Book Reviews

Coalbrookdale and the Darby Family: The story of the world's first industrial dynasty by Emyr Thomas. *Sessions Book Trust in association with Ironbridge Gorge Museum Trust, York, 1999*, xii+*228pp, 62 illustrations and maps, index. ISBN 1 85072 217X. £12-95.*

The book is primarily a history of the Darby family, whose ironworks at Coalbrookdale are among the industrial monuments preserved as part of the Ironbridge Gorge Museum. A history of the family and its business is provided on a generation by generation basis, from the period before the arrival of Abraham Darby I at Coalbrookdale in 1709 until the foundation of the Museum of Iron at Coalbrookdale 250 years later. The book is the result of considerable (though not comprehensive) research, elucidating details of property owned by members of the family and draws considerably on the recent books on the life of Abiah Darby and Deborah Darby who travelled widely as Quaker ministers in the late 18th century. Accordingly as a family history the book succeeds quite well. It provides a fuller account of the family than Barrie Trinder's short *The Darbys of Coalbrookdale* and a more personal one than Trinder's important *The Industrial Revolution in Shropshire*. As such it might be thought that this book would supersede Arthur Raistrick's *Dynasty of Ironfounders*, now almost 50 years old. Raistrick's book was a pioneering study of the family business, made in the days when the details of the industrial history of this country were still only beginning to be unravelled. From the scholar's point of view Raistrick's book suffers from its lack of detailed footnotes referring to original sources, though those familiar with the sources could usually trace the documents used by him. Emyr Thomas however has not sought to verify the accuracy of Raistrick's statements and has apparently assumed that everything that he said is correct.

While he has (as mentioned) made good use of a number of books dealing with the family and their business, he has completely failed to make any use of articles concerning Coalbrookdale. While those articles are mostly more concerned with economic and technological history, rather than family history, the family's importance is primarily due to their technological achievements. These consisted of making pots in cast iron in the late 1700s, erecting the first coke-fuelled furnaces primarily concerned with the production of forge pig iron at Horsehay and Ketley in the 1750s, and the erection of the world's first cast iron bridge. In the 19th century they were renowned for their decorative cast iron. Accordingly the work of R A Mott in the period before the 250th anniversary ought at least to have been cited, though it does of course precede Trinder's *Industrial Revolution*. More importantly however Emyr Thomas has failed to mention Nancy Cox' work (in *Industrial Archaeology Review* for 1989), which throws important new light on the first Abraham Darby and the difficulties he overcame in developing his foundry business at Coalbrookdale. It is evident that apart from a single foray to the Public Record Office, the author's research has been almost entirely limited to published sources and to manuscript ones available in Shropshire. In doing so he has not himself considered the archives of other partners in the Coalbrookdale Company, particularly the Prankard letter-book in Somerset Record Office (used by Nancy Cox) and the Goldney archive in Wiltshire Record Office.

Furthermore it is apparent that he has not himself examined the account books of the Coalbrookdale Works or checked certain other original sources for the work of Arthur Raistrick and others, and has in consequence drawn some unjustified conclusions. On page 55 he quotes from Raistrick a reference to a model erected in 1735 'near ye Faulcon Stairs' in Southwark, linking this with a reference to a foundry which the Company did have at Southwark rather later, thereby suggesting the Falcon Foundry belonged to the Company in 1735. While it is not clear who owned the Falcon Foundry at that date, there is absolutely nothing in the Company's accounts to indicate that the Company owned it. If anything the Company's accounts point in the opposite direction, in that they sold pots to various important ironmongers in London, and pig iron to Thomas Goldney, a partner in the Company resident in Bristol, for resale, but no pig iron to any one in London. When the Company did subsequently have a foundry in Southwark for a few years, it cannot have been the Falcon Foundry as that then belonged to Wright and

Prickett. Similarly, a foundry associated with the Company at Liverpool is mentioned but little effort is apparently made to determine its history, though perhaps further detail cannot be discovered.

