While Latour's system works well in describing many aspects of state-sponsored expeditions, it fails to explain knowledge networks of other types. For one thing, Atlantic networks were unstable. As Neil Safier explains in tracing the work of French naturalist Joseph de Jussieu, acquiring and transmitting information was a precarious business. 'The successful circulation of information from one point in the Atlantic to another was often dependent on circumstances that could just as easily go wrong as right' (p. 219). The networks developed by Spanish botanical expeditions, as described by Daniela Bleichmar, were of sturdier stuff. Yet Bleichmar points out other weaknesses in the Latourian model, specifically how 'periphery' is a term ill-suited to describe botanical science in the Americas: 'Circulation [of information] did not resemble the flight of a boomerang, always returning to the center, but rather a more reciprocal paddle game. Every letter or shipment from one side provoked a reply from the other' (p. 239). While European 'centres' were important – no one disputes the asymmetries in power between mother country and colonies – they were dependent upon colonial peoples' cooperation. This was not merely a question of finding Indians and Africans to collect things. As Susan Scott Parrish and Ralph Bauer point out in essays on diasporic Africans and Native American magic respectively, Europeans adapted indigenous knowledge systems to make sense of an occult, magical nature. If London, Paris and Madrid operated as hubs of scientific calculation, they were centres shaped by the world wheeling around them.

With such a strong theme linking all the essays, *Science and Empire* does not really need section headings. I found the four offered – 'Networks of circulation', 'Writing an American Book of Nature', 'Itineraries of collection', and 'Contested powers' – too vague to be useful. There are fruitful subordinate themes that track across essays, such as the tension between theory and empiricism (Sandman, Bauer, Furtado, Barrera-Osorio) and environmental history and technology (Golinski, Dew, Delbourgo and Regourd). Still, this is a minor quibble. Dew and Delbourgo have managed to square the circle of edited collections: bringing together a diverse set of essays to target an important historiographical issue.

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PETER M. JONES, **Industrial Enlightenment: Science, Technology, and Culture in Birmingham and the West Midlands, 1760–1820**. Manchester and New York: Manchester University Press, 2008. Pp. xii + 260. ISBN 978-0-7190-7770-8. £55.00 (hardback).
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Nothing quite explains the staying power of the idealist and positivist vision of pure science and the scientist. While contemporary historians of science have largely abandoned it, this vision of science, utterly separate from technology or any particular utility, can still be found at work among some economic historians (see, for example, Robert C. Allen, *The British Industrial Revolution in Global Perspective*, Cambridge, 2009). But the tide is turning. Now economic proponents of the view that science had nothing to do with industrial development are forced to confront the scientific-culture argument head-on, and, unable to refute it, are left insisting, rather than proving, that inventiveness ultimately derived from the forces of demand and supply, and not from any distinctive intellectual and cultural context. Peter M. Jones adds his welcome voice to the chorus singing about scientific culture. He uncovers more evidence to augment the work done by Larry Stewart, Joel Mokyr, Jack Goldstone and myself. Indeed his title is lifted – with acknowledgement – from Joel Mokyr, who invented and popularized it to explain the distinctively British persona, visible by the second half of the eighteenth century, of the *savant–fabricant* who worked at the heart of the 'Industrial Enlightenment'.

Jones seems to have a weakness for other authors' phrases; he has also written an article entitled 'Living the Enlightenment', which is the title of a 1991 book of mine. But that is a small

quibble in the face of the extensive documentation Jones provides for the scientific knowledge of Matthew Boulton, James Watt, their sons, Richard Edgeworth, Thomas Cooper, James Keir, Samuel Galtons Sr and Jr, William Strutt, Richard Reynolds and a host of lesser-known men active in Midlands industry after 1760. From any perspective they created the first epicentre of the Industrial Revolution.

Jones elaborates two themes. First, the British Enlightenment worked to inculcate utility as well as politeness. Entrepreneurs and scientific engineers collaborated in industry after industry, and by 1800 became leaders in cotton manufacturing, mining, and the application and improvement of steam engines. In that sense the partnership of Boulton and Watt, forged around a common scientific and experimental vocabulary, was paradigmatic. We can see its parallel among industrialists and engineers such as John Marshall and Matthew Murray in Leeds and McConnell and Kennedy in Manchester. With or without university training they had mastered Newtonian mechanics, as well as the latest chemistry coming largely from the Continent. They also possessed tactile knowledge of machines and processes from the simple making of chisels to the translation of the horizontal motion of the beam of a steam engine into rotative motion that drove numerous industrial processes, from weaving to rolling cooper. They also became enlightened cultural leaders in their communities and fostered theatres, reading circles and literary and philosophical societies.

The book's second theme is the explanatory challenge that the Industrial Enlightenment in Britain represents. Although acting as a local historian in this book, Jones, a professor of French history at the University of Birmingham, reads various foreign languages and tries his hand at comparing Continental sites that might have been favourable to the application of power technology to manufacturing, water removal and mining. His analysis of the Swedish, Dutch, French and Spanish settings, while largely endorsing what others have argued, adds more sources to the comparative approach – essential if we are to say anything meaningful about the larger questions of why Britain was first to industrialize or, or more generally still, why the West was first. Jones does not shy away from the big questions and even devotes a chapter to the historiographically complex question of the relationship between English Dissenters and the new science. Jones rightly points out that the presumed linkage does not stand up to statistical analysis, but he also cannot avoid the larger category, the Protestant and science linkage. He misses the opportunity to shed new light on the important question of why Unitarians and Quakers were particularly visible in entrepreneurial and scientific roles. This is a historian whose modesty in the face of the big questions leads him to nuance the work of others without ever assuming an original voice that this reviewer suspects is surely part of his intellectual make-up.

But modesty can be refreshing, especially when it is combined with serious archival digging, particularly in the vastly rich Boulton and Watt manuscripts housed at Birmingham City Library. Knowing Continental sources so well, Jones is insightful about the 1790s when first revolution and then the Napoleonic wars inhibited cosmopolitan exchanges about matters scientific and effectively ended the era of Enlightenment. He devotes little attention to educational curricula of the period in part because there are so few extant records. Readers may be pleased to know that Richard Edgeworth's extensive notes on scientific lecturers given at Edinburgh University during the 1790s have surfaced at Young Library, UCLA, and can be read at http://industrialization.ats.ucla.edu/. They make plain why so many industrialists wanted their sons educated there and how attuned men of science such as Joseph Black were to industrial innovation. Jones's book must be added to the list of required reading for everyone interested in the resources that made British industrialization possible.

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