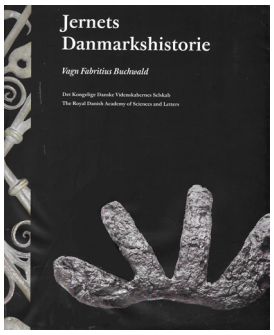
Book reviews

Jernets Danmarkshistorie by Vagn Fabritius Buchwald. *Royal Danish Academy of Sciences and Letters, Copenhagen, 2015, 345pp, 277 figs (some colour), 68 tables, index, ISBN 9788773043882, 300 DKr, p/b. In Danish.*



The title literately translates as 'Denmark Iron History' and this in itself provides an excellent description of this book. There are ten chapters, spanning from *c*500BC up until the decline in the production of iron and subsequent trade, and concludes with the invention of the Bessemer process in England in 1856. Each chapter describes the evidence for ironworking or the iron trade in Denmark, placed into context by considering Europe-wide developments. The author also emphasises the work and achievements of some historical individuals that have affected this important industry.

Chapter 1 details ironworking in 500-1 BC and starts with objects made from iron meteorites. It also introduces different types of iron ores as well as describing slag and iron phase diagrams, after which the pre-Roman Iron Age is also described. The next chapter covers the Roman Iron Age (AD 1-400) but starts with details of the smelting process. The author describes how thousands of shaft furnaces were built in Jutland to exploit the local bog iron ore. There is also a section that discusses the weapon sacrifices, and includes metallography of some of these swords.

The third chapter discusses the evidence for ironworking in the migration period and the developing trading network in this period. There are some descriptions of key sites including the settlement at Ribe. This chapter also includes a description of the smith, and some nice illustrations showing manufacturing methods. Chapter 4 describes ironworking in the Viking Age (AD 750-1050) and Denmark's close connection with Norway which supplied almost all the iron and steel in this period to make its knives and ships.

The Middle Ages are split into three phases in chapters 5, 6 and 7. The chapter on the Early Middle Ages (AD 1050-1241) discusses the comprehensive evidence for trade from Skane and Halland, using evidence gathered from objects and slag. It also describes the influence of monasteries and churches on the industry. Chapters 6 and 7 discuss how during the Kalmar Union Denmark obtained most of its iron from Bergslagen in Sweden where the first blast furnaces were constructed in 1200. This trade continued for 400 years with the trade of Osmund iron, small potato-sized lumps of malleable iron. However, there is still evidence for ironmaking in Denmark with clear activity in central Jutland which produced four-fingered ingots, though no smelting furnaces have been found.

In chapter 8 the period from 1523 to 1660 is discussed; this covers the dissolution of the Kalmar Union described in the previous chapters. This encouraged new iron production in Norway using the excellent iron ores west of Oslo. A string of blast furnaces supplied iron bars to smiths in Denmark. The next chapter introduces several ironworks including Baerum, Fossum, Ulefos, Hassel and Egelands, all in Norway. The final chapter covers the period from 1789 to 1860 and continues to describe the trade and production of iron in Norway. The author also details the developments in English coke furnaces, puddling furnaces and the use of cupola, before summarising the invention of the Bessemer process in 1856 to conclude the book.

Apart from the English abstract at the front of the book the rest of the text is in Danish. The only downside of the book is that sometimes the topics in the chapters were not entirely obvious. For example, chapter 1 starts with an introduction to early iron in Denmark, but then discusses the details of slag and iron analysis, before finishing with more historical information. For a non-Danish reader it might have helped to separate all the technical smelting information into a single chapter. The photographs and illustrations throughout the book are clear, and the maps and diagrams assist the reader.

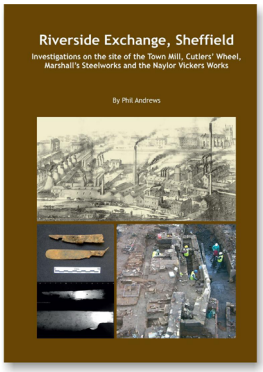
One of the highlights of the book is the appendix which includes a wealth of metal, slag and slag inclusion compositional data covering the full range of periods

and locations. The data, mostly collected using SEM-EDX, is clearly labelled and may prove useful to those looking to compare slag samples.