The difficulties with the description of how the Company began to produce bar iron in small quantities in the 1720s are not entirely of the author's making in that he has repeated an error of Raistrick, who refers to an Old Forge being brought into use in 1718, something which is not mentioned in the Company's account books. With the exception of one reference to a trial of 'our piggs' quoted in full by Raistrick (but misdated to March 1719 rather than March 1720), the accounts in fact contain no reference to the use of any forge (except by sub-tenants) until after the Company took over Coalbrookdale Middle Forge (later known as the Upper Forge) from Thomas Stanley in summer 1720. Raistrick was also misled by a reference to 'Expenses to Stourbridge' into thinking the trial had taken place in a forge there, when it was actually the subsequent process of slitting the iron into rods that took place near Stourbridge, in Thomas Brindley's slitting mill at the Hyde in Kinver. With the state of knowledge 50 years ago, Raistrick's mistake is understandable. Fortunately Emyr Thomas only dealt with this briefly with the result that the error is a slight one.

These are perhaps minor quibbles, relating to a few sentences here and there in a substantial book which is primarily a work of family history. For a business or technical history, the reviewer will continue to prefer other works. The book is well-written, nicely presented and is interesting to read, even if its subtitle is somewhat over the top.

Peter King

King copper: South Wales and the copper trade 1584-1895 by R Rees. *University of Wales Press, Cardiff, 2000. viii+179pp, 232x155mm, 22 figs, index. ISBN 0-7083-1589-5, £14-99 (pb). ISBN 0-7083-1588-7, £30-00 (hb).*

King Copper is claimed to be the first social and environmental study of the copper industry of South Wales. There have been commentaries on the smoke nuisance in other more general books starting with Grant-Francis and Percy in 1861. Other authors tell of the effect of the non-ferrous industries on the social structure of the town. This book covers all aspects and presents the court actions in detail. There is an extensive bibliography.

The first chapter deals with the history of the industry. The author describes the process in use at Keswick in the 16th century. He seems not to know that 'metal' in the copper smelting industry was matte, a mixed metal sulphide. We do not have any contemporary account of what they were doing at Neath but it was almost certainly different from the process at Keswick. As the demand for copper increased at the end of the 17th century the good access offered by the Tawe, which was navigable for about three miles, attracted other intending copper manufacturers. At this time the town of Swansea was a bathing resort for the middle classes; the Town Hall, the Assembly Rooms and the facades of some of the elegant houses from this time still stand at the old river mouth. All the facilities for summer visits to the seaside were there. It was not to last.

Chapter 2 deals with another facet of the industry. Coal was local, ore had to be imported, even if only from Cornwall and other British sources, so shipping and the ports were crucial. As the British mines became exhausted ore had to be carried around the world but port facilities were inadequate for the larger vessels. The first major improvement was in 1825 when the Copperhouse Dock at Llanelly was rebuilt by the Nevilles as the first 'float' in South Wales. The second 'float' soon followed at Port Talbot. By then the Town Council of Swansea had been discussing the North Dock for 30 years but could not agree; it was eventually opened in 1851. Within two months a start had been made on the second (South) dock. This was on the Burrows where there had been gardens and walks. It was the end of the fashionable resort. The chapter continues with an account of the Cape Horners, both ships and men. It finishes with a description of the 'ticketing' system for selling ore. Almost at the end of the chapter we again have confusion about the term 'metal'. We are told that too much sulphur produced coarse metal. 'Coarse metal' is an iron rich copper-iron matte, essential to the process.

Chapter 3 deals mainly with social conditions. Unlike some other commentators the author has not fallen into the easy trap of relating everything to modern expectations. He points out that at first the worst conditions were created by the movement from country to urban housing. This was compounded by the ignorance of the causes of disease. While the houses provided by the coppermasters were satisfactory or better, and out of the worst of the smoke, they failed to provide pure water, drainage and public cleansing. The interest in workers' accommodation was, of course, not entirely altruistic, like the age-old tradition of the tied

cottage. Along with the houses went the schools and churches. The author tells of their foundation and control and also provides an account of working conditions. To us they were severe but they attracted workers from what seem to us to be more attractive jobs. The chapter ends with an account of the sharp contrast with the lives of the coppermasters. The Vivians set up their homes to the west of Swansea, the Morrises built a house to the west of their works but later joined their peers in Sketty, while the Grenfells lived on the east side of the river but to the south of the smoke.

Chapter 4 is an account of the problem of copper smoke and some of the early litigation. It contains an unsatisfactory description of the smelting process. Again there is confusion about the nature of coarse metal and white metal. There is an early nineteenth century description of what poling was thought to do to blister copper; this was shown to be wrong by 1860. Following this there is the most complete account I know of the experiments to rid the town of this pernicious problem but it omits the Grenfell trial of 1848.

