of 1733-48 exist but have not been examined.

Not only ore but 'foreign' pig iron too was beginning to appear at the Forest of Dean works. Edward Hall supplied Lancashire pigs, and Nehemiah Champion the Bristol merchant both Lancashire and 'Scotch' pigs to Lydbrook Forge. The other two forges held were at Llancillo and Monmouth. From time to time Lydbrook seems to have had three forges working, the Upper, Middle (possibly the 'Lower' of the previous decade) and New Forge. Osmond iron continued to be an important though minor part of the product of the group. Monmouth Forge drew most of its pig iron from St. Weonards, Redbrook or Bishopswood, but had 25 tons of Cunsey (Lancs.) pig in 1725-7. Like Lydbrook, its hammers and anvils still came from the Stour Valley. Llancillo, barely half the size of Monmouth Forge, lay almost midway between the Wye and the Usk, and could thus draw pig economically from John Hanbury's Llanelly Furnace north of Abergavenny (which also supplied hammers)¹, as well as from the partnership's Forest furnaces.

The bulk of Llancillo's bar iron was marketed through Monmouth Storehouse, and in common with a big share of Lydbrook and Monmouth Forge bar, found its way to the partnership's important agency at Bewdley, and so to the ironmongers of Birmingham and South Staffordshire.

In the final five years for which accounts are available, 1746-51, the concern operating Bishopswood and Elmbridge Furnaces and Lydbrook and New Forges would seem to have shrunk from a partnership to a privately managed group of works. The size and the raw material basis for the furnaces remained unchanged: cinders, 'myne' (both Forest and local 'Fluxmine' in the case of Elmbridge), and charcoal. Compared with thirty years before there was however a significant change in the proportion of cinders and ore used. These were now charged in roughly equal proportions, which strengthens the view that resources of cinders were failing. As no ore from other

¹ Llanelly Furnace was presumably using local coal measure ironstone, which was suited to the manufacture of hammers and anvils but produced pig inferior to tough Forest iron.

districts was imported, the increased demand for local iron ore must have stimulated mining. Supplies of charcoal presented no new difficulty. In fact it is quite remarkable how similar are maps showing the quantitative distribution of charcoal sources in 1710 and 1746-8. The recurrence of many place names in the lists of woods suggests that the growing of coppice wood to be regularly cut for charcoal had become an established practice in the area.

If any change can be recognized in the distribution of pig iron it is the increase in the importance of the Stour Valley market. Here Lord Foley and Edward Knight, together, purchased a large part of the output of Elmbridge Furnace in particular. Bishopswood, while also supplying Lord Foley, sent more to George White (probably still at New Weir) and to Thomas Daniel & Co.

New Forge was a 'finery' only, refining pig from Bishopswood and sending the 'anconies' or blooms to Lydbrook. The latter both refined pig iron and drew it (and New Forge anconies) into bars in the 'chafery' forge. The quantities handled were not great *e.g.* Lydbrook in 1748-9 refined 45 tons and hammered out 87 tons into bars. Bewdley Storehouse no longer came within the control of the concern, and does not appear among the destinations of bar iron, which went to a number of merchants among whom Messrs Roberts and Hanbury, Wm. Chinn, and Samuel Partridge were the principal, probably all of them Bristol and South Wales merchants.

* * *

The foregoing account cannot be claimed to be complete, but it reveals the flourishing state of the iron industry in the Forest of Dean at the turn of the 17th century. As further material becomes available it should be possible to carry the industry's story through into the latter half of the 18th century, the period of its losing struggle for survival.