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Book Reviews



THE CORRESPONDENCE OF JOSEPH BLACK: VOLUMES ONE AND TWO.
Edited by Robert G.W. Anderson and Jean Jones. Pp. xiii and 1564, Illus 40. Ashgate Publishing Ltd, 2012. Price: £300.00. ISBN 978 075460 131 9.

Joseph Black (1728–1799) was a leading figure of the Scottish Enlightenment. From an Ulster family, he was born and brought up in Bordeaux until 1740, then spent just four years in Ulster before going to Glasgow as a medical student in 1744. He spent the rest of his life in Scotland: first in Glasgow, then in Edinburgh from 1752 to 1756, back to Glasgow from 1756 to 1766 (where he first became friends with James Watt), then back to Edinburgh until his death in 1799. Although best known for his discovery of latent heat (within physics in modern disciplinary terms), his academic posts were largely in medicine and chemistry. His active interests included botany and geology, and he continued to practice as a medical doctor for much of his life. He also had an active interest in the industrial applications of his work and of chemistry in general; quite apart from his friendship with Watt, many of his letters show him acting as a (seemingly unpaid) consultant to various industrialists and public bodies.

The book starts with introductory chapters by the editors on Black's historical background — in terms of eighteenth-century Edinburgh and Scotland — his life and work, the history of the surviving Black manuscripts, including a thorough inventory by repository and referencing to previous publications where applicable, their nature and significance, the policies and conventions followed in the transcripts, and a chronological list of the correspondence. These are all thorough and competent, though the absence of any specific survey of Black's background and significance in terms of the development of chemical theory, and of eighteenth-century science in general, is a surprising omission.

The remainder of the book consists of full transcripts of all known surviving letters to and from Black (with any accompanying reports); clearly considerable efforts have been made to locate letters outside the core collections of Black MSS *per se* (notably that in Edinburgh University Library). The academic apparatus of the transcripts is impeccable; interpolations, crossings-out and different hands are clearly indicated, both drafts and final versions are included, and the letters are copiously footnoted. These footnotes show a commendable thoroughness in attempting to identify the individuals mentioned. However, the editors' grasp of geography is sometimes limited; for example, Hopetoun house is west, not north, of Edinburgh (p. 222), and Kenton (near Newcastle-upon-Tyne) is on the Coal Measures, so the borehole there is unlikely to have struck Permian limestone whose nearest outcrops lie some ten miles to the southeast, rather than 'to the north' (p. 226). The editors' knowledge of iron-making is also clearly limited; for

example, John Wilkinson certainly did not develop the use of coal for iron smelting, or construct the first iron bridge in 1781 (p. 1432).

One comment that must be made concerns format and price. This is a two-volume hardback book, weighing *c.* 4 kg in total and costing £300. At this price, few non-academic researchers will be able to buy the book; in the current financial climate, even the majority of university libraries are unlikely to purchase it. In this day and age, when a digital version could be sold profitably for maybe a tenth of the price, is this ethically acceptable? In this reviewer's opinion, the answer is no.

However, the prime reason for reviewing this book in an archaeological journal is to assess its importance for the archaeologist of industry and technology. The industries on which Black comments or advises include acids, alkali (caustic soda), coke-making, cudbear (a lichen-based dye), glass-making, iron-making, lead/silver and other non-ferrous metal ores, porcelain, salt, sugar, and white lead. At a general level, all are important as illustrating the first attempts to apply recognizably modern science to industrial processes. It is also notable how strongly the geographical locations of the works discussed cluster around Edinburgh (the centre of the Scottish Enlightenment) and Birmingham (the home of the Lunar Society), and to a much lesser extent, Liverpool/St Helens. While this partially reflects biases in Black's correspondence and its survival (e.g. his own home-base in Edinburgh, and Watt's in Birmingham), the first two cities do genuinely seem to reflect the two areas in which the leading industrialists of the Industrial Revolution actively connected with the leading scientists of the contemporary scientific revolution. It is also notable that in Scotland these connections were conspicuously with universities (both Edinburgh and Glasgow), whereas in England they conspicuously were not.

Turning to the specific industries with which this reviewer is familiar, the correspondence on coke and salt adds little to our understanding of the industrial technology, though it does indicate the limitations of early oven-made coke for many industrial applications, and throws new light on early attempts to develop a salt-based chemical industry. For the iron industry, the picture is different; the correspondence includes considerable technical detail, especially on the development of Cort's puddling process in the 1780s, in which Black took a considerable interest. Some of this material is already known (E. Robinson and D. McKie, *Partners in Science: Letters of James Watt and Joseph Black*, 1970), but some is new. Reports on a series of puddling trials at Pitchford and Wednesbury Forges give important information on the yield, process and terminology. For example, the initial burning-out of carbon from the pig-iron took place in a 'finery furnace' (known as a 'puddling furnace' in later terminology), and 'lous' produced were consolidated into a bloom in a 'balling furnace', before reheating for bar-forging in a conventional chafery (pp. 787–92). This may seem technical, but since the 'balling furnace' at this date has previously been interpreted as primarily for recycling scrap, it throws new light on other contemporary records, and challenges some modern interpretations of a fundamental development in industry. James Watt's analysis of Cort's process as masking, but not curing, the fundamental weaknesses of his (phosphoric) iron is remarkably close to

current archaeo-metallurgical thinking. On a rather different tack, descriptions and illustrations of a spectacularly unsuccessful Edinburgh attempt to produce wrought iron directly in a massive blast-furnace-like natural-draught furnace illustrate both the limitations of late eighteenth-century scientific understanding, and the oddities (documented or otherwise) that may turn up in the archaeological record. This serves as a lesson to archaeologists; not everything that we find was on, or even near, the mainstream of industrial progress.

So, can I recommend these two volumes to the readers of the *Archaeological Journal*? The honest answer has to be no; few will find it a good use of £300. But if you can find a library copy, or if the publishers produce an affordable digital publication, there is valuable information here for those of us with an interest in industrial production and its relationships with scientific understanding.

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