The next four chapters make fascinating reading. They are an account of the disputes between various persons and authorities and the coppermasters caused by copper smoke. I suppose it was for the greater good at the time that they 'got away with it', to use a modern phrase. In any case for most of the period you made copper and smoke or neither.

In the last chapter the author chronicles the decline of the industry. In doing so he repeats criticism of the Welsh copper makers for not being sufficiently progressive. The truth of the matter is that Swansea was no longer the right place for smelting copper. He seems not to have understood the major reason for the rapid growth of electrolytic refining – the need for copper purer than can be obtained by fire refining. The chapter concludes with a brief account of the restoration of the Swansea Valley. The last few sentences should perhaps make us pause for thought. We have not cured the pollution. Our copper pollutes someone else's landscape.

In conclusion I recommend this as an interesting and thoroughly readable book.

Peter Hutchison

Alexander Raby, Ironmaster edited by Glenys Crocker. *Surrey Industrial History Group, Guildford. 2000. 43pp, A4, 21 illustrations. ISBN 0 9523918 9 9. Price £7-50 inc UK postage, from SIHG, Castle Arch, Guildford GU1 3SX.*

This brief but well-produced volume comprises essays derived from papers presented in 1998 at a meeting at Cobham, Surrey. Alexander Raby (1747-1835) was born into a family with wide connections in the iron trade. His father, Edward Raby, had been apprenticed to Ambrose Crowley, the noted iron merchant, who was involved not only in the Stourbridge trade but in the steel industry of north-east England, notably on the Derwent at Winlaton. The Raby connection with the London trade, the main subject of this publication, began in the 1740s, when Edward worked as an ironmonger in Smithfield. He moved into iron smelting, in 1758 leasing, with Alexander Master, Warren Furnace, East Grinstead, and purchasing the adjacent Woodcock Hammer. Guns were cast for the Board of Ordnance and for the East India Company until Edward's death in 1771. Edward's son, Alexander, took over the business, and concentrated on the production of iron and copper goods at water powered forges in north Surrey, on the Mole and the Wey. It is with these mills and their business that four of the six essays are largely concerned.

The scene is set by Jeremy Hodgkinson, setting out the family background in the iron trade, with emphasis on Edward Raby's gun-founding in the Weald. John Potter sets the scene for the north Surrey mills, followed by David Taylor's more detailed examination of sources for the mills on the Mole at Cobham. This is complemented by Alan Crocker's examination of the Downside Mill site, Cobham, and David Barker's essay on Raby's mill at Addlestone. The final paper, by Lyn John, briefly outlines Alexander Raby's entry into the south Wales iron trade in the 1790s, his part in the expansion of the Llanelli iron industry, with its related coal mines and limestone quarries, linked to blast furnaces by tram-roads. The period between 1806 and Alexander's death in 1835 is briefly outlined, years when the Raby business was repeatedly in debt, in periods of fluctuating demand for iron products during and after the Napoleonic wars.

The book is well illustrated, referenced and indexed, and can be recommended as an outline of an area whose iron trade has been overshadowed by the industry of the Weald.

David Crossley

Early iron and steel in Sri Lanka: a study of the Samanalawewa Area by Gillian Juleff. *von Zabern,*

Mainz am Rhein, 1998. Materialien zur Allgemeinen und Vergleichenden Archäologie, Bd 54. viii+422pp, 280x195mm, 201 figures and tables (22 full colour), 6 appendices. ISBN 3-8053-2512-6. 78DM.

As is explained at the beginning, the great bulk of this book is a revised version of Gill Juleff's PhD thesis. Before the beginning of the Samanalawewa survey and excavation project, which this book describes, little was known of the development of the early iron and steel industry of Sri Lanka. It was thought that the most likely discovery might be earlier evidence for the crucible steel industry, the last firings of which took place at the end of the 19th century and were reported by Amanda Coomaraswamy (*Medieval Sinhalese Art,* London 1908). Sri Lankan (Sarandibi) steel features prominently in Yacob al-Kindi's description of sword types, and the different sorts of iron and steel used to make them, which was written between 832 and 841 AD.