All in all a good general book on the iron industry in Denmark, and a useful resource for those interested in Denmark's iron industry.

Eleanor Blakelock

Riverside Exchange, Sheffield: Investigations on the site of the Town Mill, Cutlers' Wheel, Marshall's Steelworks and the Naylor Vickers Works by Phil Andrews. *Wessex Archaeology, Salisbury, 2015, A4, x+81pp, 61 figs (some colour), 6 tables, ISBN 9781874350842, £7.50, p/b.*



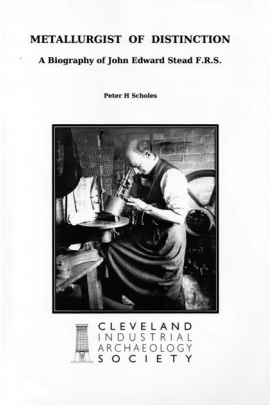
Sheffield developed at the confluence of the river Don and four tributaries, the most significant of which was the Sheaf from which the town derived its name. Thus water power is the key to the early industries of the town and Riverside Exchange is an example of this. Despite the amount of modern development there have been relatively few opportunities for excavations on multi-period sites, not least because of the depth of cellarage and services. Riverside is a fortunate exception and this report demonstrates the wealth of stratification that can be expected. It shows a medieval estate corn mill being superseded by water-powered sites of metal trades and by 19th-century steel production sites which, unusually and fortunately, have left significant evidence of the earlier activities.

The archaeological evidence derived from each period is significant and an exemplar for other towns and this report does justice to it, if in summary form. The medieval period is when the industrial topography first evolved in an area stretching from Kelham weir downstream to the location of the medieval Lady's Bridge adjacent to the Castle where a weir returned mill water to its original course. Although the cartographic evidence gives a good idea of where the medieval sites were situated features specific to the mill were not found. However, the later tannery and cutlers' wheels were demonstrated by archaeological evidence and were as rewarding as any cutlers' wheel site yet seen in the city. The 19th-century evidence for cementation and crucible steel was plentiful and can be regarded as a model for future work. It provides the archaeological counterpart for the archive-derived study splendidly presented by Barraclough in the two volume study of crucible and cementation steel.

There is good use of the ceramic evidence, emphasis which at first sight seems out of balance but will in fact be a valuable framework for future work in the town. Production is excellent using high quality originals with only one – but significant – flaw; there is no index.

David Crossley

Metallurgist of distinction. A biography of John Edward Stead FRS by P H Scholes. *Cleveland Industrial Archaeology Society, Hartlepool (Research Report 11), 2014, A4, 72pp, 28 figs (some colour), ISBN 978-0-905728-08-7, £10.00 incl p&p to UK, p/b. Available from: T Hay, Grindstone Garth, Dalton, Richmond, DL11 7HX.*



This nicely produced publication recounts the life and achievements of John Edward Stead, who was born on Tyneside in 1851. In 1865 he was apprenticed to the Newcastle chemist John Pattinson, with whom he set up a partnership as analytical and metallurgical chemists in Middlesbrough only eleven years later, after working for a variety of metallurgical companies. In this capacity he built a reputation for his probity, reliability and technical knowledge; he was to remain a partner in Pattinson and Stead until his death in 1923.

In addition to this commercial work Stead began undertaking metallurgical research and over his lifetime produced at least 80 papers which are listed in full in an appendix. The subject matter was varied but the most frequent topic was the characteristics of phosphoric ironstone, and more generally phosphorus in iron and steel. He also wrote on the metallurgy or iron and steel, and was a pioneer in the use of both hardness testing and metallography. He also encouraged co-operation in scientific research and chaired the committee set up by the Iron and Steel Institute that oversaw this collaboration – a committee which continued to operate until 1970, long past Stead's death.

Stead was a member of many learned societies, notably the Iron and Steel Institute which he had joined in 1873.

He was elected a Member of Council in 1895 and later was Vice President and then President. He was awarded the Bessemer Gold Medal in recognition of his eminence as a metallurgist and of the value of his research work and for his service to the Institute. He was also elected a Fellow of the Royal Society and was an active member of the International Association for Testing Materials.

These are just a few of the highlights of this energetic man's scientific and metallurgical interests; for the full story of his local, national and international activities and achievements I can only refer you to this engaging and well-illustrated book.

Justine Bayley