Instead of finding evidence for an earlier medieval forerunner of the crucible steel industry, the furnace remains of a totally unexpected, large scale bloomery iron smelting industry were discovered. The furnaces, which were situated on the exposed south-west facing slopes of this area, were of a design not encountered before. They were made by cutting a shelf-like scoop into the hill slope. A tablet-like piece of stone (roughly brick-shaped but larger) was placed vertically in the ground on either side of this scoop, about 2m apart in the later examples, to form the wide-mouthed entrance to the furnace. A clay wall, about 60cm high was built between the stones forming the front wall of the furnace. Set into this wall, near its base, was a row of tapering clay nozzles, or tuyères, through which passed the air powering the furnace.

The air blast, however, was not provided by bellows but by the strong, dry, autumnal south-westerly monsoon winds which prevail in this part of south-western Sri Lanka. It was clear, from excavated fragments of clay, that it was carefully shaped so as to form an aerofoil so, when the wind passed over it, an even draught was drawn into the lower part of the furnace. The reduction zone was just behind the front wall and, therefore, the furnace was correspondingly narrow, measuring only about 50cm front to back.

Many examples of these furnaces are reported to have been found over the survey area, and were recognisable by the stones still standing on either side of the front wall. Excavation of part of one area of hillside revealed a stratified sequence of furnaces, carbon-14 dated to the 7th-11th centuries AD. It was clear that the furnaces were used more than once, with the front wall being broken down to allow retrieval of the iron bloom after each firing. Before the next firing the clay wall was rebuilt, incorporating fragments of tapering clay tuyères from previous firings within the wall, as well as laying a new row of tuyères near the base. This may have been done repeatedly before the furnace was finally abandoned. During these four centuries the furnaces gradually became wider, from approximately 1.5m for the earlier examples to the 2.0m width of the later furnaces.

Survey and limited excavation revealed the remains of two much earlier, narrower furnaces, which were again recognisable by two upright stones flanking the front wall/entrance, this time less than 0.5m apart. These furnaces were carbon-14 dated to the 4th century BC, and these early examples were almost certainly bellows driven. Sometime during the intervening period these early furnaces appear to have evolved progressively into the much wider wind-powered examples seen a millennium or so later in the Samanalawewa examples, although how this took place is not yet known.

The background to these discoveries is covered in the first part of the book which reports that iron use reached the Indian sub-continent in the mid-late 2nd millennium BC and Sri Lanka some time in the early 1st millennium BC. The bulk of the book (and parts of the appendices) gives the results of what was clearly a very thorough field survey and excavation. Also reported are the successful results of the experimental reproduction of the process based on an exact replication of the design of furnace reconstructed from archaeological remains. This showed how sensibly-designed and well-recorded reconstruction experiments can provide additional information to help understand how an early technological process like this actually worked.

For the most part, this book is an exemplary piece of work which should show the way to approach similar areas where industrial processes might be predicted, or where they might be encountered by chance. Inevitably some of the conclusions are open to alternative interpretation. For instance I disagree that the type of steel which the experiments showed that these wind-powered furnaces produced is likely to be the same as that reported (between 832 and 841 AD) as having been exported and used to make swords in some sites in Greater Iran and the surrounding region. Al-Kindi is quite specific in his description that the steel used for these swords was made by a secondary process and is described in a way which must refer to a crucible origin.

It is therefore also misleading to say that al-Kindi does not mention how the steel was made. It is correct that he does not describe the production process in detail, or directly refer to crucibles, but it is clear that he knew the origin of the steel. It is also clear from al-Biriami's description two centuries later, that al-Kindi worked with at least one earlier description which does describe the crucible process in detail. In any case the steel produced by these furnaces would be sure to have been inhomogeneous in its raw state.

This does not detract from the excellent standard of the book, but just means that the secondary production sites have yet to be found, although some fragments of crucible steel of the same period as the wind-powered furnaces have recently been found and reported by Gill Juleff in HMS News, although too late for inclusion in the book.

Last, but not least, special mention should also be made of Prof Mike Wayman's excellent report on the metallurgical investigation of a series of ferrous objects relating to the nearby late 19th century crucible steel process recorded by Coomaraswamy. The superb scanning electron micrographs are particularly helpful in understanding the structures.

The low price (£28), presumably highly subsidised, and very high quality of this German-published book should also be mentioned.

Brian Gilmour